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United Nations Industrial Development Organization (UNIDO)
Saudi Consulting House (SCH)

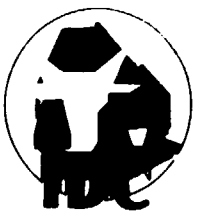
FINAL REPORT

DP/SAU/90/004

Techno-Economic Study on
Development of Dairy Sector of the Kingdom of Saudi Arabia

focussing on

Policy Aiming at Food Security by Self-Sufficiency
in Dairy Products



International Dairy Consultants B.V.

Consulting – Engineering – Planning – Management

United Nations Industrial Development Organization (UNIDO)
Saudi Consulting House (SCH)

FINAL REPORT

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Techno-Economic Study on
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in Dairy Products

Prepared in Accordance with UNIDO
Contract No. 91/069
By

International Dairy Consultants B.V.
The Netherlands

January 1992

Preface

In the course of 1990 the Saudi Consulting House approached the United Nations Industrial Development Organization (UNIDO) in order to examine the status of its national dairy industry and to formulate a programme for the modernization, diversification and/or upgrading of the milkprocessing sector in the country. To carry out this task UNIDO contracted International Dairy Consultants (The Netherlands); contract no. 91/069.

In close cooperation with experts of the Saudi Consulting House, a team of three experts conducted this study in Saudi Arabia during the period of 1 June until 26 July 1991.
The team consisted of:

Mr. M. Luijkx	- Dairy policy / Team leader
Mr. B. Bos	- Dairy technologist
Mr. W. Cellarius	- Agro-economist / Financial analyst

After the field survey a final report was prepared by the consultants in which comments and remarks made by the Saudi Consulting House and UNIDO staff officials were incorporated.

The UNIDO-team expresses its gratitude for the assistance received from the Board and staff of the Saudi Consulting House, in particular:

Mr. Abdulaziz A. Al-Khatlan	- Director General
Mr. Abdullah S. Al-Zaagi	- Head of Agricultural Consulting Unit Economic & Industrial Consultancy Department
Eng. Mohammed Al-Kaoud	- Agricultural Consulting Department, EICD
Dr. Ghanem S. Haddad	- Agricultural Consulting Department, EICD

Last but not least the team appreciated very much the visit of Mr. Galat (UNIDO) during the field survey and the fruitful discussions concerning the draft final report, which was presented in September 1991.

A second draft report was completed in december 1992 with the valuable remarks made by the UNIDO officials as well as the Saudi Consulting House in regard to the first draft final report. Additionally, the text was reviewed on contradictions and additional material was added.

This underlaying Final report was prepared after lengthing discussions with UNIDO officials held in January 1992 and after certain paragraphs were reviewed or rephrased.

Emmeloord, 30th January 1992

Contents

Chapter V : Recommendations for a Programme for Development of the Dairy Sector

Abbreviations

UNIDO	- United Nations Industrial Development Organization
SCH	- Saudi Consulting House
UHT	- Ultra High Temperature
NDO	- National Dairy Organization
MAW	- Ministry of Agriculture and Water
SAAB	- Saudi Arabian Agriculture Bank
SIDF	- Saudi Industrial Development Fund
SASO	- Saudi Arabian Standards Organization
ISO	- International Standards Organization
GATT	- General Agreement on Tariffs and Trade
SR	- Saudi Riyal
cl.	- centilitre
ltr.	- litre
GCC	- Gulf Cooperation Council
FU	- Feed Units
mm	- millimeter
DM	- Dry matter
kg	- kilogramme
MEMRB	- Middle East Marketing Research Bureau Ltd.
LME	- Liquid Milk Equivalents

Summary

Approximately 50% of the national milk production is realized by ten large farms only. These are mainly concentrated around Riyadh. About 90% of the modern farms do have more than 1,000 cows.

In regard to the climate conditions it is concluded that the average milkproduction is at a high level. 50 % of the dairy farms do have an annual milk yield of 6,000 ltr/cow. Even 10% of the farms are reaching over the 8,000 ltr./cow However exceptional low yields less than 3,000 ltr./cow are also encountered. From field information an indicative cost price of raw milk production has been calculated and is estimated to be at Sr 1.6 - to 1.9 per litre (depending on season). Due to climate conditions, there exists a higher milk production during winter season (November-February).

Raw milk for processing is transported throughout the country, even up to a distance of 1,500 kilometre.

The present status of the dairy industry sector shows a daily output for the liquid (consumption) milk market of about 1,400,000 litres a day (800,000 ltr. produced by fresh milk processors and 600,000 ltr. recombined milk).

At present there are over 65 companies involved in the production of dairy products either dairy product alone or in combination with other foodstuffs. Most dairy plants have been established since the 1980's by well-reputable firms and it is obvious that those plants are well-equipped with modern tehnologies. Plants are equipped to produce a wide range of products, but do have in general a low occupation rate on their installed machinery.

The fresh milk market consists of 80% laban and 20% liquid milk. About 80% of the total market is in the hands of two large companies. Fresh milk plants are characterized by the fact that they process milk of their own farm and they seldom buy milk from other farms. Consequently, the entire sector shows extremely large farms, but simultaneously the same number of relatively small milk processing plants, with only a few exceptions.

The recombined milk market consists of nearly 100% liquid milk, mostly long-life (UHT) milk, whereas the total market is for about 70% in the hands of three companies.

Indicative costpirce calculations have been prepared for:

- fresh pasteurized milk - SR 2.50/ltr.
- fresh yoghurt - SR 3.53/ltr.
- recombined UHT milk - SR 1.72/ltr.
- recombined yoghurt - SR 2.64/ltr.

For fresh milk about 68% of the cost price is related to the raw material (milk). For recombined milk this is only 47% of the costprice. Packing materials are the second largest cost component.

Most companies have national distribution networks. Due to increasing competition many explore new markets in remote areas of the Kingdom. Hence, the associated costs are rising accordingly. The returns from the shopkeepers of non-sold milkproducts is high and varies between 3 to 15% of marketed quantities.

The marketing of the dairy products is an extremely weak point within the sector itself. Some dairy farms and plants already face problems of liquidity. A number of dairy farms have already decreased milk production and are switching to beef production.

The current marketing problems are shown by a sharp competition at retail level with in fact a "laughing" consumer at the end of the milk chain. In the winter period (higher production and a lower consumption) dumping of some "surplus" milk in the desert even takes place.

The environmental burden caused by the "milk" substances of the dairy plants is in general moderate, due to efficient waste water treatment systems.

Annual over 1,27 million tons LME are imported (1989) to Saudi Arabia and it is estimated to be 70% of the national milk supply.

Conclusions and Recommendations

The Government of the Kingdom of Saudi Arabia is, in accordance with the Five Year National Development Plan (1990-1995), aiming at food security by self-sufficiency. With regard to dairy products this aim is, for a country with some strong economic trumps like crude oil, a realistic goal providing sufficient land with high-potential renewable water resources will be available for additional milk production.

In this respect water-availability in agriculture should not be underestimated as limiting factor of water-availability in agriculture. First of all, a sound "water policy" must determine to what extent an overall self-sufficiency in dairy products can be realized. Consequently, the future long-term goal should be read as follows: local production of fresh milk should be promoted, but in a justified way! On the way to achieve this goal the following points, from cow to consumer, are strongly recommended to be performed:

1. Prior to promote self-sufficiency in all dairy products a professional study for the benefit of a justified use of groundwater in agriculture should be carried out.
   Self-sufficiency should, for present times, be restricted to the production of liquid (consumption) milk and fresh dairy products only. This means that the share of recombined milk in the liquid milk market, actually over 40%, should be gradually replaced by locally produced fresh milk.

2. Afterwards, at a (second) justified stage concerning water availability, a review of the dairy policy will very probably show that next priority should be given to local production of cheeses (salted soft and/or ripened hard). After that, at a third stage, the production of milk powder, condensed milk, etc. should be considered. For the coming years, however, Saudi Arabia has to import these products in order to meet the existing consumer demands.

   Such a review of the dairy policy of the government focused on a further degree of self-sufficiency, should be a strategic development plan for the entire dairy sector.

   One important aspect to be taken into account in this policy is the extremely concentrated location of dairy farms and processing plants. Therefore it is suggested to:

3. Stabilize growth of existing large-scale (specialized) dairy farms in certain areas.

4. Stimulate a better geographical distribution of milk production and processing.

5. Encouragement of the development of the existing traditional farms in the Western region into specialized family dairy farms.

   The advantages of these recommendations are among others:

   - Lower risks of possible disruptions of national milk supplies, which will contribute to a higher level of food security.Such disruptions may occur as a consequence of animal diseases, failures in water supply, restrictions in physical distribution facilities, etc..
   - A more optimal price-fixing of fresh milk and milk products on national level may occur, due to a larger competition

   Continuous competition and a further implementation of new dairy projects in the same production areas around Riyadh in combination with the absence of any cooperation among the processors (suppliers to retailers), will undoubtedly result in very difficult years to come. This downwards spiral of declining prices has to be stopped as soon as possible. In reality, these problems counterwork the defined goal of self-sufficiency in dairy produce as well as export possibilities within the region (Gulf Cooperation Council).

   Underlying causes for these marketing problems are a too large number of suppliers on the retail market each having an overcapacity in their processing plant.
   In order to stop this downwards spiral, the following initiatives are recommended:

6. Termination (at least for some years) of the granting of licenses and/or loans for the construction of new dairy plants for liquid milk and milkproducts.

7. Creation of a cessation programme (a buying-out scheme) for processors willing to stop completely their production of liquid milk and fresh milk products (either based on raw or recombined milk). Participation in such a cessation programme should be on a voluntary basis. The compensation premium should be negotiated within a special milk committee of the under 8 proposed national dairy organization. For calculating this compensation, following important points should be taken into account, i.e.

   - fixed costs evaluated by an official independent financial auditor, and
   - current throughput of liters of milk
   - brandname (goodwill)

   In case it concerns a processor with a dairy farm, the buy-out (cessation) should be juridically based upon a long-term guaranteed milk-delivery contract for the fresh milk to be taken in by the (remaining) milk processors.

   The latter ones, with a diminished overall capacity, are less in number and consequently much less at the mercy of shops. Despite the total growth of the demand of 7,5% per annum, the existing dairy plants will, in the first years have sufficient processing capacity to deal with this growth. As in particular the smaller processing plants of fresh milk may appeal to the proposed cessation scheme, the above-mentioned capacity will still be sufficient

   The Kingdom is currently characterized by extremely large farms but on the other hand there are quite a few relatively small processing units. The last aspect is negative from the point of view of financial viability and number of suppliers to the market. A more limited number of processors will bring more balance into the structure of their markets and will automatically make it easier. Interest groups do not exist at any level in the dairy sector. The complete lack of institutionalized cooperation contributes to inefficiencies at nearly all stages of processing, supply and marketing. Therefore it is suggested:

8. To establish a national dairy organization for the entire dairy industry (fresh and recombined milk). This organization should set up: platform discussions on policy matters, specialized technical or marketing working groups for undertaking common tasks on nutritional education, general promotion of milk consumption, training and many other services.

   Self-sufficiency will never be reached if the production of recombined milk by imported basic materials, continues. For that reason it is strongly recommended to:

9. The recombining industry has to participate in solving the problem of seasonal surpluses in fresh milk. This participation, based upon a signed contract, should contain the intake for processing of a proportional part of the surplus milk, offered at a calculated price by a special committee of the national dairy organization. This proportion should be based on the quantity of basic materials imported for/by the recombined dairy plant in question.

Government policies focused on promoting local milk production have shown remarkable successes in the past. Some shortcomings and objections, however, are to be mentioned, like:

Continuation of (subsidized) settlements of projects round Riyadh where, apart from problems in water-availability, a high rate of self-sufficiency in liquid (consumption) milk and fresh dairy products is already achieved.

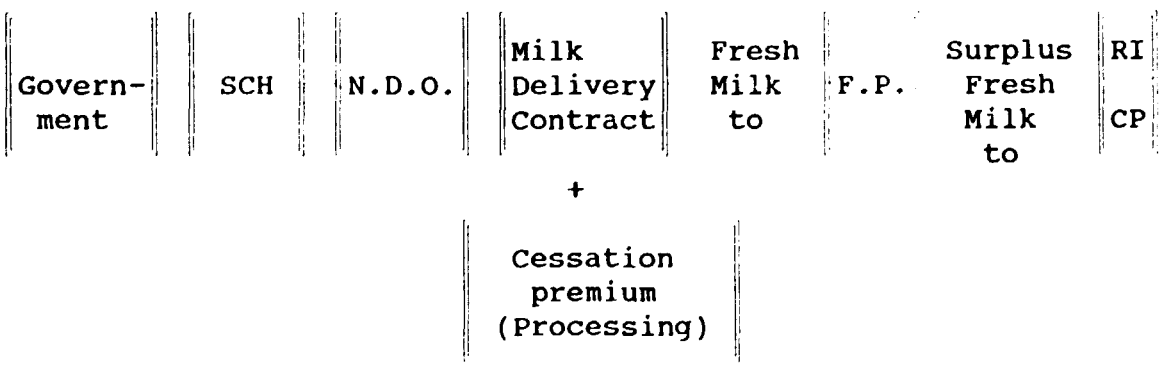
Prices of imported basic materials for the recombining industry are not at all in balance with the cost price of the fresh raw milk. Low priced whole milk powders in consumer-ready packaging are abundantly for sale in shops. Within such a policy-framework, competition cannot work on a fair basis but will even be sharper.

A solution has to be found in a shared responsibility (Government and dairy industry) for the current problems, i.e.:

10. There should be more cooperation between the Government and the entire dairy sector (fresh and recombined). In this context, the establishment of a national dairy organization is an important step; as one of the first tasks a cessation premium (a buying-out scheme) for processors could be developed. In the light of shared responsibility the Government should commit itself to (pre) finance the cessation premiums involved.

11. Another important Government task concerns legislation concerning a clear labelling of (recombined) dairy products on behalf of the consumer.

As an endeavour to a closer cooperation within the dairy sector has failed, new initiatives should be delegated by the Government to the governmental institution i.e. the Saudi Consulting House. It is recommended that this organization should prepare a blueprint for the structure, functions and duties of a national dairy organization (NDO). Next, it is up to the dairy sector, having governmental commitment in (pre)financing a cessation premium scheme, to react on the opened vicious circle!
The above-mentioned initiatives to be undertaken in order to solve the current marketing problems, may be outlined step by step (from left to right), as follows:



SCH = Saudi Consulting House
NDO = National Dairy Organization
FP = Fresh Milk Processors
RI = Recombined Industry
CP = Cheese Production (under certain conditions; see below)

In those periods when there is a surplus of fresh milk, the recombined industry should be forced to use this surplus and subsequently should reduce the amount of used imported milkpowder. For this, the recombined dairy plant only needs a minor investment (US$ 100.000) in order to facilitate intake of raw milk.

In a limited number of dairy plants small-scale production of white (fresh) cheese is still possible with existing facilities. Production of cheese, fresh and ripened, on a large scale (aiming at self-sufficiency!) has to be part of a strategic plan on macro level. Such a plan should cover an appropriate governmental policy on import levies and/or internal subsidies in order to give local production a chance to develop.

12. At last but not less important is the recommendation to improve the skills and knowledge of the existing dairy plant labourers and managers by establishing a national training institute. This will undoubtly support the national policy aiming at food security by self-sufficiency in dairy products.

Chapter I

Introduction

1. Project background

On the 13th of November 1990 International Dairy Consultants B.V. (IDC) received an invitation from the United Nations Industrial Development Organization (UNIDO) to prepare a proposal to provide assistance to the Saudi Consulting House (SCH) in carrying out a techno-economic study on the national dairy industry activities (project no. US/SAU/90/004). On April 15th, 1991 the contract was awarded to IDC.

Information concerning the different aspects of the Saudi dairy industry was lacking, scarce or inaccurate. Therefore the Saudi Consulting House envisaged, that a team of their own specialists and UNIDO consultants with complementary capabilities in this field should to carry out a sectoral study on the dairy industry activities in the Kingdom of Saudi Arabia. The study was to emphasize issues related to the whole sector on macro-level and to review issues regarding some of the specific plants in Saudi Arabia working in this sector as well as to give prospects for future dairy industry development.

2. Terms of reference

On behalf of the Kingdom of Saudi Arabia the United Nations Industrial Development Organization (UNIDO) formulated a Terms of Reference to provide assistance to the Saudi Consulting House (SCH) in carrying out a techno-economic study on the national dairy industry activities.
The Terms of Reference were formulated in November 1990, numbered US/SAU/90/004.
Tasks of the UNIDO mission can be summarized by the following three subjects:

- **Present status**

Analyze and evaluate the present status of the national dairy industry activities. Consider the technical, economical and managerial aspects i.e.:

- update the statistical information available;
- assess the actual situation of raw material production,transport, storage, technology used, equipment, etc.

♦ **Future reinforcement**

Outline a strategy for strengthening the dairy industrial capabilities concerning:

- modernization/upgrading of milk processing;
- diversification of dairy products manufactured;
- requirement for management and manpower training, etc.

♦ **Identification**

Identification of areas for future development of dairy industry, in connection with the foregoing subjects.

3. Government authorities

For an appropriate assessment of the Saudi Arabian dairy industry background information was gathered on all those governmental organizations and authorities which are in some way involved in national livestock and dairy industry activities. The main ministries are listed underneath, while in Annex I other major institutes are listed.

The Ministry of Industry and Electricity

Industrial development is a key component of the economic development strategy of Saudi Arabia. Some of the most important objectives of this strategy are:

- diversification and expansion of production
- development of non-oil manufacturing with import substitution or export potential to create alternative sources of income
- achievement of an adequate level of self-sufficiency

Agro-processing is increasingly receiving attention of the Government. Recombining milk from milk-powder and fresh milk processing are activities that both receive due attention of the Ministry of Industry and Electricity.

The following important agencies are responsible for specific support and development aspects of the dairy sub-sector:

- The Saudi Consulting House
- The Saudi Industrial Development Fund
- The Saudi Arabian Standard Organization

The agencies will continue to perform their role in industrial development. The Saudi Consulting House will carry on to prepare investment opportunity files as well as feasibility and technical studies for industrial projects. The Saudi Industrial Development Fund will continue to extend industrial credit facilities, while the Saudi Standard Organization will strengthen its position during the current 5-year National Development Plan. Details of those organizations are given in Annex I.

The Ministry of Agriculture and Water

The Ministry of Agriculture and Water (MAW), through its departments, agencies and programmes, carries the responsibility for the support and development of raw milk production and processing in the country. The determination of subsidy programmes and levels, and the issuing of new land for farming is the responsibility of the MAW. These are two important instruments to influence the production system, and the pattern of the dairy production map in the Kingdom. In addition to the ministerial departments, the Saudi Arabian Agricultural Bank plays an important part in dairy development in the Kingdom (see also Annex I).

Directorate-General Animal Resource Department

Technical matters concerning animal resource development are covered by this department. Important subjects dealt with are related to cattle-breeding; import licensing of cattle; and the issuing of (new) land suitable for dairy farming also in relation to the water-factor.

Agricultural planning

Agricultural planning is carried out as part of the national planning process. The Ministry has its own planning department and is actively making use of evaluation results of current projects and programmes (refer to chapter I, section 2).

The planning section is an important department within the ministerial organization. The dairy sub-sector is an integrated part of the planning process of the Ministry.

Economic studies and statistics

The section on economic studies and statistics of the Ministry of Agriculture and Water is aiming to collect and update fundamental data and information related to agricultural production, finance, feasibility and marketing. It also includes surveys of sub-sectors and a comprehensive agricultural census.
The dairy sub-sector is subject to regular studies and constant monitoring.

4. Saudi Arabian development plans

The planning process in Saudi Arabia is detailed, well described and analyzed in various planning documents. Fundamentally, the most recent results of evaluation of projects and programmes are used for the draft of operational (sector) plans and the Five-Year National Development Plan.

The development and operational plans are laid down in four different documents:

a) Five-Year National Development Plan (1990-1995)

This is a planning document in which summaries are given concerning the evaluation of policies, objectives, programmes and projects of the preceding planning period.
The Plan provides the features of main issues of the various sectors in the economy and in addition, deals with indicative long-term policies and developments as well.

The Plan is descriptive in its nature. Analytical and more detailed data are provided in other plan documents.

b) Operational plan

The operational plans are drafted per sector. The period under review in the operational plan coincides with the time span of the national plan.

This document contains analytical data and full details on the respective (sub-)sectors of the economy, policies, programmes and projects.

In the case of the agricultural sector, there are several operational plans, especially geared to certain important development issues or instruments such as: Agricultural Finance; Irrigation Authorities and Grain Silos and Mills. (Documents are for internal use only).

c) Set of policies and programmes

This document is indicative by nature and is especially meant to support further strengthening of the private sector in the development of the national economy.(Document is for internal use only).

d) Project and programme evaluation

This document, consisting of several volumes, contains detailed evaluation results of projects and programmes. The document deals with numerous projects and programmes in the different (sub)sectors.

The use of evaluation results, together with recommendations for policies, programmes and projects, for drafting the national and operational plans constitute the true basis of the planning process at sectoral and national level. Document is for internal use only).

5. Government policies and regulations

The Government continues to play a crucial role in agricultural development in the Kingdom by the implementation of a wide range of programmes in essential fields, such as: agricultural services, research, agricultural management methods, agricultural finance and support to create more efficient marketing channels.

Important issues in Government policies are a primary involvement of the private sector, an increase in the participation of small farmers and a stimulation of a further commercialization of agricultural production by dynamically applying price support policies and imposing tariffs, if appropriate, to encourage domestic production. Regional trade should be strengthened among Arab countries, with due consideration of the interest of domestic producers, however.

In addition, government subsidies and price support for some commodities will continue to encourage balanced cropping patterns and farming systems, a more optimal geographical distribution of production activities, and contribute to increase agricultural production.

However, government policies are more and more aiming at a further commercialization of the farming enterprises, therefore for a constant review of subsidy and price support policies is necessary.

5.1. Subsidies and regulations in dairy development

Subsidies, tariffs and import regulations are dynamically applied to stimulate a constant development of agricultural sub-sectors.
The following subsidies in the dairy sector are still effective (references 4,6 and 11):

- production input	: fertilizer	(50% of cost)
	animal feed	(50% of cost)
- machinery/equipment	: dairy equipment	(30% of cost)
	engines and pumps	(50% of cost)
- transportation	: air transport of cows	(100% of cost)
- agricultural/agro-industrial credit	: SAAB and SIDF	(see Annex I)
- land acquisition	: free	

Government authorities are permanently reviewing the effects of price and subsidy policies. In an attempt to commercialize farming and agro-processing, subsidy and price policies, together with concessional lending opportunities could be subject to adjustments during the current plan period.

Import duty legislation on consumer-ready food articles was already introduced in 1986 for articles in retail packaging, including tinned milk-powder. For imports in bulk such as milk-powder and butter oil, the tariff was not enforced till the beginning of the year 1990. Since then, an import duty of 12% on milk-powder and butter oil is imposed.

Cartons for the packing of pasteurized milk-products are also subject to an import levy of 12% since local production has been started. In the same period, however, Government placed a full ban on the import of long-life milk-products in retail packaging.

5.2. Produce quality standards and regulations

The Saudi Arabian Standard Organization (SASO) is the institute responsible for defining technical specifications and standards of products.

SASO is a member of the International Standards Organization (ISO), the Arabian Standards Organization, and the International Organization for Standard and Calibration. SASO has also become a member of many technical committees. SASO holds the Secretariat of the Gulf Arab Standards Organization which approved 85 Standard Gulf Specifications, most of which are related to health and safety specifications.

One of the key issues that will receive due attention during the current five-year planning period refers to improvement of the co-operation between the SASO and the government agencies involved in the enforcement of the approved standards. Appropriate measures are being prepared for full compliance with the approved standards.

The quality of dairy products is carefully defined by sets of criteria developed by the SASO and the Ministry of Industry and Electricity.

The standards have been developed since 1977. The standards are detailed for pasteurized and sterilized milk-products. Issues included in the regulations refer to: product definition, quality requirements, addition of vitamins, sampling, methods of testing, packaging, labelling, and transportation and storage.

On the packaging the origin of the product has to be mentioned, together with production date and expiry date (references 16 and 17).
In 1988 the SASO introduced a quality label for the dairy industry this, however, did not contribute to a better recognition by the consumer of recombined- and fresh milk products.

As a result, the Ministry of Agriculture and Water introduced her own label for the fresh milk industry. The label of MAW is not allowed to be used by processing companies involved in both recombining and processing of raw milk.

One of the most recent developments in labelling is that the SASO, in an attempt to indicate on the packaging the difference between recombined and fresh milk, prepared a concept proposal for recombiners to clearly mention on the packaging, in the same lettering as the brand name: "produced from powder milk".

The SASO is, together with authorities of the Ministry of Agriculture, involved in an effective control of the correct application of quality conditions of dairy products.

5.3. Health services

The Ministry of Health is involved in the quality control of consumer food items in wholesaling and retailing.
There are frequent inspections, especially of perishable and sensitive food products such as meat and dairy products. Principally, shopkeepers are responsible for offering products not beyond the indicated expiry date and/or products of inferior quality.

In the case of dairy products, assessed against the background of increasing competition, an enormous assortment (brands and package-units) and low retail margins for especially pasteurized fresh milk products, it is fully understandable that shopkeepers in their contacts with suppliers refuse to accept any responsibility for unsold products.

Together with authorities of the Ministry of Agriculture and Water, the Saudi Arabian Standard Organization (SASO) is involved in a correct application and effective control of processing criteria of dairy products.

Chapter II

Present status of the dairy sector and its evaluation

1. Structure of the sector

Relations in the dairy sector are strongly characterized by vertically integrated connections in both major types of industries: the fresh milk processing and the recombining industry. Consequently, marketing supply channels and distribution organization and conditions show considerable similarities, although retail outlets are rarely owned by processing companies. For important connections (marketing channels) see figure II/1 on the next page.

Furthermore, the dairy sector is characterized by a high degree of domination (80% of market) by only a few processors in fresh milk production and processing and the recombining industry (see table 2, annex V).

Without proper support and protective facilities the sector is hardly open for new initiatives. Also, independently operating dairy farmers are confronted with disproportional problems and negative conditions in marketing of their basic (raw milk) and final products.

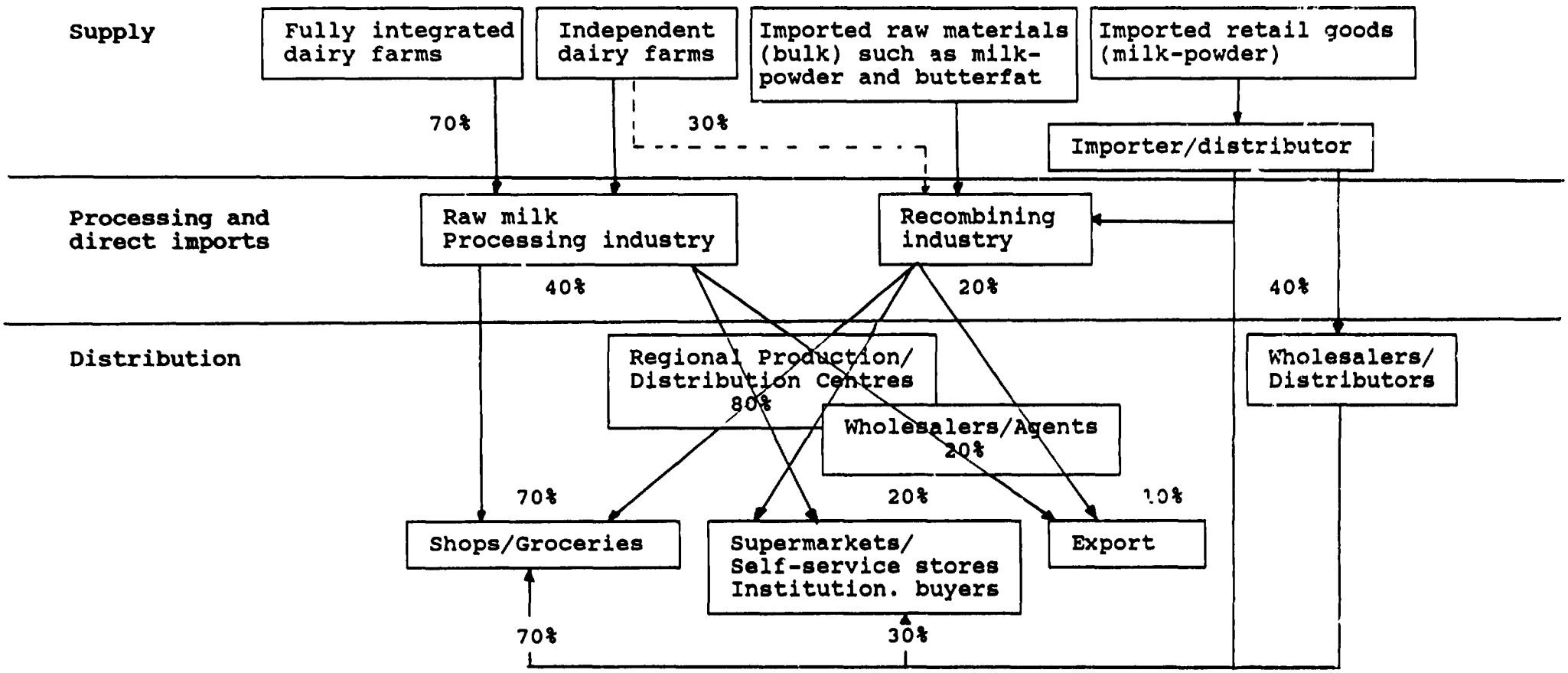
Interest groups do not exist at any level in the dairy sector. This causes a difficult application of effective services and programmes of relevant organizations or the Government.

Horizontal cooperation, at different levels (raw milk producers and processors) is only taking place very sporadically. The complete lack of institutionalized cooperation contributes to inefficiencies at nearly all stages of processing, supply and marketing distribution.

Stimulated by the process of Saudiization, share capital of processing companies is increasingly taken over by Saudi Arabian companies.
Non-dairy food industries seem to be mainly interested in building-up ownership positions in the fresh milk and recombining industries in the Kingdom.

Figure I/1 : Important marketing channels in the dairy sector

(Indicative market share of major products, in Liquid Milk Equivalents, between brackets; refer for detailed data to table 1-6 of Annex V)



Legend: — regular connections
irregular channels

2. Dairy farming and milk production

Dairy farming developed rapidly in Saudi Arabia. Large-scale farms are dominating the sector. The development has been characterized by a dynamic breakthrough during recent years. The first farms started about 15 years ago. Most modern farms are large-scale units.

According to Table 1 (Annex III) in 1989 the Kingdom had 39 specialized dairy farms in operation. Since then three new specialized dairy farms have been projected. It is expected that they will soon be put into operation.

Most of the farms (including the new ones) are situated round the capital of Riyadh, only four farms are found in other regions: three in the north and one in the district (amarah) of Najran. Dividing the Kingdom of Saudi Arabia into two large parts a concentration of the population in the east (i.e. Riyadh and Dammam) and in the west (i.e. Jeddah, Al-Taif, Makkah, Madinah, Yanbu, Jizan and Abha) is observed.

With regard to the cattle population (Table 1, Annex III) there is a big difference in milk supply from specialized dairy farms between the different districts and, in particular, between the eastern and the western part of the country. It is not by chance that historically the recombined milk industry is mainly situated in the west and partly round Dammam in the east.

Taking Table 2, Annex III into account, a high potential of milk production capacity exists round Riyadh and in particular in the southwest region of the Kingdom.

2.1. Fresh milk farms

About 90% of the modern farms have more than 1,000 cows. However, 50% of the annual fresh milk production is produced by only ten farms (25% of all farms). The largest dairy farm counts over 14,000 cows in one location. The contribution to aggregate national milk output by medium-scale farms would represent about 40%, for smaller farms the corresponding figure is 10%.

During more recent years dairy farmers have successfully been able to economize production operations and to diminish the seasonal fluctuations by improved herd management.

Optimal attention for disease control together with effective amelioration of feeding have contributed to far better economic results of dairy farming than would be held realistic previously, considering the harsh climate.
Consequently, the cost of production has steadily decreased in recent times.
The gradual decline of the cost price of raw milk has been about 25% during the last 5 years. However, considerable differences have been observed between farms. An attempt to calculate an indicative cost price is discussed in section 1.2.3 of the report.

2.2. Cost price estimation of raw milk

Generally, dairy farmers appeared extremely reluctant to provide farm management data, which in itself is understandable. Since formal data sources seem to be subject to a restrictive dissemination of statistical material no reliable reference basis could be made availaole during the mission.

However, from field information an indicative cost price of raw milk production has been determined. For details is referred to Table 1, Annex VI. Table (1) provides a detailed build-up of the cost price and includes a percentage distribution of respective cost items.

The calculated cost price amounts to 1.44 SR per litre, overhead and capital expenses included. The price refers to an optimally managed dairy farm with a minimal difference between winter and summer production, the latter can be obtained by perfect herd management. A decrease of the difference between summer and winter production generally implies a lower total farm production, which goes along with savings on feed and labour.

The cost price has been corrected for all associated expenditure (non-productive animals). The figure is optimistic but nevertheless it is strongly believed that more dairy farms will closely approach the figure by managerial adjustments in the future.

Presently, the average annual cost price is estimated at an amount of 1.8 SR/litre. In the winter period feed intake and digestion are more efficient thus contributing to a higher yield per animal. Consequently, cost price is subject to seasonal fluctuations. Currently, the cost price varies between SR 1.6 - 1.9 per litre for winter and summer season respectively.

2.3. Dairy farms visited: observations and recommendations

According to Statistics of the Ministry of Agriculture and Water (1989) concerning 31 dairy farms there are considerable differences between the average milk yields of different dairy farms.

Annual yield per cow (average)	no. farms	in %
2,000 - 3,000	5	16
3,000 - 4,000	3	10
4,000 - 5,000	4	13
5,000 - 6,000	3	10
6,000 - 7,000	5	16
7,000 - 8,000	1	3
8,000 - 9,000	9	29
9,000 - or more	1	3
Total	31	100

The conclusion is obvious: About 50% of the dairy farms are below an annual average yield of 6,000 ltr. and sometimes far below (5 only 2,000 - 3,000 ltr.). About 50% of the dairy farms have a yield above 6,000 ltr. (10 more than 8,000 ltr.).

* Some cows were clearly suffering from mastitis. Consequently problems may arise from milking technics (vacuum pulsation, cleaning, maintenance, etc.), contamination and curing.

* The condition of the herd was in general quite acceptable. Still, there are cows and heifers over-weighted, which causes problems concerning optimal milk production and gestation. In contrast some of the cows were under-weighted. The feed-balance should be improved at some of these dairy farms.

It is highly recommended to appoint an animal husbandry development specialist to advise the dairy farms in feeding, nutrition, hygiene and veterinarian aspects.

3. Milk transportation

At this moment only in two cases transport of milk in bulk (road tankers) takes place:

A. from dairy farms without processing facilities to dairy plants

B. from dairy farms with a plant (but in a weak marketing position) to other dairy (processing) plants.

However, there is still some transport of raw milk in road tankers from Riyadh to the Western region in order to penetrate into the recombined milk industry.

4. Dairy plants visited: observations and recommendations

The team visited 25 dairy plants in various regions of Saudi Arabia. Due to the limited timed available no detailed assessment could be made on technical and managerial aspects of those plants. However, a general impression can be given.

This impression is also based on a questionnaire prepared by the SCH and sent to the milkplant just before the field visits took place. General result of this inquiry are summarized in Annex IV.

According to local statistics there are 61 dairy plants in the Kingdom engaged in producing various products, i.e.:

39	plants produce liquid milk and other dairy products
12	plants produce only fermented milkproducts
1	plant produces only white cheese
9	plants produce only ice cream

Those milkplants, which to a large extent depend on fresh milk as basic raw material are all integrated in and attached to a dairy farm. Recombining dairy plants are not located at dairy farms.

Only four of the visited dairy plants were equipped to produce cheese. Due to importation of cheese at a low price level cheese making on a large scale has never been put into practise.

Technical aspects

Since most dairy plants have been established since the 1980's by well-reputable European and American firms is it obvious that those plants are well-equipped with modern technologies. Lay-out as well as used standards are according to norms of the American or European Standards.

Most dairy plants are equipped to produce a wide range of products, but they have a low occupation (efficiency) rate on their installed machinery (ranging form 25% up to the maximum) In general most plants below a output of 10 million ltr/year have only one working shift per day. Larger plants operate in two shifts. Efficiency rates mentioned are related to one shift only.

Causes of a low rate of occupation are mainly:

- A decline in the milk production on the farm at the dairy plant.
- Initial investments were based on a larger production in future.
- A too large capacity of the pasteurizer, or sterilizer, in relation to the capacity of the various packing-units (results of the wish to produce all kind of packing sizes: "competition").
- A too large product diversification.

Occupation rates can be increased by:

- Enlarging own milk production by increase in herd size and milk production per animal.
- Purchasing milk from other dairy farms (i.e. closing down small dairy plants attached to other dairy farms).
- Product diversification by manufacturing of non-dairy products (like juices) or even recombined milk by some fresh milk processors.

Furthermore, in case milk plants would shift to a 2- or even 3-shift processing cycle a tremendous increase in processing capacity can be created without any large investments. This aspect should be taken into account when new processing plants apply for financing of extension of their capacities or even for the establishment of new plants.

The level of automation and mechanization is high, especially taken into account the relatively low production capacities in some plants and the availability of "cheap labour". In various cases it must be ascertained whether extra expenditure on automation and mechanization is economically justifiable. Having a production on a 2 or 3 shift basis could be a justification for a high automation level.

Sanitization and product quality

For cleaning of dairy equipment the C.I.P. system (cleaning in place), manually or automatically regulated is used. With regard to control of chemical and bacteriological aspects of the products an adequate range of tests are performed, such as:

- mastitis control of the cattle (at the dairy farm)
- chemical control (water, pH.)
- composition tests on the raw milk (fat, dry solids)
- bacteriological control of the final products (total plate count, coliform and more specific tests e.g. antibiotics).
- organoleptic control, sometimes irregular, sometimes on planned days. Some plants regularly bought products from their competitors in order to compare them with their own products and to improve quality.

Despite those tests the team noticed that various products show "poor" quality with regard to taste* (absorbed and cooked flavour), sediment, colour and appearance (consistency texture).

Those defects can be avoided by improving maintenance of used machinery and upgrading the skill and level of processing technology of process-operators and management. In order to stimulate the physical quality and appearance of the products (especially cheeses and laban) and to realize a higher level of uniformity in quality criteria it is suggested to establish a "quality promotion office".

Although the SASO (see Chapter 1.5.2) is responsible for defining and controlling quality standards for the dairy products produced in Saudi Arabia they only cover inspections, i.e. quality control in regard to health aspects and national standards (rules and regulations).

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* Determination of taste and quality of milk products is to some extent an arbitrary subject. Some"defects in taste" as experienced by one person, could be regarded by an other person to be a special flavour of that specific product.

Utilities

From a marketing point of view this office (other than the state quality control office - the SASO) should, among other things stimulate and promote the quality by means of exhibitions, inter-plant taste-contests and grating quality awards and premiums (hallmarks).

Some dairy plants do experience difficulties regarding availability and purity of water. Dairy plants require large amounts of water, mainly for cleaning and cooling, but also for processing. In Jeddah those problems are invigorated by the long supply distance of water. In eastern regions high mineral contents of water cause problems when the water is used for cleaning or supplying boilers. Therefore, special filtering facilities are needed to reduce the hardness of water. Water quality affects, directly or indirectly, the taste and appearance of the milk products as well.

Milkplants generally produce large quantities of effluent, principally consisting of used detergents, process-effluent and relatively clean water from coolers. Most dairy plants have their own facilities for the treatment of effluent, like septic tanks, biological filters or installations for spraying the effluent on land. It can be concluded that misuse of water is reduced to minimum, but to some extent the use of water can be reduced by a more strict cleaning regulation.

Starter production

For the production of fermented dairy products inoculations with a small quantity of the desired fermenting flora, called culture, take place. Since the culture initiates or starts fermentation it is often referred to as starters especially in the production of butter and cheese.

Labour and management

As stated in Annex IV almost 93 percent of the work force are of non-Saudi nationality.

Workers engaged in the primary processing activities do not have any specialized education or received training in their specific jobs, and are therefore lacking basic understanding in processing technologies.
Supervisors are in general basically educated and trained for their specific jobs and duties although this is not updated nor extended to new products or innovations.

Dairy plant managers (general, technical as well as processing managers), local as well as expatriate experts, have a degree in their specialization and are well-experienced and qualified to perform their jobs.

Special training facilities and activities to inform all workers, at all levels, about new technologies or updating their skills will certainly contribute to a more efficient working routine and thus to improvement of quality and efficiency.

Maintenance and repair

Availability of spare parts and a well-equipped workshop are not encountered to be a limiting factor, quite to the contrary most plants are able to conduct adequate repair services. However, preventive maintenance routine and working-regulations could be improved or re-introduced. Training in preventive maintenance-routine of the technical supervisors should be considered.

5. Financial aspects of dairy processing industry

5.1. Recombined UHT milk and yoghurt

The processing costs of UHT-milk and yoghurt have been calculated. The most important components are discussed for UHT-milk. The figures for yoghurt are slightly different from those of UHT-milk.

Total production costs for UHT-milk come up to SR 1.72/litre (1991). The total cost price for yoghurt is SR 2.70 /litre. A detailed overview of cost build-up is given in Tables 4 and 5 (Annex VI) for UHT-milk and yoghurt respectively.

Raw materials

The expenses related to basic raw materials constitute an important cost factor in the processing industry. This explains about 47% of the cost price of milk.

Supplies are mostly realized by direct imports. The processing industry is actively exploring the most optimal conditions in the different supply markets. The cost of raw materials is dynamically monitored by most processors. Uncertainties in price developments hamper the industry in performing a precise planning approach.

Storage policies are applied together with purchasing practices which results into the lowest possible production prices over a certain period of time. Quality of products is an essential issue but it has been observed, that sometimes concessions are made concerning quality of basic materials in favour of short-term profits.

Occasionally, processors also purchase surpluses from local wholesalers, often against attractive prices.

It is common practice in the processing industry to adjust recipes of products to realize an optimal net margin. Variations in cost of raw materials amounting up to 20% of regular expenses within only two months were observed. To what extent quality of products, and hence sales fluctuations, are related to that type of flexibility, is hard to assess.

Imports of milk-powder and butter oil are subject to a Government import duty of 12%. Additional expenses for clearance and in-land transport can be set at 3% of the cif-value (refer to Chapter I, section 5.1 of the report).

Packing materials and minor components

Packing materials is the second largest cost-component. About 25% of the total cost price can be explained by the packs needed for long-life milk. Almost 20% of the total cost price is composed of: overhead (8%) and miscellaneous variable expenses (9%).

Depreciation

Depreciation of fixed assets is normally calculated on the basis of historic purchase prices.
Since company profit taxes are not levied by the Government, the depreciation levels generally applied are somewhat arbitrary, especially because of the sometimes considerable under-capacity of the machinery in comparison to the existing capacity.

The general occupancy rate of the equipment shows great differences between dairies:

- for milk products the average rate seems to be about	40% - 75%
- for ice-cream between	20% - 95%
- for juices between	10% - 75%

However, definitions of installed capacity per 24 hours are frequently explained in different ways so that an uniform figure can not be given.

The average provision for depreciation in the total cost price of UHT-milk amounts to about 10%.

Cost of marketing

The total expenditure for marketing and distribution of the recombined products is about SR 0.60/ltr in which amount a general reservation for distribution losses of SR 0.10 /litre is comprised. Considerable differences occur between companies, both in total expenditure as well as in composition.

An indicative division of the remaining amount for regular distribution and promotion is as follows:

- salaries and commission	53%
- transport	28%
- warehousing	5%
- promotion	7%
- administration/overhead	7%
	100%

Selling prices and margins

Selling prices show differences between recombining companies. Although basic prices are more or less on the same level, informally agreed by the partners in the industry, considerable additional discounts (up to 25%) cause a wide range in final prices.

Regular purchase prices with retailers are:

UHT-milk SR 2.70/litre (corr. for 10% regular wholesale discount)*

Yoghurt SR 3.50/litre (SR 1.75/0.50 litre)

*) lowest price observed: SR 2.40 /litre

Recent margin developments

There has been a steady decrease of margins in the recombining industry of dairy products. The steady increase in prices for milk-powder forced the industry to adjust prices before Ramadan in 1988. The general price increase at retail level amounted 17% to SR 3.50/ltr. (based on 12 litres/carton).

The negative effects of the price boost in the turnover has never been fully compensated yet (1991). Additional consequences for the rentability in the sector refer to the introduction of an import duty on milk-powder with 12%, and a similar import-duty on packaging material, both imposed early 1990.

Although the recombining industry has steadily economized on controlable expenditure items such as staff, administration and distribution, the sector has been confronted with decreasing profit margins from sales and efficiencies on returns to share capital.
Indicative percentages are difficult to provide, because there are rather big differences between companies. Hence, the sector will continue to diversify in order to improve margins and to avoid risks that might arise from new Government measures.

The company profits are increasingly affected by relatively new products such as juices, ice cream and non-dairy products. An indicative example of profit analysis: 45% from milk, laban and yoghurt (65% turnover); 30% from ice cream (15% turnover); 25% from juices and other non-dairy products (25% of turnover).

Implications of world market price developments

Prices on the world market for milk-powder are difficult to assess, also due to ongoing negotiations in the context of the trade liberalization of the General Agreement on Tariffs and Trade (GATT). The general indication is that prices may increase as outlined in Chapter IV, section 5.2 of this report.

Earlier projections, however, indicate a general increase in the real price of whole milk-powder with about 50% in the period 1991 till 1995 (reference 37).

Consequently, the cost for using raw materials in the recombining industry will increase. The cost of processing will increase with about SR 0.40/litre. The share of total cost price will increase from 47% till 57% during 1995.

5.2. Milk and laban on raw milk basis

Transfer / purchase price of fresh milk

Dairy farms are managed as financially independent units, also when farming is fully integrated with processing. Internally, raw milk is transferred at a price which generally allows for a profit margin of 15-20% of the so called transfer price.
Until a few years ago (1988/1989), milk was transferred at annual average ranges of 2.50 - 2.90 SR/litre. More recently, prices have been adjusted at annual averages of about 2.20 SR/litre, this still leaves sufficient space for the profit margin as mentioned earlier.

Raw milk is also purchased from independent dairy farmers. A few years (1988) ago contracts were still made at 3.25 SR/litre for yearround delivery.

Due to the relatively rapid improvement of farm efficiency, along with a general 20% price-decrease of retail prices of fresh milk-products in 1988, contract prices tended to level just below 2.00 SR/litre in the last winter season.

The recombining industry is occasionally purchasing raw milk. If supplies are irregular during the surplus season (winter) only, prices are as low as 0.70 SR/litre, which is mainly determined by the comparable level of expenditure on requirement for imported raw materials.
In the calculation of the cost price of pasteurized milk the basic price for raw milk has been set at 1.70 SR/litre. The raw milk intake represents about 68% of the total processing costs of fresh milk (refer to Table 2, Annex VI).

Packaging material

The expenditure on packing material is the second largest cost component in processing. About 11% of the total cost price is related to the use of normal carton for fresh milk (see Table 2, Annex VI).
In case of UHT-milk production, an additional amount of 0.20 SR/litre has to be included for packing material.

Depreciation and Interest

Depreciation of fixed assets is normally calculated on the basis of historic purchase prices. In case of subsidies involved, no corrections were made in the calculations in order to account for sufficient replacement reservations.

Depreciation percentages are normally related to the expectancy of the technical lifetime. Since no company profit tax is levied by the Government, the depreciation levels generally applied are somewhat arbitrary, especially taking into account the considerable under-occupancy of the machinery in comparison with the installed capacity.

In compliance with Islamic law dairies pay an annual tax ("Zakat") of 2.5% of the value of the difference between the original invest-ment and the nett book value of assets.

The following depreciation percentages (%) are generally applied in the calculations:

	%		%
1. Plant and machinery	10	2. Other buildings	10
3. Land	3	4. Vehicles	25
5. Freezers	25	6. Tools and equipment	20
7. Fork-lifts	20	8. Lab equipment	10
9. Office equipment	15	10. Air compressors	10
11. Workshop equipment	15	12. Air conditions	17
13. Computers	25	14. Telephone & telex	20

Source: field data

Depreciation represents about 9% of the total cost price of fresh milk and Laban, with which level the component is equally important in comparison with packing material (refer to Table 2, Annex VI).

Interest is normally not included in cost calculations. Two reasons for this are: loans received from government development banks (SAAB; SIDF) are without interest, and the remainder of the funds attracted for financing often originated from the investor(s). The registered profit margins thus include an interest component on privately pledged funds.

Other Components

The remaining components represent 12% of the total processing costs, out of which the provision for general overhead is 5.5%, and the expenditure for salaries is nearly 2.5%.

5.3. Indicative cost prices of processing of milk and laban, and general transfer price

The total cost calculation of processing of milk and Laban amounts to SR 2.50/litre (see Table 2, Annex IV). The calculation is based on a transfer price for raw milk of SR 1.7 /litre.

In an attempt to realize target margins in each independent unit within the same company, larger firms transfer for internal calculations the products at a price of 3 SR/litre (1991).
Generally, smaller companies calculate a real, final cost price, which enables a dynamic pricing and promotion by the marketing section, thus facilitating an aggressive selling approach and market penetration development.

Indicative cost price of UHT-milk (from fresh milk)

The production of UHT-milk from raw milk is rapidly gaining importance in the Kingdom. The cost price of "fresh" UHT is about SR 2.80/litre, which is SR 0.30/litre above the cost price of pasteurized milk.

The difference can be explained by more expensive packing material (plus SR 0.20/litre), and additional depreciation (SR 0.10 /litre).
Considering the less expensive distribution costs, and the generally lower price of raw milk in the winter season, the UHT product is attractive to the fresh milk industry.

Variable and fixed processing expenses for yoghurt

A detailed costing of the processing of yoghurt is provided in Table 3 (Annex IV). The calculation is based on the most common contents of a plastic cup: 380 grammes.

The total cost calculation amounts to SR 1.73 / 380 grammes.
The percentage composition of the costs is different from milk and laban, mainly because of the price of packing material which represents 21% of the total. The largest single component is raw milk (48%), followed by processing material (11%), depreciation (8%), and general overhead (6%).

5.4. Cost of marketing

Regular marketing costs

The costs associated with distribution and other marketing aspects like promotion and marketing losses show considerable differences between companies. The cost items fully depend on the type of distribution network and the type of retail outlets served. The level of the cost figure also depends on to what extent regional depots are used.

Most companies have national distribution networks. Due to increasing competition many explore new markets in more remote areas of the Kingdom. Hence, the associated costs are rising accordingly.

A general build-up indicates the following items:
(figures relate to 35% inter-regional transport and distribution via depots, the remainder is directly distributed from processing units).

	SR /Litre
- salaries (including commission and benefits). .	0.40
- transport (long-distance) and distribution . . .	0.25
- promotion	0.10
- depreciation crates	0.05
- overhead (incl. services; capital expenses) . .	0.15
T o t a l	SR 0.95 /Litre

The amounts are indicative only. If a distribution network is composed of a relatively large number of retail outlets, the reduction in transport and salaries could easily reach 50%.

Distribution losses due to excess of expiry date

Shopkeepers often take the decision to return products to the supplier, even when expiry dates have not been reached yet. Consequently suppliers are frequently confronted with returning products. These returns can represent a cost element which reaches till SR 0.65/litre on realized turnover. The "returns" vary between 3% and 15% of marketed quantities (reference 25).

Total cost processing and marketing operations

The most important cost items of the aggregate cost price are subject to serious fluctuations due to specific conditions of individual processors and suppliers. The differences in production costs of raw milk and distribution costs, together with marketing losses, cause a wide range of total costs between individual suppliers. An indicative range for the total cost price of pasteurized, fresh milk is: SR 2.85 - SR 4.10/litre.

5.5. Selling prices and margins

Retail margins are limited for fresh dairy products. Regular selling prices to retailers of milk and laban are in the range of SR 3.65 - SR 3.85 / litre (pro ratio for larger and smaller units).
For yoghurt a general margin of 10% - 12% of the retail price is practice. In case of wholesale deliveries similar margins are granted.

Retail margins for UHT milk (raw milk based) are more attractive. The regular build-up of the price is as follows:

A. CASE I: products not regularly available on the market during summer months

- purchase* price . .	SR 2.65/litre	(or SR 32.0 /12 litre)
- consumer price . .	SR 3.50/litre	(or SR 36.0 /12 litre)
- margin **	SR 0.85/litre	(or SR 4.0 /12 litre)

B. CASE II: products regularly available on the market during summer months

- purchase* price . .	SR 3.35/litre	(or SR 40.0 /12 litre)
- consumer price . .	SR 4.50/litre	(or SR 45.0 /12 litre)
- margin ***	SR 1.15/litre	(or SR 5.0 /12 litre)

* Purchase price refers to the selling price of the processing industry

** The margin in case A fully complies with regular margins for UHT-milk from recombining industry (leading brands)

*** The margin in case B is about 35% above the regular margin for recombined UHT-milk from leading brands (not considering promotional price offers).

The general build-up of costs and (target) margins clearly indicates the risks associated with the level of the cost price of raw milk. But almost more important is the efficiency in distribution and management of the "returns".

Appraising the current margins and consumer prices for pasteurized products, together with seasonalities in demand and supply and the wide assortment in the market, it is obvious that retailers can hardly accept any kind of risk for unsold products and breakages.

For the retail trade, the UHT-milk, a relatively new product of the fresh milk industry, is currently one of the most attractive products when linked to the level of profit per unit.

5.6. Financial feasibility of raw milk processing and marketing, and implications of current subsidies

A reliable indication of the financial feasibility of integrated fodder production, dairy farming and processing of raw milk is hard to give, especially since there are considerable differences in the level of farm and plant management and in natural conditions between regions.

Additional features hampering an accurate evaluation refer to:

- the relatively recent start of dairy farming in the country (the first specialized farm started only 15 years ago)

- the strong improvement of herd management and consequently efficiency, also with regard to the decrease of seasonal output fluctuations, in the production of raw milk during the last five years

- the dynamically changing market conditions which is especially due to the strongly increased production of raw milk in the Kingdom, together with changing retail/wholesale prices: increase in recombined products, in contrast to a decrease of prices for fresh milk articles.

However, an attempt is made to discuss indicative figures of the internal rentability of integrated fodder production, dairy farming and processing of raw milk.

Recent financial feasibility studies on fully integrated farming and processing activities indicate an IRR of 19%.*

The level of the IRR (19%) would at present be acceptable for the Ministry of Agriculture and Water (MAW) for issuing the land (free), and for the SAAB for participation in the financing (concessional loans) of the project.

The IRR of 19% appears to be rather sensitive to changes in total costs and decrease of total revenues. An increase in total costs by 10% will result in a drop in the IRR to 14%. A decrease of 10% of total revenues would diminish the IRR with slightly more than 5%.

If both negative developments would coincide, the IRR will be just below 10%; the latter level clearly indicates the (high) risks involved.

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*) Internal Rate of Return - IRR - is that percentage at which the present value of net cash flows during the project cycle is equal to the (present) value of investments and other initial expenses; cash flows are calculated prior to depreciation and financing costs.

Considering the general assumptions on which original calculations have been based, the real feasibility and associated risks become even clearer, which at the same time indicates the crucial importance of the current subsidy policy and financing support system.
The basic assumption relates to the following:

- period till full gestation of seven (7) years

- relatively high fodder yields; 15% above average in order not to arrive at too high requirements for land. This would encourage the MAW to decide negatively concerning licensing land

- market prices for essential inputs have been used in the calculations. Price levels are subject to be influenced by subsidies on fertilizer, animal feed and energy

- cost structure has been kept constant, which under certain circumstances is too optimistic, especially if the cost related to pumping and water treatment is increasing due to water availability problems

- initial investment expenditures on dairy plant equipment were kept at moderate levels, 35% below price quotations of most attractive brands. With an average share of investments on equipment for processing to the total component of investments and costs of 25%, the total investment component would most likely be 12.5% above the calculated level

- a constant price level of dairy products (basis 1991), which is too optimistic, taking into account the background of general market conditions. There has also been a steady decrease of prices for fresh dairy products in the recent past and a tendency to a further (slight) continuation of this trend

- a relatively low level of distribution losses (3%), and marketing costs because of better management and the presumed strong position in the market; the figure is optimistic because of the present background of existing distribution systems and the increasing competition in the dairy sector.

6. Marketing of dairy products

6.1. The national market of dairy products

The major products in the consumer market are milkpowder in retail packaging, recombined milk, fresh milk, laban and yoghurt. The total volume of these consumer ready products is estimated at about 50 million litres/month. The total domestic market has shown a trend of stabilization, with even a tendency to some decline during the last 18 months.

For an overview of an indicative market share is referred to Table 1 (Annex V): Composition of the National Dairy Market as to Most Important Products: Milk-powder; Recombined Milk/Laban; and Fresh Milk/Laban/UHT-milk. The national distribution of fresh milk, recombined products and retail-packed milkpowder, specified to most important consumption areas is given in Table 4 (Annex V).

Market shares of the main groups have changed in the course of time. The most striking indication of the rapid growth of the fresh milk market is the increase of its share from about 9% till presently about 40% within less than 10 years.

Market shares also change within one year through the seasons, which is strongly related to the pattern of consumer demand (refer to section II, 2.2). Although the figures in Table 1, Annex V, (Composition of National Dairy Market) show the national distribution for one bi-monthly period in the winter season, fluctuations throughout the year are registered as well. The seasonal fluctuation of the market share for fresh dairy products is between 40% and 43%, while the recombining and the retail powder products range from 18% to 16%, and from 38% to 41% respectively.

There are regional differences. Roughly, the following indicative market shares (%), in an annual range, are:

	"fresh"	recombined	powder
- Western Region:	41% - 43%	16% - 18%	37% - 40%
- Central Region:	43% - 44%	14% - 17%	37% - 41%
- Eastern Region:	36% - 39%	19% - 21%	41% - 42%

Both the recombining industry as well as the raw milk processing sector are strongly dominated by only a few suppliers.
The fresh dairy products are supplied (75% of total) by only two companies, while in the recombining sector, about 80% is supplied by one group (refer to Table 2, Annex V: Indicative specification of the national market shares for supplier of raw milk and recombined dairy products).

Nearly all suppliers of dairy products have distribution networks in most important urban areas. A geographical distribution of milk products as to most important consumption areas by three important processors is provided in Table 3 (Annex V).

The shares of the main commodity groups show fluctuations, which underwent considerable changes because of the War in the Gulf in early 1991. Direct effects (export increase) and indirect effects together have reallocated flows of products, consequently changing the composition of the national volume. The distribution of fresh dairy products thus underwent a redestination of at least 10% during the last year (1990/'91), including a substantial increase in exports to neighbouring countries.

The supply of other dairy products refers to cheeses (90% imports, and representing about 80% of the total liquid milk and (retail) powder market) and evaporated and condensated milk.

Ice cream is rapidly gaining importance, mainly as one of the products of the recombining industry, but it is also supplied by specialized ice cream factories (refer to Chapter II, section 7.2.).

The statistical information is poor in the country. Marketing partners are depending on survey data from external marketing offices.

With regard to recent growth data of the total market some figures suggest an increase of 7%. For the respective sector the growth rate would amount to:

- for recombining: plus 18.0 %
- fresh : plus 10.0 %
- powder (retail): plus 0.5 %

However, results of the analysis indicate that the growth rate is completely due to increase in export trade in the region (corrected for population growth).

Seasonalities in demand are eminent for each of the commodity groups. The summer season is normally characterized by a strong demand. The output of the total market (main products) can be 10%-15% above the lowest level in the winter season.

Especially the fresh market is experiencing fluctuations (uncertain-ties) in demand as a tremendous burden. In fact the result of poor matching of supply and demand is contributing to a relatively high percentage of unsold products (3%-15%). This is in particular apparent during the winter season.

6.2. The liquid market

6.2.1. Recombining industry

At present there are over 65 companies involved in the production of dairy products, either dairy products alone or in combination with other foodstuffs such as bread, pastries or meat.

The development of the recombining dairy industry was very much stimulated when in 1988 a full ban on the import of retail packs of long-life milk was imposed by the Government. This indust.y, which originally started its activities with the fabrication of recombined dairy products, is rapidly diversifying its product assortment.

Against the background of a strongly performing fresh milk processing industry and changing consumer's preferences, the recombining industry is forced to (and actively involved) in the exploration of new markets, domestic as well as outside Saudi Arabia In addition, they are extending their product assortment by including non-dairy products in their processing range, such as fruit juices.

Product assortment varies from plant to plant. This is illustrated by the following table, in which typical compositions (in turnover) of the various product ranges are illustrated.

product	plant		
	A	B	C
long-life milk	55%	75%	5%
laban and yoghurt	10%	5%	10%
ice cream	5%	15%	27%
juices	15%	5%	10%
other(non-dairy)	15%	-	48%
	100	100	100

Nowadays an increase in the share of non-dairy products (in money turnover) of 100% within a period of three years is no exception in the recombining industry. The share of the original dairy products in the annual turnover could be reduced to a level of 60% only.

Another occasional activity, of those plants is retail packing of imported butter- and cheese products. The size of retail packs ranges from 20 cl. up to 6 ltr. packs.

Ice cream production is an activity that will also become an important the future processing and marketing activities. Domestic production of ice cream emerged around 1978. At present more than 53 companies are involved in the production of ice cream. Although annual ice cream consumption is low (1,5 kg per capita), compared to the consumption in Europe (15 kg/per capita), it is expected (and estimated by the local industry) that the annual consumption will increase by 50% in the next few years. This assumption is based on the annual increase of ice cream consumption as registrated in the period 1985 - 1991.

Another phenomenon in the recombining industry is a further concentration on the inclusion of deep-frozen products, which, together with extension of ice cream production, would considerably strengthen market development and distribution efficiency.

Prices and pricing policies

Prices have been rather stable for the last few years. Retail prices, normally recommended by the industry, have been kept very constant throughout the country. Retail prices of recombined products were increased in 1988 by about 17% (from 3.00 SR/ltr.- 3.50 SR/ltr.; wholesale prices increased by 24%), and about 5% at the beginning of 1991, while production volumes are still below the 1988 levels.

Prices are not determined by government intervention. Price-fixing is realized by free-market forces of demand and supply. Previously, the recombining industry has rather successfully been able to stabilize uniform selling prices at wholesale and retail level.

However, due to increased competition, more fragmentation of distribution areas and changing distribution patterns, the industry is currently facing considerable reductions of margins because additional discounts (up to 25% on regular selling prices) are offered.

Although retail prices have not changed during the last three years, also because suppliers preprint the retail price on the package, bulk sales (per carton) to wholesalers, retailers and institutional buyers increasingly show more attractive prices.

Consequently, present pricing practices lead to confusion. Because of curtailing margins there is at present a general attempt from the side of processors to reorganize extraordinary high and erratic discount rates by informal agreements between partners of industry.

If some or other form of coordination fails to occur, it is likely that consumer prices will undergo further downward adjustments under the present cost structure and competitive market conditions. An important aspect is to what extent some processors would prefer to reduce the output of dairy products in favour of production of non-dairy products. It should be noticed that some companies produce milk at special request only.

Distribution pattern

Each recombining industry has its own national distribution network. Generally, all major consumption areas are supplied with products, more recently there has been a strong tendency to a further dispersion (fragmentation) of distribution to more remote and more sparsely populated areas.

Export development to Member Countries of the Gulf Cooperation Council (GCC) is rapidly becoming important and several companies are planning to concentrate on a further strengthening of their export market. The more intense exploration of export markets in the region has been stimulated by the effects of the recent War in the Gulf

An uniform distribution pattern is difficult to provide, because only a few companies dominate the national production volume. A direct consequence of this is a relative large market share in the near vicinity of the processing location(s). (see Table 2, Annex V).

A typical overview of geographical distribution is given in Table 3, whilst the national demand as to consumption areas is shown in Table 4, Annex V.

The data clearly indicate the national scale of operations of the companies. The data refer to one two-monthly period only and have not been corrected for seasonal effects. However, ratios were confirmed by various respondents during field visits of the mission. The figures have an indicative value only, especially considering that some companies have several processing plants in the country, and market shares are changing dynamically. The latter is also due to an active enlargement of the range of products handled by companies.

Sales mainly take place directly from the processing plant to retailers and to depots. About 20% of total turnover is realized through wholesalers and direct deliveries to institutional buyers (hospitals/restaurants).

Retail outlets can be divided into four categories: supermarkets, self-service stores, groceries and small shops. The distinction is mainly based on the conditions and daily sales potential.

There are about 20,000 small retail outlets (groceries and small shops) in the entire Kingdom. The number of supermarkets (60) and self-service stores is about 400, while the number of specialized wholesale/retail shops (meat and imported dairy products mainly) is estimated at 1,000. The largest supermarket chain runs 26 branches with a planned expansion rate of two (2) new locations per annum.

The distribution pattern is very much determined by the dispersed location of the majority of retail outlets and the character of the retailing of consumer goods. Consequently, 75% of total sales is realized by small shops and groceries (refer to Tables 5 and 6 of Annex V).

Supermarket sales are only of minor importance. In addition, suppliers grant a normal credit term to supermarkets of one month (in practice sometimes three), while sales to small shopkeepers are against cash payment only.

Normally small shops are visited once a week or twice a month. In comparison with supermarkets small shops, groceries and self-service stores tend to sell relatively more fresh milk as a part of total dairy sales. Probably, sales of fresh milk are still considered an important "service" to the customers (see Table 6, Annex V).

Market development policy

The major elements of support market development refer to:

- product quality
- dynamic pricing policies
- distribution services
- diversification of products both in dairy and non-dairy products
- close cooperation and/or merge with other companies

In fact, and this illustrates the dynamics of the recombining sector, all market instruments are actively applied.

6.2.2. Fresh milk products

The seasonal nature of raw milk production and consumption, together with the high perishability of fresh dairy products and strong consumer preference for fresh dairy products, imposes an extremely high strain on the efficiency of the dairy sector in general and the marketing system in particular.

Especially the harsh climatical conditions and the geographical imbalances between production of raw milk and processing capacities contribute to specific features of the fresh dairy industry.

The fresh industry is completely dominated by only two producers (and processors at the same time). Hence, there is virtually no free market for raw milk. Milk sales by independent producers face a mono-psonistic market condition under which continuation of dairy farming development will virtually be impossible (see Tables of Annexes V and VII).

The general failure of the establishment of a dairy production and processing cooperative in 1988 is largely explained by the current structural conditions of the market. The prevailing production and processing structure hardly contributes to a further enhancement of a sustainable supply system of fresh milk products.

Supply conditions of raw materials

All raw milk for commercial processing originates from specialized and modern dairy farms. Most processors have their own farm(s). However, more and more larger firms have rented farms for securing additional supplies of raw milk.

One of the leading companies has 10 farms in ownership and an additional 10 under a rental contract. Besides, of the total daily intake about 30% is purchased on contract basis.

Raw milk for processing is transported throughout the country. From the northern region milk arrives in the Jeddah area, while from the central (Riyadh) region quantities are also taken to the western region. The quantities involved are irregular and difficult to assess, also because of some experiments of recombiners to take up raw milk processing last year.

Milk transport over a distance of 1,500 kilometres is easily done without negative consequences for milk quality. Normal transport costs for long-distance transport are about SR 0.10/litre (insulated tanks with about 25,000 litres per load).

A related problem of long-distance supply of milk is the availability of water of good quality for the recombining industry. A considerable share of the daily water requirement needs to come from distances as far as 50 kilometres outside the Jeddah region. In addition, on those locations too, problems of decreasing availability are manifested due to increasing demands from other consumers as well as from the soft drink industry.

Against that background the long-distance supply of fresh milk seems to become more and more reasonable as a concept.

The prices of raw milk and prevailing price levels for contracted milk are discussed in Chapter II, section 2.2.

Product assortment

Product assortment is mainly confined to milk, laban, yoghurt, and -more recently- UHT from fresh milk. Each supplier, however, has its individual scala of contents of packaging. For a complete overview of assortments refer to Tables 7,8 and 9 (Annex V): Consumer prices of Most Important Milk products.

Product quality

Quality standards are clearly determined by the Saudi Arabian Standard Organization (SASO). For these details is referred to section 3.3, Chapter I of the report.

The regulations mainly cover the production, transport and storage processes. No criteria have been developed so far for handling and displaying conditions at retail points.

Due to small quantities delivered to sometimes numerous shops, it appears that temperatures during distribution transport are increasingly at too high levels, thus hampering a reasonable quality conservation. In addition, display conditions are sometimes completely below any acceptable standard in retail shops.

Surveys have indicated that, even in supermarkets, the temperature of pasteurized milk products is sometimes far too high; temperatures between 10 and 19 degrees Celsius were observed.

As a consequence, those circumstances disproportionally contribute to the sometimes high returns and to the excessive preference of consumers to purchase dairy products of recent production date only.

Pricing policies and practices

In the fresh dairy industry prices have been kept rather constant over the time. The most important price adjustment was made in 1988, prior to the time of fasting, when retail prices were decreased by 20%. General efficiency in the sector was conducive to the adjustment.

Although no formal price regulation and/or control is effective in the Kingdom, in 1988 an attempt has been made by the Ministry of Agriculture and the Ministry of Commerce, together with one of the leading processors, to prevent the price to decrease, but the industry appeared not to be ready to maintain the original level (SR 5.0/litre).

Price corrections are now mainly introduced by changing contents of packaging. Consequently, under these circumstances the price transparency for consumers is not increasing (see Tables 7,8 and 9, Annex V).

Distribution pattern and distribution losses

The intensity of supplies by processors to retailers heavily depends on the type of retailer. Supermarkets are daily (or every second day) supplied with fresh produce. Processors give high priority to an optimal occupation shelf space in the refrigerated displays of the shop, preferably only with most recently dated products (see Tables 5, and 6, Annex V).

Small shopkeepers are supplied a few times per week. Deliveries to shopkeepers with a small turnover (50 litres/day) mostly take place every second or third day (refer to Table 5, Annex V for turnover specifications of retail-outlets).

Retailers are visited regularly. This belongs to the service of the supplier, otherwise he is running the risk his products will be placed behind competitors' products in the refrigerated cupboard, or a fresh product is placed in front of an older product or there is no product at all in stock.
Most smaller shops have the same kind of dairy products of three or even more suppliers; supermarkets deal with the entire assortment of all suppliers (refer to Table 7 -legend 2- Annex V).

In this way each dairy plant is in fact obliged to have its own very complicated and expensive distribution system. All these factors can lead to lower sales and decreasing returns.

Normally, preference is given to replace the outdated products by new supplies. The not yet outdated products are delivered to selected shopkeepers in middle and low income regions.

Retailers generally consider the sales of fresh milk articles an essential item in the assortment of dairy products and will therefore accept a relatively low retail margin: 6.5% of the average selling price. For particulars concerning geographical distribution, market shares and relative importance of selected retail outlets is referred to Tables 1-9 of Annex V.

Distribution losses can reach a considerable level. The fresh industry currently anticipates the losses in a range between 5% and 15% of turnover. Recently, partly due to reorganization of distribution networks, savings have been registered for some companies. For the financial consequences is referred to section 5.4., Chapter II, of the report.

Market development policies

Efficiency in marketing is extremely poor. This is the greatest concern of raw milk processors (refer for details on costing to section II, 5.4. of the report). There are too many articles (brands, sizes). Under increasing competition efficient marketing is becoming increasingly difficult.

Marketing efficiency could be improved by extending the product range. In fact, some companies are aiming at including ice-cream, juices, nectars and marmalades in their assortment.
It is also reported that others are considering to purchase firms in food marketing. One of the latest developments is that one of the raw milk processors has accepted one of the leading food processing firms in the Kingdom to participate for 40% in its (existing) share capital. Reportedly, the distribution of a complete food package would be aimed at, for this realization the use of the dispersed distribution network of the dairy company would be beneficial.

Some companies do both: recombining and raw milk processing. In addition they produce ice cream, juices and other non-dairy articles and plans to extend its non-dairy assortment.

Under the given circumstances such a combination is the most attractive, and it is probably only a matter of time till more raw milk processors take the decision to include recombining and/or non-dairy consumer goods.

Such a development is even more likely now the fresh industry has started actively with the installation of UHT processing equipment.

By means of a long-life product the fresh industry will develop new marketing opportunities in previously unexplored retail outlets. In such a new concept, the addition of other long-life consumer goods seems a logical step.

Some form of coordination between fresh processors and recombining processors seems an absolute prerequisite to maintain certain operational margins. At the current level of development of the fresh dairy sector, government initiative in further supporting the sector, organizationally as well, is of utmost importance.

6.3. Consumer market

6.3.1. Consumption figures

The annual per capita consumption of dairy products is declining as to formal statistical sources (reference 27). The Food Balance Sheets (references 26 and 27) provide national data covering a 10-year period: 1974/1976 until 1983/1986.
After an average annual increase of about 8% from 1975 to 1978 for all dairy products together, a steady decline of per capita consumption emerged during the subsequent period including 1986, the last year of the period under review.

The general downtrend can mainly be explained by the decline in use of milk of sheep, goats and camels. An average annual reduction of 5% occurred during the period under review.
A steady decline of 5.5% per annum is also observed for milk originating from traditional dairy cattle.

Unlike the decline in consumption of certain products, the intake per capita of the total population during the corresponding period showed an increase in the consumption of fresh farm-milk, dry milk (powder in bulk and retail packaging), and condensed milk products. Average annual growth percentages were 21%, 13.9%, and 14.6% respectively.

6.3.2. Assessment of recent consumption trends (1986 - 1990)

The consumption of pasteurized fresh milk products has shown a considerable increase during the period. With a per capita intake of about 16 litres of milk from specialized farms in 1986 (consumption of traditional cattle milk at an average of 2 kg), the average domestic production reached 24.5 litres per capita in 1990 (references 23, 34, 35, and 36).

The increase comprises an annual compound growth rate of about 11.2%. However, the growth rate of domestic output declined: from 18% to 15.4% in the periods 1988/'89 and 1989/'90 respectively.

The decline coincides with a decline in turnover of fresh milk in so called "first class" distribution points (supermarkets), where some decline has been observed during several years. This has been the benefit of sales of low-priced recombined liquid milk.

The decline could indicate that under prevailing consumption habits and preferences and changing price relations with other essential consumer goods (red meat, poultry meat, eggs, rice, vegetables and fruit) a certain level of saturation has been reached in the middle and higher income groups of society.

Factors that could support the preliminary conclusions relate to the following:

- Distribution of fresh milk-products more and more takes place by groceries and small shops (65% in 1991); refer to Tables 5, and 6, Annex V).

- Retail prices of fresh milk-products decreased in 1988 with an average of 20% (from 5.0 SR/ltr. to 4.0 SR/ltr.), causing a temporary strong increase in demand in favour of fresh milk products.

- Retail prices of recombined products increased in 1988 with about 17% (from 3.0 SR/ltr. till 3.5 SR/ltr.) in 1988, and about 5% at the beginning of 1991, whereas production volumes are still below 1988-levels.

- Consumers have a high preference for products like red meat, poultry meat, eggs. This is indicated by the steadily growing increase of per capita consumption figures during the period '74/'75 till '85/'86 (references 26 and 27).

- Retail prices of essential food items have risen since 1988; red meat: 35% up; poultry meat: 10% up; eggs: 15% up; vegetables and fruit: 20% up; with an all-food index for the cost of living remaining constant a change of priorities in purchasing pattern is eminent.

6.3.3. Consumer behaviour and preferences

The consumption of milk products is strongly subject to seasonal influences. Seasonalities of demand are eminent for both the products of the recombining industry as well as the processing sector of raw milk.

Seasonal influences strongly dominate the market for dairy products. Demand for laban generally drops with about 20% in winter periods in comparison with the turnover in summer. The purchase of milk, however, shows an increase (25%), which leaves the raw milk processing industry with an average decrease in demand of about 10% in winter (for typical examples is referred to figures 1-5 of Annex VII).

The recombining industry is also facing seasonalities in demand. About 60% of total sales of liquid milk are realized in the period May till November (incl.), with highest sales in August/September.

Milk products, and especially Laban, seem no regular part of the menu of many consumers in the country. The relatively low level of per capita consumption, together with the seasonalities and mutual exchange of consumed quantities between milk and laban, might support such a preliminary conclusion.

Another possible indication for that observation could be that the majority of the turnover (35%) *) is packed in the smallest units (50 - 20 cl), thus directly competing with the fruit juice industry. This would indicate that, at least for drinking laban, consumption refers more to thirst-quenching rather than to a general notification of the high nutritional value of the product.

Obviously, consumers have a high preference for small packs, which is strengthened by producers pricing policy. This is done on a pro-rate basis in relation to larger units (refer to Table 7, Annex V, for consumer prices).

Flavoured and sweetened fruit juices are very popular in the country. Prices are fully comparable to those of drinkable milk products, especially for the smaller units. It is appreciated that some juices in 1 litre-packs are nearly 20% more expensive than fresh liquid milk products.

Juices are well-sweetened and well-packed and presented. In super-markets and grocery shops, total shelf-space devoted to fruit juices frequently exceeds that for milk products, and in nearly all types of outlets fruit juices are offered for sale. Fruit juices can be considered a serious competitive product for important milk products such as liquid milk and more especially laban.

Lactose intolerance hardly exists in the country, which is mainly due to the traditional milk-drinking habits of the people. However, precise figures and real effects are hardly-known in the country.

Preferences of consumers and purchasing habits have hardly been analyzed in the country. Although individual companies are emphasizing an optimal anticipation of consumers' wishes by making use of results of own market research, there is still a serious lack of general information.

Outcomes of an overall survey on preferences and budget analysis are indispensable for planning purposes of all partners concerned: raw milk producers, processors, and government authorities.

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*) There is a rather wide range between different processors: percentages of 60% are sometimes reached in certain periods of the year; much depend on the type of market segment served.

Typical features related to purchasing habits

Some specific features that relate to purchasing customs of consumers are:

- Fresh milk (raw milk) shows a reasonable stable demand, with a small increase during winter. Milk is warmed up before being consumed because of the cold weather.

- Fresh-milk laban and yoghurt are normally consumed being cooled, therefore these are less popular in winter periods.

- Low-fat products are still little preferred by the consumers, which explains the low production level of low-fat products, and the relatively limited need for developing products such as butter and cheese.

- Results of a limited consumer's survey indicate that 47% of the respondents think that milk-powder is added to fresh milk, 27% have no clear opinion about this issue (reference 28 Annex II).

- Recombined yoghurt has a more regular turnover because it is also used for preparing meals.

- The increase in consumption of raw-milk products begins earlier at the start of the summer season than purchases of recombined products and milk-powder; fresh-milk items show an earlier peak in sales than the other dairy products; during the summer period, purchase of milk-powder decreases earlier, which coincides with an increase in the demand for recombined milk.

- Apart from the seasonal demand fluctuations purchases during the fasting month ('Ramadan") are significantly higher.
  Concerning the imbalance between milk production and consumption some relieve of differences can be expected in the coming years (5-10 years) because of the annual earlier event of the fasting month.

- The younger age groups in the country are consuming more non-dairy products than to older age groups (reference 28).

- The attractively priced fruit juices have a serious negative effect on increasing sales of milk products.
  Presently, sales of juices and soft drinks are in summer three (3) times higher than sales of fresh milk products (milk and laban); in winter the ratio is about equal.

6.3.4. Consumer prices

Consumer prices of fresh-milk products are rather stable throughout the Kingdom. There are no price differences between retail outlets (supermarkets, shops) within urban areas and between regions. Some discounts have been observed in sales of products which are close to expiry date, but this is certainly not common practice. Price differences do occur during promotional campaigns of individual companies, however, without effecting overall price levels (references 32/33).

Although a wide range (brand names and contents/unit) of fresh milk-products is supplied to most retail outlets, price-competition hardly exists for milk and laban. For yoghurt some price differences occur (20%), due to use of packing-units with varying contents.

There are wholesale shops in urban areas that specialize in a few food items only. In the city of Riyadh there are about 150 of those outlets. Meat and imported dairy products generally belong to the range of products. Sales are in bulk only, but open to consumers and small retailers. Prices are about 20% below prevailing consumer prices for butter, tinned milk-powder and cream. Milk-powder in bags (25 kg) is also available against prices about 50% below the price of tinned milk-powder.

For prices of most important dairy products is referred to the Tables 7,8, and 9 of Annex V.

7. Environmental aspects

During the visits to dairy farms and plants some observations regarding the environmental situation were made.

The dung and liquid manure of the farms dried up very quickly by sun-shine and wind most of the time. The dry material could be used for the crops on the farm, but was mostly sold to other plantations at a good price. Only when the sheds were too broad, or the shelters hanged with curtains to create more shade, or when a water-sprinkling installation was used in order to cool the atmosphere under the sheds there were more problems with the drying of the manure. In that case more purification is recommended.

The environmental burden caused by dairy plants in general is moderate. The most important emissions into the water are:

- "milky" substances (fats, proteins, sugars)
- heavy metals

The sources of both categories are not alike. Milky substances originate from cleaning and spills (therefore partly due to inefficient lay-out of equipment) whereas heavy metals originate from the use of acids in the piping system and (possibly) from the ashes of boiler-installations.

As far as possible, the team tried to get a global idea of the existing situation of the plants visited. It can be concluded that although the environmental burden caused by dairy factories is moderate. However, it could be worthwhile to conduct a national survey on good environmental practise (management policy, analysis- and registration habits, refuse removal etc.), emissions into water and air, nuisance and product-contamination. It is obvious that the population density in the country as a whole plays an important role in the actual need for such a survey.

The waste water of the dairy plants caused no recorded problems because of:

- The waste water was partly collected in big reservoirs and used for irrigation of crops (recycling).
- The waste water was partly drained off into a public drain of an oasis and used for irrigation (recycling).
- In some cases the public drain of a village or town was used.

The waste cartons of milk recollected from shops were most of the time dumped into a container on the yard of the plant and at a later stage transported to an official public dumping place.

Generally, the environment will become a growing concern in the country. Wrecks of cars, rubbish, plastic bags and so on are scattered everywhere, especially outside the urban areas, in spite of the efforts of the Government to keep the roads and cities clean.

Chapter III

Favourable and restrictive factors in the development of the dairy industry

1. Favourable factors

In spite of the harsh weather conditions in the Kingdom favourable possibilities for keeping dairy cattle exist.

Regardless present restraints in the agricultural sector concerning water supply (many not renewable resources, in all probability and salination of the soil, many acres of fertile (good texture) soils are available. Water problems are amply discussed in the next paragraph.

The team identified and visited suitable milk production areas in the Western mountainous and hilly areas like Asir and Najran. It is noted that also in Jizan and Tabuk (north) milk production is possible.

Rural farmers in those areas may realize a better future, thanks to an improved infrastructure and favourable natural conditions. Traditional (low yielding) cows should be replaced by high productive cows. The milk produced should be collected in well-equipped cooling centres and transported to existing recombining dairy plants in Jeddah. A supply of fresh milk already exists, mainly from Riyadh, to the western, populated cities like Jeddah, Makkah, Madinah and Yanbu. Altogether, such operations should be based on a signed contract.

Another favourable point is the fact that consumption of milk per head is still increasing while the total population is growing as well. This means that there is scope to extend the milkproduction sector.

2. Restrictive factors

The specialized dairy farms (with processing plants) are mainly situated in the eastern part of the Kingdom, where in all probability renewable water resources are not available apart from some oases (e.g. in Hofuf).

As a consequence, the enormous quantities of water used for irrigation of fodder crops (wheat and barley) are a real future risk because of the likely non-availability of sufficient water in these areas. On top of that, there also is visible danger for salination of agricultural fields.

An increasing water consumption requires deeper wells. Generally, the water of these wells has a high salt content and a high temperature (about 65^{o}C).

This water has to be cooled down by an evaporation system, which through concentration leads again to a higher salt content of about 15%.

To avoid salination of the soil, more and more water is needed. Now already some fields are visibly covered with a (white) salt layer. Using not renewable water resources may cause penetration of sea water, in particular in the coastal areas.
For that reason, the mission confirms the intention of the Kingdom's Five-Year National Development Plan to economize on available water resources.

A high temperature in arid areas may lead to mortality of cows and calves; heat-stress causes a decline in milk production, particularly in the summer period (April - August).

Problems with pregnancy in the harsh summer period result in a higher milk production output during winter season (November - February). However, consumption of milk in that season is decreasing. Those problems will only partially be solved by introducing cooling facilities (water sprinklers) more shade and mechanical ventilation systems into the cowsheds.

Altogether there is still a long way to go to improve the current balance between winter and summer as far as milk production is concerned.

In 1989, a list was made of a number of farms with effective adjusting measures by the Ministry of Agriculture and Water and the results are as follows:

Months		**Percentage of Annual Production**	
		Average/Month	**Total Period**
April-July	(4)	9.0	36.0
August-Oct., March	(4)	8.5	34.0
November-February	(4)	7.5	30.0
			100.0

Some farms have improved their milk production in the summer period (April - July) remarkably since 1989.

As fresh milk production is mainly concentrated around Riyadh, the surpluses of milk in the winter period are also found in these areas. This automatically leads to a very strong competition between the producers of fresh milk.
During the mission the team noted or observed the following findings:

- Dumping of some milk into the desert, reportedly sometimes over 15% of daily production during inter period.

- An overall drop of prices for fresh dairy products.

- Export of final products to neighbouring countries at relatively low prices.

- An even further extended marketing (distribution) system.

- An exaggerated service to retailers, particularly concerning delivery times, conditions for payment, responsibility for expiry dates of the products, etc.

Although the production of sterilized (UHT) milk may to a certain extent solve the problems arising from seasonal surpluses of fresh milk, the word "fresh" being mentioned on the packaging is very disputable. It should also be borne in mind that this type of milk requires additiona' costs and storage facilities.

In case the amount of milk during the summer period will increase by means of a higher number of milking cows this automatically leads to a larger surplus in winter time.

Each producer of fresh milk feels himself completely unprotected by the Government contrary to other agricultural or non-agricultural sectors; prices of imported milk powder and butterfat for the recombined industry are too low for a fair competition with locally produced fresh milk.

A solution for surplus milk could be found in enlarging the current range of dairy products. Development of new dairy products is difficult and expensive and cannot be undertaken by relatively small enterprises.
Some of the dairy plants have cheese-production facilities. However, the prices of imported (subsidized) cheeses are too low for an economic local production.

For the consumer there is no clear distinction between on the one hand pasteurized milk and sterilized (UHT) milk processed from fresh milk and recombined milk on the other hand.

In order to enable the consumer to make a clear choice in this respect, an advertisement programme and a clear labelling with regard to the origin of the product are really necessary.

Until now, no cooperation between the processors of fresh milk has been realized. Some efforts were taken in the past, but they failed. There have only been some irregular contacts between the processors (plants) but no common activities have been undertaken so far.

Some projects already face problems of liquidity due to weak marketing conditions caused by a too high number of suppliers.
A couple of dairy farms have already decreased milk production and have switched to beef production.

Chapter IV

Future goals and structural plan for reinforcement

1. Determination of medium and long-term goals

Security of food, e.g. in dairy products, can normally be fulfilled by self-sufficiency. Self-sufficiency in food products is economically sound when no limiting factors play an important role. Energy, for example, is in the Kingdom of Saudi Arabia no limiting factor at all. However, water may in this country be or become a limiting factor indeed. In its Fifth Development Plan the Government attaches great importance (1990-1995) to the implementation of the following "water policy" in the agricultural sector:

"Distribute land only in areas with high-potential renewable water resources; areas with critical ground water depletion rates will be identified and regulations introduced on appropriate water pumping rates and the areas to be cultivated".

It was not possible to quantify a feasible milk output in future areas with high-potential renewable water resources. Official data concerning these areas, to be indicated on a land-map for the operational planning of important agricultural sectors, were not available. Consequently, the study continued with field observations.
High importance should be attached in particular to the south-western region of the country where, apart from dairy farms functioning by means of irrigation (sprinkling), more natural water supply (rainfall) is available. Irrigation facilities (dams) are already in place. Traditional dairy farming is of great importance in that area and may rather easily be transformed into specialized small and medium-scale milk production.

Furthermore, in line with the goals of the Kingdom's Fifth Development Plan (1990-1995), the south-western region may offer consequent possibilities to raise the income level and welfare of rural inhabitants, thereby minimizing migration to the urban areas, and contributing to the achievement of regional population balance.

Over the last ten years, dairy farming in the Kingdom has proven that milk production is technically feasible. However, there are at present doubts whether milk production could be continued without any limitations throughout the country with water may becoming a limiting factor, at least in certain areas, in particular round Riyadh.

One should bear in mind, that the realization of financial feasibility is not an easy issue. In many places in the world with advantages like regular rainfall, a temperate climate, permanent pastures, etc. milk is usually produced at a lower cost.

Notwithstanding the absence of these advantages, aiming at security of food by local milk production in Saudi Arabia could be a justified policy in the light of some very important trumps: abundance of crude oil, resulting in a strong economy with high purchasing (importing) power and the presence of a high-level infrastructure.

Aiming at self-sufficiency in a high nutritional foodstuff like milk, is in general terms, a sound policy. In case, notwithstanding the above-mentioned limitations, milk production in those areas should be further increased in the light of Government policies, it is highly recommended to apply a more or less "preferential" water policy, i.e. to link the use of water for land to milk production should be preferred to water used for the production of other foodstuffs.

Altogether, the "water policy" to be applied in the agricultural sector should refer to:

- Areas with high-potential renewable water resources, and
- Preferences to the particular foodstuffs to be produced in those areas.

Taking such a "water policy" of the Government into account, as well as the license system in this respect applied by the Ministry of Industry and Electricity and assuming sufficient land for milk production will remain available in the long term (which may be the case in north-western areas and in particular in the south-western region, both hilly and mountainous) aiming at self-sufficiency in dairy products is a realistic goal.

In the first years to come, this self-sufficiency should first of all be focused on the production of liquid (consumption) milk and fresh dairy products. Afterwards, other dairy products presently imported, like cheeses, whole milk powders, condensed milks, etc. are to be replaced by locally produced ones.

Hence, the future goal, regarding the dairy policy of the Kingdom, could be determined as follows:

Local production of fresh milk should be promoted, but in a justified way (in balance with external factors)!

2. Growth projection

2.1. Total raw milk production

Details of growth projection, as formally supported by Government bodies and authorities, could not be deduced from the internal document. The most important growth indicators are mentioned in the Five-Year National Development Plan (reference 12, annex II).

An average growth rate of 3.8% per annum for total consumption of dairy products is anticipated during the current plan period. Production increase would amount to 4% per year during the corresponding period. The plan is not indicating the implications of the mutual relation between the fresh milk sector and the recombining industry. For the framework of general goals and criteria, within which the dairy sector would most likely develop, is referred to relevant sections of the report.

From (informal) personal communication it has been understood that the recent growth rate (about 10%) of fresh milk production on specialized farms will be maintained during the current planning period (see also reference 23, Annex II).

2.2. Concessional loan facilities for farming by specialized credit institutions

Government policy is geared to a further increase in operations of the Specialized Credit Institutions during the Fifth Development Plan.

The "loan target" of the Saudi Arabian Agricultural Bank (SAAB) amounts to an annual average of SR 1.4 billion during the Plan-period (Annex II, reference 12; Table 8.2).
Specifications as to agricultural sub-sectors have not been revealed as yet. Also the Directorates-General of Animal Production and Planning of the Ministry of Agriculture have not released financing priorities as to sub-sectors related to dairy farming and processing so far, which is fully in line with the nature (internal) of the Operational Development Plan for the agricultural sector.

However, the agricultural bank has a considerable number of newly requested dairy projects under evaluation. A total of 29 projects is being studied by the bank, with a total initial raw milk output of 102 million litres per annum. This represents an additional quantity of 50% of current raw milk production, not including the growth of herds.

Geographically, the planned dairy farms are concentrated in Al-Kharaj (40%), Hail (15%), Riyadh (12%) and the eastern part of the country (9%). It is worthwhile to mention that the Agricultural Bank is increasing its involvement in financing the production of fodder crops during the current (fifth) development period. More than 200 projects for forage production are presently in the process of loan evaluation.

The total increase in production would amount up to nearly 600,000 tons per annum, this is an increase of 200% if compared to total installed capacity.

Note
The level of realization during the fifth national development plan could not be indicated. However, with regard to the total additional irrigation water required for such new production, an indicative calculation shows that the additional demand would represent about 4% of the current total water intake for agriculture (consultants calculations and references 1.1. and 1.2.). Note that under the fifth development period, the government is aiming to reduce the total water intake in agriculture with an average of 8%.

The geographical distribution of the forage projects correspond more or less to the dairy project under evaluation: Al-Kharaj (50%), Eastern (20%), and Hail (10%).

3. Demand projection / consumption structure

3.1. Determinative factors

Population growth and urbanisation development

The anticipated national growth of population is estimated at 3.5% till the year 2000 (Annex II, references 34, 35, and 36). About 60% of total population is living in urbanized areas. Although government is encouraging, by the stimulation of a well balanced regional development policy, a decrease of the inflow of people from rural areas to urban conglomerations, it is foreseen that during the years ahead the process will continue.

Furthermore, a contributive factor is the strengthened process of Saudiization, which will strongly be supported by adjusted government policies. Moreover, the availability of housing facilities is sufficient after the successful and ambitious housing programmes in urban regions.
It is presumed that the inflow from rural areas, with a population growth similar to the national average, will be 50% of the national population growth (3.5%). As a result, urban regions will grow by an additional 0.7% (national average).

Immigration

A net immigration of 0.3% is foreseen, which is expected to decrease over the subsequent planning periods, and be negligible by the year 2010 (reference 12, Annex II). The net immigration into the country is presumed to fully affect the urban areas only. Consequently, the population there will grow with an additional 0.5% (the net immigration rate amounted 0.5% on the entire population in the period 1985-1990).

Effective income growth and income redistribution

The effect of a net increase of income on the rise in demand for fresh dairy products is presumed to relate only to about 20% of the total population in urban areas (thus 12% of the national population).

Although the real national income growth per capita will remain low over the fifth planning period, some sectors will show considerable growth figures under a balanced sector development policy of the Government. The manufacturing sector is projected to grow at an annual real rate of 6.5%. In certain sectors, employees will benefit from increase in real income.

The income effect will also be strengthened because Government is increasingly providing direct income support for the less affluent income groups in society, rather than a full continuation of price support policies all income groups would benefit from.

No figures concerning consumed quantities are available for that category. But, assuming an average consumption of 25 litres per capita/annum (national average), an income elasticity of demand of 1.5, and a real income growth rate of over 3%, the effective increase in demand will amount to approximately 5% per annum.

In relation to the present national output from specialized farms (240 million litres), and the population-group under review (20% of urban population), the total demand will increase with an additional 1%.

Effects of decreasing share of milk powder (retail packaging), and changing share of recombined milk in the domestic milk market

The total market volume increased with about 7% between 1990 and 1991. The recombining industry showed an increase of 17% in its market share (16.5%), the fresh dairy industry realized a growth of 11% (market share 40.3%) while the retail powder market showed an increase of 0.5%.

A steady downtrend of the milk-powder market share with an annual rate of 2.5% is registered and repeatedly confirmed by the industry, although upward corrections have been observed due to the specific conditions following the War in the Gulf region in 1990/1991.

Assuming a continuation of the downtrend (2.5%) of the national share per annum (at 40% market share it represents 1% of the total market), and an equal absorption by both the recombining and the fresh industry, the resulting additional demand for fresh milk products would reach at about 1.3 % per annum.

After the initial drops in market shares of the recombined dairy products, which were virtually caused by price changes for both the fresh milk products (down) and the production of the recombining industry (up), the mutual exchange seems to remain rather stable at present. In an attempt to determine demand development for fresh liquid milk products, in the calculation no further substitution is taken into consideration.

Effects of the production of long-life milk from raw milk

Long-life milk with fresh milk as basic material is rapidly becoming popular in the Kingdom. Currently it represents about 2% of the national milk market, or 5% of the fresh liquid milk market.

The products clearly meet the demand of a new group of consumers. The impacts on demand, also considering the production costs, are difficult to forecast at the present stage.

Effects from relative price changes

Price levels of competing consumer articles are important for the demand of fresh dairy products. Most important substitutes are recombined milk and milk-powder. Price changes for those articles are difficult to predict, but, also without further government intervention, it is believed that prices will rise, due to external market conditions (refer to IV, 5 of the report).
However, the real effect on demand is difficult to assess at this stage, also because of improved overall efficiency, both from internal rationalization and diversification, in the recombining industry, which would allow for relative price decreases in the future.

Fruit juices, rapidly becoming more popular in the market, especially in summer season, are an important product of the recombining industry. Retail price levels are presently similar for fresh milk and laban, but margins, both in processing and distribution, would allow for a downward adjustment of prices. Since juices are considered one of the most competitive products with laban in summer, it is evident that the recombining industry has a very strong, if not one of the most important, marketing instruments to influence market development of the most important article of the fresh dairy industry.

The effects of more general changes in price relations between essential consumer articles are difficult to predict. Detailed analysis of consumer preferences and household-budgets are indispensable for proper assessments. But, admittedly, because of a dynamical development of the Saudi food market, results of such surveys will rapidly loose practical value for planning purposes in marketing for the private sector and governmental authorities as well.

In order to stimulate increasing efficiencies in marketing, emphasis might be put on collection and timely dissemination of accurate and recent market information such as prices and marketed quantities for all participants in production, processing and marketing.

Effects of regional export development

Partly stimulated by the Gulf war, processors have strengthened their export position in the Gulf region. Nearly all processors, recombining and raw milk processors, are actively involved in exports. Marketing channels have changed with percentages between 10-30% thanks to the specific circumstances.

An indication of this is that some companies export already more than 15% of total production to neighbouring countries, e.g. Kuwait, more than 50%.

Effects of promotion, improved distribution networks, and changing food habits

Promotion is actively used as a market instrument by the raw milk processing industry. However, the experience is that with the fierce competition campaigns are more geared towards maintaining existing shares in certain market segments rather than aiming at an overall increase in consumption.

Distribution networks (supermarkets, groceries, shops) will gradually improve and thus contribute to an increase in demand over time. The quantitative impact is difficult to assess.

The contributive effect of increased demand of changing food habits should not be overestimated. The culinary habits are rather traditionally, and to what extent the relative change in milk consumption would be in favour of higher consumption figures per capita still remains to be seen, especially considering the ever widening range of food supplies and drinks in the market.

The best example refers to the rapidly increasing supply of a wide range of fruit juices, which are considered a major competitive article for fresh laban.

Effects of the fasting period "Ramadan"

The fasting period is normally characterized by a strong increase in demand. The last five till ten years, the fasting period has coincided with the summer season when consumption of liquid milk is traditionally at peak level. Consequently, seasonalities in demand were extreme during the foregoing years. However, the fasting period is gradually moving towards the cooler and winter seasons. This will relatively strengthen the demand in periods when, due to certain surpluses in the past, the efficiency of the fresh dairy sector has been put at high risk.

Although a quantitative figure is difficult to give, it is widely expected that there will be a considerable contribution to additional demand.

3.2. Calculation of demand development

Assuming that the consumption of fresh milk products is fully realized in urban areas, the anticipated aggregate growth rate can be composed as follows:

- regular population growth: . .	3.5%	(section 3.1.1)
- urbanization:	1.2%	(section 3.1.1)
- immigration:	0.5%	(section 3.1.2)
- effects of income growth: . .	1.0%	(section 3.1.3)
- substitution milk-powder: . .	1.3%	(section 3.1.4)
Total growth of demand	7.5%	per annum

The total calculated growth rate of the demand for fresh milk products is 7.5% per annum. The figure is a conservative estimation. Other factors, which are difficult to quantify, might have a decisive influence on effective growth rates. For deliberations is referred to section 3.1.

4. National dairy product supply

General

The main differences between "fresh" and "recombined" dairy plants can be described as follows:

The recombined industry produces a large number of dairy and non-dairy products and is managing a good rate of occupation of the equipment involved. All recombined milk is sterilized (UHT) and as a consequence the advantage is a later expiry date. Recombined laban is of somewhat inferior quality to the "fresh" laban with regard to structure and taste. Production of recombined dairy products is rather easy to manage because irregularities in milk output at farm-level don't play an important part.

All basic materials are imported. A choice can be made between skimmed milk powders, butteroil, butter, frozen cream and whole milk powders, most of them of different qualities and prices and from various sources.

Distribution costs of dairy products of the recombined industry are lower as a result of the distribution of a relatively large variety of dairy and non-dairy products at the same time. The long life processing system (UHT-treatment in combination with aseptic filling) results in relatively low returns from the shops.

The recombiners may support a certain price difference between the recombined milk and the "fresh" milk products on the consumer market but they are afraid to lose a part of the market if that difference becomes too small.

The recombiners have the feeling that they are the "underdog" because the production of fresh milk is stimulated by subsidies while prices on the world market for their own basic materials are rising and charged with an import duty of 12%.

Most of the recombiners are of the opinion that there will be a good future in store for "fresh" milk in spite of their belief in the good quality of their own products. Therefore, there seems to be a willingness to cooperate within the recombined sector.

At the same time, the "fresh" milk industry has the feeling to be unprotected against low prices for the basic materials of the recombined industry. They are against an unclear labelling of final dairy products sold on the consumer market. For that reason, the "fresh" milk industry more and more tries to cooperate with the Government.

Both dairy industries (fresh and recombined) suffer from a strong competition with the imported (whole) milk powders in consumer-ready packaging, from imported cheeses and from other low-priced imported dairy products, which are most of the time subsidized by the exporting countries (refer for price levels to Tables 8 & 9 of Annex V).

Butter Fat

- For the recombined dairy plants it is very easy to regulate the fat content of their products. Standardization is possible by mixing skimmed-standardized or whole milk powder with butter fat (cream, butter or butter oil).

- For the fresh milk plants standardization is more complicated. A special calculation, the so-called "fat balance", should be worked out.

  - If the fat content of the raw milk is too low for processing laban and/or whole milk (3% fat), part of the milk has to be skimmed and sold as low fat milk.

  - If the fat content of the raw milk is higher than 3%, part of the butter fat can be used for processing cream, sour cream, break-fast cream or ice cream.

Milk-byproducts

The dairy plants, currently in operation in the Kingdom, are producing liquid (consumption) milk and fresh dairy products like laban and yoghurt. This type of dairy plants does not produce byproducts.

Treatment of byproducts will certainly become an important issue as soon as cheese production on a large scale will take place. Establishing a central factory treating whey of various cheese plants may be an interesting investment.

Milk fat as a by-product of the milk hardly exists because no great difference occurs in the fat balance of incoming and ongoing milk and milkproducts. However, if there will be a trend towards slimmer's milk or low-fat milk (like nowadays in western parts of the world), there will occur a surplus in milk fat. The installation of butter machines is then needed.

5. International trade, structure, policies

5.1. Importation

Saudi Arabia has been an importer of dairy products for many years.

Main imports in Saudi Arabia in 1989 in tonnes and expressed in LME (Liquid Milk Equivalents). As skimmed and whole milk powders as well as condensed milks could not be differentiated in these statistics, data of the Office of the European Commission in Brussels have been used to point out the figures for these three types of preserved milks.

	in tonnes
Fresh Milk and Cream	1,714
Skimmed Milk Powder	159,174
Butter(oil)	24,426
Whole Milk Powder	485,100
Condensed milk	113,695
Cheese	485,310
	1,269,419

Source: UN Statistical Office Geneva

These trade statistics indicate the main imports only, apart from some concentrated whey.

Main imports in liquid milk equivalents (1,269,419 tonnes), represent up to 70% of total supply and include imports of consumer-ready goods as well as basic materials for the recombining industry. Whole milk powder, for instance is to a very large extent imported as consumer-ready good (in small packs for sale in stores) and partly imported in bulk packs for the recombining industry; unfortunately no quantitative distinction is possible as only one total import figure is available (see next page).

Year 1989 (in tonnes)

Fresh milk production (1)(2)	555,000 (30%)
Total main imports (3)	1,269,419 (70%)
Total supply	1,824,419 (100%)

Legend:

(1) According to Saudi Economic Survey of January 16, 1991 (reference 3, annex II)

(2) Of which around 290,000 tonnes of processed milk from 39 specialized farms.

(3) Of which around 220,000 tonnes of recombined milk.

In the future the policy will be to increase "water supply" within a justified percentage of the fresh milk consumption.

5.2. Dairy export policies (Export policy of foreign countries)

The outcome of the on-going discussions and negotiations which have started three years ago in Uruguay within the framework of the GATT (General Agreement on Tariffs and Trade), is at this stage difficult to predict.

However, at this moment some rough indications can be brought forward while one wants to forebode possible future developments in the world market.

- The world market in dairy products can from a marketing point of view to be split into:

(1) Consumer-ready goods such as evaporated milk, sugared condensed milk, whole milk powder, butter in small packs, cheese and casein/caseinates

(2) Basic products (semi-manufactured articles), mainly for recombining. It concerns skimmed milk powder, butter oil and whole milk powder (in bags of 25 kg), the latter being more and more used by the recombining industry.

- Contemplating the future of the world market in dairy products one has to bear in mind that in particular the dairy policy of the European Community will certainly imply a different outcome of both groups.

For policy makers, e.g. the European Commission, products with a high value added have a priority over semi-manufactured articles. The latter being the basic materials for the recombining industry. Export of consumer-ready products requires quite high investments by the exporting processing industry and trade. A sound export policy of the European Commission will undoubtedly give preference maintain certain support in subsidies for consumer-ready goods (high added-value) to basic products.

- In its endeavour to save expenses in agricultural policy, the European Commission will in all probability continue to use the instrument of tightening the milk reference quantities (quotas) as a part of a reform of the common agricultural policy. Diminishing milk quotas directly leads to minimal production of skimmed milk powder and butter, the intervention products in the European Community. This decline in supply of skimmed milk powder and butter(oil) results in an increase in the world market prices of these basic products for the recombining industry.

- Hence, foregoing points very probably indicate an increase in the prices for the basic products of the recombining industry. The influence and impact of the policy of the European Commission on the world dairy market should not be under-estimated. The share of the European Community in this market is over 50% for the average dairy products. For some consumer-ready goods the share market is even over 80%. It may be said that the European Commission is price leader.

- The above-mentioned conclusion of higher prices for skimmed milk powder and butteroil will also remain applicable in case the negotiations of the GATT (General Agreement on Tariffs and Trade) should result in more multilateral free trade. In this light, it is New Zealand, the second biggest supplier in the world market and economically very dependent on relative high prices for dairy products as (skimmed) milk powder and butteroil.

6. Related matters, identification of other areas for future development

6.1. Sheep, goats and camels (utilization of their milk)

According to Annex III, Table 5 a considerable change occurred in number of cows, sheep, goats and camels in the years 1987 on 1988 (estimated) in comparison with 1986.

In several regions the number of indigenous cows considerably declined, i.e. the eastern region -23.4%, Riyadh -16.7%, Madinah -51.4% and Al-Baha -40.1%.

However, at the same time there has been a firm increase in the Northern region +82.1% and Najran +25.1%. Generally a decline of about 10% is observed. Reason of those variations are difficult to analyze but could be a combination of urbanisation, rises in feedprices or decreases of beef prices.

In 1988, there were still about 140,000 indigenous cows in the Kingdom which could be replaced by specialized cows. The average annual milk yield could consequently be increased from an estimated production of 2,000 litres to at least 6,500 litres. As a result the annual milk output could increase with 630,000 tons.

According to Annex III, Table 5 a decline of the number of sheep with round 10% and an increase in the number of goats with 8.5% and camels with about 3.5% are observed. In general the husbandry methods of those animals are labour-extensive and the milk yields of these animals average low in comparison with specialized cows.

Sheep are rarely used for milk production but mostly for mutton.

It is not always possible to replace sheep or goats by specialized dairy cows, because most of the pastures and grazing fields are not suitable for cows. However, there are possibilities to replace traditional sheep and goats by other breeds with a more efficient milk production. This surplus milk could be used for production of home-made cheeses.

6.2. Production of animal feed

Generally, complaints about the quality of the concentrated feeds are restricted to the irregularity of the quality throughout the seasons. Consequently dairy farmers are actively involved in calculating feed ratios at the farm in combination with advise of feed specialists in this respect.

This important subject should be examined in a more profound way. However, such a study is not covered by the current terms of references.

6.3. Water use and supply development

Water use

An advantage of the recombined industry is the relatively limited requirement of water: for 1 litre of recombined milk around 8,5 kg of water is needed, including water requirement for cleaning.

On the other hand, for production of fresh milk there is a need per cow/day for drinking and for producing feed (fresh lucerne) of around 7,500 litres of water *1. This means with a milk production of 20 litres per cow/day around 375 litres of water are needed per kg of fresh milk, exclusive water for young cattle *2. To this figure roughly 5 litres of water per litre of fresh milk, processed in the dairy plant, have to be added.

*1 and *2 = see next page.

Hence, approximately 380 litres of water are needed to produce 1 litre of fresh milk as final product, compared to 8,5 litres of water for 1 litre of recombined milk.

Watersupply

Considering the high level of water requirement for fresh milk production, regular water supply of an acceptable quality will be an important development criteria to continue existing dairy farms and/or establishment of new farms in the future.
Therefore, a well-balanced water demand and supply pattern should be designed per agro-hydrological region, for which clear medium and long term production priorities could be determined.

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*1 Based on:
a) production of fresh lucerne (20 tonnes DM/ha/year)
b) annual waterrequirement of 1,200 mm/ha/lucerne thus a total waterrequirement/ha 12 x 106 litre per kg DM 600 litre
c) feed energy per kg DM lucerne 760 FU
d) feed energy requirement per kg milk is 460 FU thus 1,6 kg milk production per 600 litre water use

*2 Additional concentrates have to be added.
DM = Dry Matter
FU = Feed Units

Chapter V

Programme recommended for the dairy sector development

1. Technical, economical & managerial recommendations

1.1. Milk production

Referring to the intentions of the Kingdom's Fifth Development Plan, the team of experts is in the position to underline the following goals:

- Creation of facilities to use available natural resources (subject to the optimum long term use of water, in order to minimize costs and subject to lower water consumption for major farm products)
- maximizing labour productivity by creating job opportunities for rural citizens
- improvement of the efficiency in production and marketing
- increasing the animal output, especially for milk, from a self-sufficiency in 1988-1989 of 73% up to 100%.

Taking into account the above-mentioned goals, it is recommended:

A.
To consider a freeze or even a restriction of dairy farming activities around Riyadh and subsequently to stimulate dairy farming in other region's.
At present milkproduction around Riyadh is characterized by a self-sufficiency rate of fresh liquid milk and fresh dairy products. In view of the national policy of the Ministry of Agriculture to encourage dairy farming in the rural area's and taking into account the limited water resources available around Riyadh, this recommendation needs careful attention. The consultants have been informed that some dairy farms are already considering to move or reallocate their farm to another region in order to have sufficient waterresource in future.

B.
To encourage establishment of large scale dairy farming in other area's than around Riyadh. Region's around Hofuf, Damman and Hail do have scope for establishment of those projects. At present only a few of these projects are present.

C.
To encourage and develop the dairy farming sector in particular in the south/western part of Saudi Arabia, in those, mountaineous area's more natural water resources are available due to a higher amount of rainfall. Furthermore, recently constructed dams have created the possible to provide irrigation facilities during a long period of the year.

It is suggested to stimulate the existing "mixed" farmers to put more emphasis on the milk production aspects of their farming operation. This could be achieved by:

(1) Replacing ingenious cows by "high productive" dairy cows
(2) Establishment of collection centres with cooling facilities for fresh milk
(3) Establishment/provision of Agro Service facilities, i.e. collection centres should simultaneously deal with services such as extension, education, animal health, milk hygiene and quality improvements as well as with giving opportunity to farmers for purchasing fodder concentrates and other farm requirements.

In order to determine the exact scope of milkproduction increase, as well as region's in which such a scheme can be encountered, a detailed survey and identification and project formulation study in needed Taking the above-mentioned points into consideration, self-sufficiency as mentioned in the Kingdom's Fifth Development Plan could be reached on a much more economic and solid basis.
In this way, not only the local fresh milk production will be increased but also the rural population is provided with jobs. The income level will undoubtedly rise, thereby minimizing migration to the urban areas. This contributes to another goal of the 5th Development Plan i.e. the achievement of regional population balance.

1.2. Fodder production and marketing

Availability of roughage at a reasonable price is an essential condition for developing dairy farming activities. Under certain circumstances expenditure for roughage is nearly equally important as the cost of concentrates in dairy farming (cattle need to have at least 30% roughage in their feed ration).
Recently, fodder has increasingly been exported to neighbouring countries without any restriction.

Assessing the medium and long-term domestic availability of fodder supplies against the background of increasing costs of irrigation water (limited availability) and the general priority to extend the domestic output of raw milk production, it is suggested to establish export regulations in order to contribute sufficiently to production efficiency of raw milk.

Export regulation issues could be discussed in the context of the regional economic community, the Cooperation Council of the Arab States of the Gulf (GCC). The issue indicates the need to establish a branch organization (in the preliminary phases a Commodity Board)

1.3. Transport

Taken into account the suggestion given in paragraph 1.1. there will be a need to invest in large road tankers in order to transport milk from the suggested collection centres in the western region to the existing dairy plants in Jeddah.

1.4. Milk processing

Technically spoken, the Saudi Arabian dairy industry is equipped with update technology.

As stated in Chapter 2, paragraph 4. (observations and recommendations on dairy plants visited), most dairy processing plants have a low utilization rate of their installed processing capacity.

Efficiency rates of those capacities, as well as financial returns on investments can be improved by using those capacities to their maximum by shifting to 16 or 24 working hours a day. Therefore, it is recommended to scrutinize each request for financing and subsidizing new milkprocessing facilities (or capacity extension) with regard to its location and the equipment utilization rate of dairy plants situated nearby.

In this way it can also be avoided that a new brandname (i.e. competitor) is entering into the already overcrowded milkmarket with regard to the number of suppliers. This is buoyed up by the idea to reduce the number of suppliers at the different selling points (par. 1.5.1.) as well as by the introduction of a fund for the cessation of processing plants.

An activity necessary from a technical point of view is the updating and training of the processing labourers and management in new technologies and product development (see also par. 1.10. of this Chapter).

1.5. Distribution

1.5.1. Distribution reorganization

In Chapter II various aspects have been mentioned of the need to simplify the existing distribution system.

In practice, the most suitable solution is a reduction in the number of suppliers (plants) of dairy products at the different selling points.

This reduction will only be possible if a good understanding and future cooperation will function between the producers of fresh milk (farms) and the dairy plants (fresh milk processors as well as recombiners).

1.5.2. Distribution facilitation

Quality standard development

The SASO has developed standards concerning processing, handling and storage of dairy products. In practice, however, dairy products are increasingly being sold in small shops (45%), where sale conditions are not always conducive to an optimal conservation quality and shelf-life of products. Therefore it is suggested to design general sales criteria for retail outlets of perishable dairy products.

In case the Government would pick up the idea of a national distribution network for fresh dairy products, thus benefitting the majority of urban consumers, it could be considered to purchase suitable cooling facilities. A well-organized distribution at the same time would further stimulate consumption of fresh dairy products.

Both the SASO and the Ministry of Agriculture and Water are involved in issuing labels indicating quality standards for dairy products. Nevertheless, product specification on the packaging is still confusing and provides unclear evidence of its contents.

A reconsideration of upgrading labelling is suggested, together with the introduction of a reliable quality inspection system of the respective products.

Varieties and quality of dairy products

The range of fresh dairy products is very wide. Although supplies are heavily dominated by only two suppliers, all suppliers are strongly competing each other, both on shelf-space in shops and on expiry date. Hence, suppliers are always emphasizing in their distribution to keep the periods till expiry date as long as possible.

As a result, consumers hardly any buy milk showing an expiry date after one or two days, but rather shift between brands to obtain most recently produced dairy products.

Suppliers accept the full responsibility for unsold products in retail outlets. The so called "returns" disproportionally contributes to total expenses and particularly to distribution costs.

By economizing on distribution, which for smaller suppliers would consequently result into lower turnovers, the current net margin on operations could be increased by 150%.

In order to facilitate sales of fresh dairy products for several days after production date, efficiency for the fresh dairy industry would considerably ameliorate, it is strongly recommended to start a campaign concerning safe consumption of fresh dairy products during shelf-life.

Any type of campaign should come along with adjusted quality standards for processing, distribution and storage. It should include guarantees for an effective control organization for a strict imposement of rules and regulations.

Since no branch organizations of the fresh dairy processing industry exist at present, it is proposed to integrate the activity with such organization in the future.

Diversification towards non-dairy foods

Tendencies to diversification into non-dairy consumption items occur, likewise the recombining industry is developing dynamically. It is advised to study the licensing for diversification by the fresh dairy industry in order to contribute to the improvement of distribution efficiency.

The issue could be considered in combination with the proposal concerning cooperation between the recombining industry and the fresh processing sub-sector.

However, any plan of an (partly) integration of activities of dairy farmers/processors with recombining companies should come along with possibilities for financial participation so that potential long term benefits for dairy farmers from further prospering of the fresh dairy sector are optimally safeguarded.

Supply conditions of essential foodstuffs

In the planning process attention should be given to a balanced price development of essential food items. Disproportional support to sub-sectors could have repercussions on the demand for dairy products.

Preferably, measures supportive to a gradual growth of supplies should more and more be emphasized, only in order to diminish market disruptions. The approach is especially of importance for dairy products in which complex demand structures exist between competing products: milk-powder; fresh products and recombined products.

1.6. Consumer Market

1.6.1. General

The Fifth Development Plan indicates that the demand for dairy products is still growing with an average annual growth of 3.8%. However, if in this figure the annual growth figure of the population (3.7%) is included, is not known (for demand projection and consumption aspects, refer to Chapter II, sections 3, and 2.2. respectively).

Beyond these figures there are certainly more possibilities to increase consumption, for instance, by:

- A school milk programme
- Advertising with a special target to teach the public about the nutritional values of milk, etc.
- Clear labelling to distinguish fresh (pasteurized) milk, sterilized (UHT) milk from fresh milk, recombined UHT-milk, etc
- Introduction of typical Arab or middle-eastern dairy food from home-made to industrially made, etc.
- Improvement of taste and external quality of the products.

A large number of new dairy products are introduced in the Kingdom, partly already imported. However, those products can be produced locally if there would be cooperation between the dairy plants, supplemented with an appropriate support policy of the Government on import duty subsidies.

1.6.2. Consumption habits and consumer's preferences (household-budget survey)

Consumption of milk-products from raw milk has rapidly increased in recent years. As a consequence dairy farming expanded accordingly and more emphasis is put on a further expansion of the sector by the Government as well as the private sector.

However, consumption of dairy products is lagging behind the relatively strong growth of other essential food items (meat, poultry, eggs, rice, vegetables and fruit). Considering the rather complex interrelation of the three major components in the dairy market: milk-powder (40%), recombined products (20%, incl. UHT from fresh milk), and fresh dairy products (40%) details on consumer preferences are indispensable for proper planning of the dairy sector.

Comprehension of consumers of the quality of fresh milk-products also looks poorly developed. Recent (limited) research revealed that nearly 50% of respondents has doubts concerning the use of milk-powder in the production of fresh-milk articles.

It is strongly suggested to conduct a profound survey on consumption habits and preferences also in relation to relative price levels of essential dairy products and other important food items.

It is appreciated that individual companies have conducted various surveys, but it is recommended that such a survey should be conducted by an independent organization, so that results can be used by all partners in the dairy sector. Ideally, a branch organization (Commodity Board) would be the appropriate authority.

1.7. Regional marketing

Export marketing of final products

Export of dairy products has always had the attention of the industry, including the raw milk processors. More recently, partly also stimulated by the War in the Gulf region, more emphasis has been put on export development. This activity is receiving much attention of both the recombining as well as the raw milk industry.

Exact figures are not available, but at least 10% of the raw milk production is currently exported. In addition, projections would indicate progressive growth potentials in the (near) future.
As a result the stability of the national supply and demand balance, with in itself a certain number of uncertainties, is under additional pressure due to external medium- and long term influences.

There are neither formal export regulations in the Kingdom for (fresh) dairy products nor import regulations in neighbouring countries. In order to stimulate a gradual development of the raw milk industry, the introduction of proper and consistent regulations is highly desirable. Arrangements should be settled by the proposed branch organization, in cooperation with governmental authorities and the regional trade co-operation authority (GCC).

1.8. Government commitment to medium-term support services

The financial feasibility of integrated dairy farming, milkprocessing and distribution is characterized by a relatively high sensitivity to relatively small changes in revenues and/or expenses (under the prevailing direct and indirect support facilities of the Government).

The Government is highly involved in subsidizing on certain items and concessional loans.

Development of dairy farming, and establishment of distribution networks, are long-term initiatives. General gestation time till full maturity is about seven years. Therefore it is suggested to provide a clear indication on farming and processing policies, and facilities on the medium and long-term, so that (small) farmers and processors can further develop their activities with decreasing risks. In this way the supply of an essential food item will be stabilized and economized.

In this context much attention should be paid to small-, and medium-scale farm development the latter would be fully in line with current development priorities of the Kingdom.

1.9. Investment opportunities

General

The private dairy sector is aiming at diversification of product assortment within the liquid milk market. Various initiatives in the production of new dairy products are receiving due consideration for implementation. Details are not known because product development and related investment plans are confidential.

It is suggested that the first priority of the private sector should be focused on the establishment of a national dairy organization who than would be made responsible to assist from their point of view the Government in formulating a dairy development strategy (see also Paragraph 2.2.1 - Organizational aspects).

Subsequently, the private sector than could investigate in detail the technical- and financial viability to establish new dairy farms and other food processing industries. Investment opportunities for the establishment of new industries are:

A) Fresh soft and hard ripened cheeses
B) Sweetened and non-sweetened condensed milk
C) Canned cream
D) Instant whole milk powder
E) Baby milk powder and
F) Ice cream

Although there are opportunities to establish a local industry for the production of starter cultures and rennets as well as a packing material industry, the consultants are of the opinion that those two activities should not have a high priority due to the reason that those sectors are mainly in hands of two or three companies who do monopolize this industry. Any private initiation can only be started in close cooperation with those companies. Same applies to item E (baby milk powder).

A local production facility for butter and butter-oil seems to be somewhat unrealistic when taken into account the average low fat content of the local produced milk. In case this % will be increased up to a level of > 4%, such an industry could be established.

For information only brief investment profiles are given in Annex IX.

However, to be able to give those new industries a real change to develop, the Government should apply, in due time, an adequate import policy on those products to be produced by the new local industries.

It always is recommendable to strive for self-sufficiency in a really strategic way in stead of policies and direct subsidies for individual investment plans (micro level). A "strategic way" means a macro level and successive implementation of first product 1 (market 1), then product 2 (market 2), etc.
For the planning of those projects, specialized preparation missions are suggested.

The Government should stimulate and realize the following short and long-term investments:

Short Term

1. Cessation premium for some fresh milk processing plants, i.e. compensation of fixed costs if processing is terminated.

2. Subsidies and loans to replace indegious dairy cows by high productive dairy cows.

3. Establishment of collecting centres equipped with

   - Weighing facilities for the milk from the farmers
   - A laboratory to check the quality and composition of the milk as well as possible diseases (mastitis)
   - Offices for a veterinary, a dairy specialist (education) and artificial insemination.
   - Cooling and storage facilities for the raw milk
   - Road tankers
   - Storage facilities for fodder, concentrates, farm equipments, etc.

4. Additional investments for the recombined industry in order to facilitate raw milk intake from road tankers.

5. Establishment of cheese production facilities, apart from a cessation of processing fresh milk into pasteurized milk and laban; it may be realistic to produce fresh (white) cheese on a small-scale level (15.000 ltr/day). Although this looks non-economical, production of special types of feta cheese (through Greek/Bulgarian techniques) can be viable if this cheese is sold exclusively). For this purpose, the liquid milk plant can be transformed into a cheese unit. Quite a few recombining plants already produce this type of cheese on small scale. Ultimate size and needed capacity of this industry can only be determined after careful assessment of the national market.

Long Term

Long term investments will to a large extent depend on the level of reorganization and cooperation. As a result of a better cooperation in processing, marketing and distribution it is anticipated that there will be a substantial reduction of costs involved. This will give more financial possibilities for creating a sound investment policy.

As stated earlier, areas in which such investments could take place are, according to local sources, production of:

1. Sweetened and non-sweetened condensed milk
2. Canned cream
3. Instant whole milk powder
4. Baby milk powder
5. Ice-cream and frozen dairy products
6. Butter and butter oil
7. Starter cultures and rennet
8. Packaging materials for dairy products

Although investment in those areas seems to be necessary to obtain and sustain a policy aiming at food security by self-sufficiency in dairy products it is doubtful if those investments will be technically and financially viable.

At present some of those investment areas are dominated by a few multinationals, holding exclusive rights on their manufacture technologies (trade secret), distribution and pricing policy.

1.10. Recommended technical assistance

1. National Dairy Organization

A study could be made of the establishment of a National Dairy Organization, that coordinates the different elements and sectors within the dairy industry. Such a study would establish a blueprint for its structure, its functions and duties.

2. Farm management survey

Execution of a detailed farm management survey on dairy farming to current production systems, and scale of operations.
Issues should relate to:

- economic development of existing units
- consequences of a changing (adjusting) scale of operations/ farming
- increasing costs due to water-availability
- financial consequences of costs due to regionalisation of dairy farming throughout the country
- evaluation of support services of the Government and future requirements
- profound evaluation of quality and availability of production inputs (financial services; concentrates; health control etc.)

The activities could be attached to the proposed expatriate position within the Ministry of Agriculture and Water, but also a more independent counterpart organization (Ministry of Planning) could be charged with the survey.

3. Consumer budget survey / consumer preference survey

Fundamental data on consumer behaviour and preferences for food items are not available. For planning purposes, more information is needed, especially under the current readjustment of economic development programmes in the Kingdom, the rapidly and constantly changing conditions in the food market, and the strengthening and promotion of regional development (affecting consumer preferences!).

The survey should not be limited to dairy products but should also include important food items such as: meat (types); eggs, fish, fruit and vegetables, pulse crops, cereals, and other essential consumer items (housing, transport etc.).

Results of the survey could:

- contribute to a more balanced growth of the dairy sector (fresh and recombining)
- promote product diversification
- provide better understanding of produce quality
- stimulate import substitution of food articles, thus contributing to strengthening and developing of local food industries
- indirectly, support agricultural development
- indirectly, support industrial supply industries (packaging; small-scale industry promotion)
- regional trade promotion

4. Support to regional development of dairy farming

Upgrading and development of the existing "rural" mixed dairy farming sector has been proposed in the western part and other regions of the Kingdom. Provision of technical knowhow, funds related to the introduction of new production systems and technical infra-structure (i.e.: on-farm facilities; collecting centres) together with organizational improvements, suitable issues for external participation, are needed.

5. Funds required for cessation of processing units

The participation in such a cessation programme should be on a voluntary basis. The compensation premium should be negotiated within a special milk committee of the proposed national dairy organization.
For calculating this compensation premium, following important points should be taken into account:

- Fixed costs evaluated by an official independent financial auditor and
- Current throughput of liters of milk
- Brandname (goodwill)

Financing a cessation (buy-out) programme as proposed is needed. Such a contribution of financial means should preferably be linked to external involvement for an organizational development of the dairy sector as proposed in the report. Including financial facilities would considerably contribute to effective organizational adjustments (see also par. 1.4. of this Chapter).
More study is needed in order to define an detailed cessation programme including identification of number of participants (processing capacities) and amount of Funds needed).

Dairy plants, linked with dairy farms having less than 500 dairy cows could be considered to participate in this cessation programme.

6. Support to local packing industry

One of the price affecting factors in the dairy industry is packaging cost. Since the Kingdom has only one local plant for manufacturing paper packages there could be a need to strengthen this industry.

The real needs were not assessed during the mission, but processors of dairy products were frequently complaining about the low quality of domestically produced packing materials. Also because of a further strengthening of international operating companies, support to the domestic industry seems justifiable.

7. Education and training

Although the country is lacking in any specific education facilities in dairy technology on primary, secondary and college level, it is not recommended to establish such a particular education system if the relatively low numbers of students to be trained are taken into account. However, there is certain a need for one national or some regional vocational training centres where dairy plant employees (at all levels) can receive tailor made refreshment courses.

Establishment of national or regional "technology training centres" will definitely increase the understanding of the processing technology and skills of labourers and management.
Main issue's for training should be:

- processing technology management
- product quality control and development
- preventive maintenance and repair

This centre should not only be engaged in organizing training courses, but should also provide advisory services (trouble shooting) and should compile specific technical bulletins to be distributed to all dairy plants.

A third activity of this "technology training centre" could comprise activities directed to a "quality promotion office" as mentioned in chapter II par. 4.

To establish such a centre, investment is needed for the construction of the necessary civil facilities and for the purchase of specific quality testing and laboratory equipment. In addition, to organize those specific courses and services it is needed to train at least five local instructors as well as one or two product-judges.

Because such a centre is mainly beneficial to the (commercially) orientated dairy plants it is suggested to operate such a centre on a similar basis, i.e. all running costs should be paid for by the user. The Government should pay for all investment made (subsidy/grant).

Operation and management of such a centre should be a self-supporting activity, preferably attached to private or parastatal agencies such as the Saudi Consulting House.

See also Annex X for Technical Assitance Profiles.

2. Policy recommendations

2.1. Policy towards self-sufficiency

The International Trade/Dairy Export Policies (Chapter III 4.2) can be summarized by the conclusion that in the future prices of the basic materials for the recombined industry will increase. Because of this and the Government's policy aiming at food security, there seems to be (at least theoretically) only one direction to go forward, the way of self-sufficiency in dairy products by promoting local fresh milk production.

Problems arising (with regard to increasing local fresh milk production)

- The Kingdom's Fifth Development Plan is stating (page 196):

  "Further large scale spatial expansion of agriculture would lead to a critical imbalance between water demand and sustainable water supply, which might negatively affect the role of agriculture in the long term. Agriculture is generally thought of as an infinite activity with permanently renewable annual cropping patterns."

- The current local fresh milk production in winter periods already provokes a surplus of around 15% of the daily production. Increasing the fresh milk production will boost this surplus even more.

Conclusion

As mentioned in Chapter III 1. (Future Goals), local production of fresh milk should be promoted, but, in a justified way. It is recommended to make a professional study for the benefit of a justified use of ground-water in agriculture prior to promoting self-sufficiency in <u>all</u> dairy products. This promotion should first be restricted to local fresh milk production for the processing of liquid (consumption) milk and fresh dairy products only. Afterwards, at a second stage, a review of the dairy policy will very probably show that the next priority should be given to local production of cheeses (salted soft and/or ripened hard). After that, the production of condensed milks, milk powders, etc. should be promoted.

Taking the "surpluses" of fresh (raw) milk into account, a renewed appeal should be made to the national responsibility of the recombining industry to assist in the processing of fresh milk, when necessary.

A better geographical distribution of milk production and processing should be stimulated to avoid disruptions in milk supply as a consequence of failures in water-supply, animal diseases, restrictions in physical distribution facilities, etc. This is why the north-western and south-western regions have to be developed for milk production. This, of course, will take time.

2.2. <u>Preconditions</u>

In order to follow as economically justified as possible the aim of self-sufficiency in dairy production, there are at least two pre-conditions:

A <u>Requirements of the sector itself</u>

The willingness of the dairy sector as a whole (farms, fresh milk and recombined plants) to act together in facing the problems any surplus in fresh milk, of over-capacity in processing equipment, of failures in marketing strategies, etc. To this end, organizational requirements on a more cooperative basis should be fulfilled (see 2.2.1).

B <u>Tasks for the Government</u> (see 2.2.2)

2.2.1. Organizational requirements

Most countries with an advanced dairy industry and trade have, apart from processing and sale enterprises and frequently on a cooperative basis, a national organization or federation or the like. Some countries do (did) even have more than one federation but often they merge later on.
In case industry and/or trade are very much orientated to a cooperative structure, the organization often has a certain link with a national (dairy) farmers union.

The main objective of a national dairy organization can be formulated as: "to take care of common interests of the associated members".

The organization's task on secretariat level can be:

- to organize meetings for the board and platform discussions on policy matters.

- to organize sessions for specialized working groups on technical or marketing issues.

  The problems arising with liquid milk returns in connection with the expiry date are specific questions to be discussed within a national organization.

- to undertake or formulate common tasks.
  In this field there are plenty of subjects and areas to contribute to and/or to co-ordinate, of which the most important refer to:

  - o nutritional education
  - o promotion/advertisement of milk consumption
  - o pricing system for raw milk (on composition, quality, etc.)
  - o human resource development (training)
  - o environmental issues
  - o fundamental research (product development)
  - o other services, like veterinary assistance and extension
  - o the establishment of a school milk scheme;

- Last but not least, to regulate the problems of fresh milk surpluses by a special milk committee.

Establishment of a national dairy organization should take place in a really professional way. This organization must be an official body with statutes and not merely a "club". It is strongly recommended to create one national organization, i.e. for the entire dairy industry (fresh and recombined milk). There should be the possibility to deal with specific fresh or recombined milk problems in separate working groups, if (temporarily) desired.

The national organization should, in particular by his Board, be an association with strong influence on policy matters. On top of a relatively stronger influence, quite some expenses will be saved by common activities in one single organization.

It should be clearly stated that processing and trade of milk remains the responsibility of the dairy company, as a member of the organization. The task of the national dairy organization is restricted to, neither more nor less than, the coordination of common interests of members. This task can only be fulfilled effectively and efficiently if all dairy plants (fresh and recombined) will become members.

Once the Saudi national dairy organization has passed its initial (not easy) years, the time may be ripe for enlarging the organization with "associated" members from the five other countries of the Gulf Cooperation Council.

However, first of all the national dairy organization in Saudi Arabia should run smoothly before neighbouring countries are invited.

The Kingdom's real aim (food security in milk) will never be reached if the production of recombined milk by imported basic materials continues to go on. The recombining industry should contribute to sound Government policies. To this end, a solution has to be found for the surplus of fresh milk causing a downwards trend in the overall prices.

The demand of the recombining industry to participate in solving the problem of surpluses in fresh milk is not ambitious. Advantages of the absence of surplus milk (an overall increase of milk prices) are appreciated by the recombining industry as well.
Participation -to be based upon a signed contract- should contain the intake for processing of a proportional part of the surplus milk, proportional to the quantity of basic materials imported for recombining. Surplus milk is offered at a calculated price through a special milk committee of the national dairy organization. In case the recombining industry is for some reason or another, not interested in moving into fresh milk processing, they may expand or start production of fruit juices, etc. as the investments are fully apt for this type of industry.

2.2.2. Tasks for the Government

Marketing of finished products is an extremely weak point within the dairy sector. This is caused by the sharp competition at retail level while even in winter time dumping of milk into the desert has taken place.

The caused for this problem are a too high number of suppliers in the retail market and each of them having overcapacity in processing.

This downwards spiral of declining prices has to be stopped as soon as possible as for some dairy farms have already decreased milk production and switched to beef production. In this way, the goals of self-sufficiency in dairy produce are counterworked.

In order to stop that downwards, spiral at the mercy of shops and consumers, some initiatives from the side of Government need to be taken.

Granting of licenses for processing should, for some years at least, be terminated or at least be carefully assessed.

A cessation premium scheme should be created for processors willing to stop completely. They should be compensated by a premium for the fixed costs involved. The intake of farmmilk should be guaranteed by a several-year contract.

Government policies focused on promoting local milk production have shown remarkable successes in the past. Some shortcomings, however, must be mentioned, such as:

- Continuation of (subsidized) settlements of projects around Riyadh where a high rate of self-sufficiency in liquid (consumption) milk is already achieved and where water - availability in future may become a problem in future

- Prices of imported basic materials for recombining are not at all in balance with the cost price of the fresh (raw) milk,

- Low priced whole milk powders in consumer-ready packaging are abundantly for sale in shops.

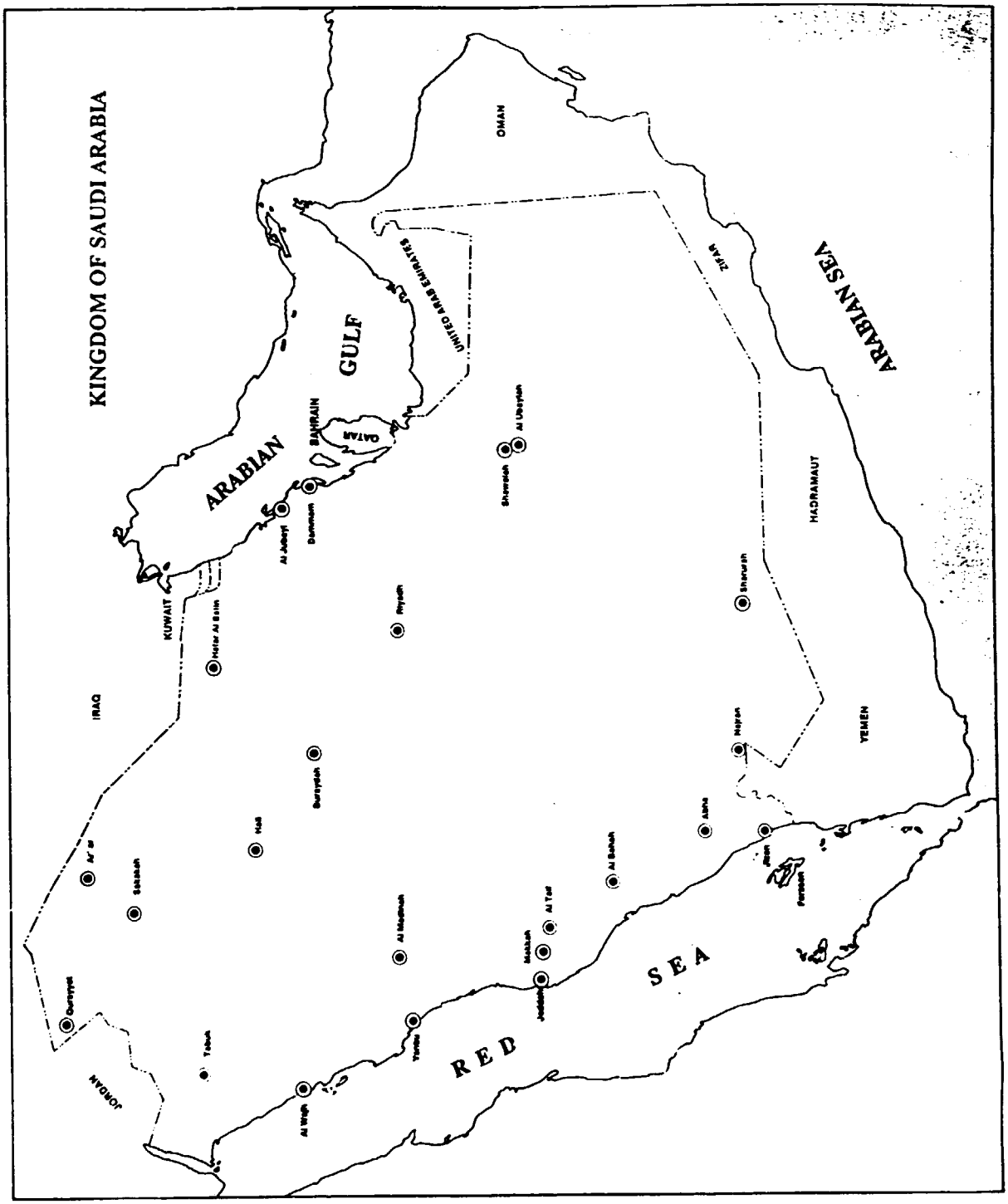
Within such a policy-framework, competition cannot work on a fair basis but will be even sharper.

For the current marketing problems a solution has to be found in a common responsibility, shared by the Government and dairy sector.
In this respect, the Government should commit itself to (pre)financing the buy-outs involved.

As some endeavour to a closer cooperation within the dairy sector itself has failed, the Government to the Saudicould delegate new initiatives to the Saudi Consulting House.

Another important Government task concerns the obligation of the dairy industry for a clear labelling of dairy products to inform the consumer.

Annexes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Najran
Sharurah
Jizan
Farasan
Al Wajh
Qurayyat

Annex I - Ministries, governmental and private organizations involved in agriculture in Saudi Arabia

1. The Saudi Consulting House

2. Saudi Arabian Agricultural Bank

3. Saudi Industrial Development Fund

4. National Agricultural Development Company

5. Production and Processing Cooperatives

6. Financial Institutions

7. Interregional Organizations and Companies

8. National Trading and Education Facilities

1. The Saudi Consulting House

The Saudi Consulting House (SCH) was established by Royal Decree in 1979. It replaced the Industrial Studies and Development Centre and is presently performing services in engineering and economic, managerial and legal fields to Government departments, businessmen, industrialists and potential investors in the public and private sectors.

The main objectives of the SCH are to develop national consulting resources required to encourage economic development in all fields, in both private and public sectors and to develop and train national manpower resources in the field of consulting, so as to decrease reliance on foreign expertise in the long run.

In order to attain its objectives, the SCH is undertaking a variety of activities, including promotion of feasibility studies, marketing studies, studies on investment opportunities, regional and urban planning studies, evaluation of proposals, training programmes, and publication of documents on subjects relating to industrial development issues.

The provision of technical assistance to Government Departments, as to specific requests, and during project implementation and operation is an important activity of the SCH, which service includes among others the following
reviewing, amending and approving technical specifications and drawings for factories which will be located in industrial cities, reducing operating costs, designing and implementing management, financial and technical systems.

The SCH initially operated on a commercial basis as a consultancy organization. Recently, in 1989, the SCH was transformed to a general Government organization, administratively related to the Ministry of Industry and Electricity (MIE), but with a separate legal autonomy.

In 1990, a Cabinet resolution was passed, approving the structure of SCH's Board and Directors, chairman is H.E. the Minister of Industry and Electricity, other members are the Director General of SCH plus representatives from MIE, Ministry of Finance and National Economy, Ministry of Planning, Ministry of Commerce and three representatives from the private sector. The SCH has three main departments:

- Economic and Management Consultancies Department (including economics, agriculture - Agricultural Consulting Unit- engineering, accounting, business administration and statistics
- Engineering Consultancies Department (including civil, architectural, electrical and mechanical engineering)
- Administration and Finance Department (including Information and Public Relations Unit)

The main office of the SCH is located in Riyadh and it has two branches in the Kingdom, Damman and Jeddah.

2. Saudi Arabian Agricultural Bank (SAAB)

The Saudi Arabian Agricultural Bank, headed under the Ministry of Agriculture, is an important credit institute for financing investments in agriculture. Although the Government policy concerning diversification of financing sources for agriculture is aimed at an overall increase of involvement of commercial banks, the SAAB is still the single largest financing institution for agricultural development in the country.

The Board of Directors of SAAB includes representatives of the Ministry of Finance and National Economy, the Ministry of Agriculture and Water, the Saudi-Arabian Monetary Agency and four representatives of the private sector.

The share of commercial banks in financing projects in agriculture amounts up to about 11% of the total loans in agriculture in 1989 (references 4 and 8). The agricultural bank also carries the responsibility for payments of subsidies, which explains the dominant position of the Bank.

Since its establishment in 1964, the total annual loan amount steadily increased with a peak of SR 4.2 billion in 1982/1983. Thereafter the loan volume of the bank decreased. In fiscal 1989/1990, the total value of the loans amounted to SR 0.85 billion.

The bank is mainly concentrating on the provision of medium-term loans (10 years). Relating to the total value of loans provided in 1989, less than 0.5% referred to short-term loans, which share represented nearly 5% of the total number of loans.

About 50% of the total loan volume concern loans below an average amount of SR 400,000 representing about 92% of the total number of loans issued during fiscal 1989/1990. About 8% of the loans represent the remaining 50% of the total loan volume, with an average loan amount of SR 1.3 million.

The latter category mainly refers to projects in wheat and/or forage production, greenhouses construction and broiler and dairy farms. Loans for agricultural projects comprised about 23% of the total loan volume of the bank in fiscal 1989/1990.

Since dairy farming has started to develop, the bank assisted in the financing of 32 dairy farms out of a total of 39 dairy production units. The initial aggregate production capacity amounted to 108 million litres of raw milk per year, which, at present (1990) represents about 40% of total raw milk production by specialized farms in the entire country (ref. 5 and 23). In fiscal 1989/1990 two dairy farms with a combined initial annual capacity of 6,800 litres were under implementation.

Forage production projects received due attention under the Bank's activities. So far, the Bank has financed about 65 projects with a total annual output capacity of 175,000 tons. Projects presently under construction represent an additional production of 150,000 tons of fodder crops.

Loan approval for forage production represents about 16% of the total loan volume of fiscal 1989/1990 (including 1% of loan volume for projects for wheat and forage production).

Loan conditions

Loan requests are evaluated on the basis of clear criteria. Investments and needs for working capital are assessed on standard figures (ratios). Concerning the financing of agricultural projects the suitability of land has to be confirmed by the Ministry of Agriculture in case ownership of land has newly been issued, or by surveyors of the Bank. Furthermore, a detailed feasibility study has to be submitted. Generally, the land serves as collateral on the loan.

Out of the total requirement for financing, 75% is financed by the Bank up to and amount of SR 3 million. Over SR 3 million, the Bank only participates in up to 50% of the requirements. Own contribution thus represents 25% and 50% respectively.

Loans provided by the Bank are free from interest. Generally, the grace period on payment of instalments is two years. Repayments start at the end of the third year. If repayment would appear to be too difficult because of cash-flow problems, the grace period is extended accordingly.

Presently the Bank faces the highest arrears in payment of instalments since its establishment. In fiscal 1989/1990 the repayment amounted to about 76% of the total outstanding instalments. The highest repayment rate amounted to about 94% in the mid-seventies. To what extent the Bank is facing arrears in payments from dairy projects could not be revealed by the Bank as yet.

Government support and policies are clearly aiming at improving the self-financing level of the Specialized Credit Institutions, whereby repayments on outstanding loans will be sufficient for their new lending activities and various special lending programmes in the agricultural sub-sector.

Projects under Consideration

Government policy is geared to a further increase in operations of the Specialized Credit Institution Loans during the Fifth Development Plan. The loan target of the SAAb amounts to an annual average of SR 1.4 billion during the plan period (ref. 12, Table 8.2 - page 163).
Specification as to agricultural sub-sectors have not been revealed as yet. Neither the Directorates-General of Animal Production and Planning of the Ministry of Agriculture have released financing priorities as to sub-sectors related to dairy farming and processing so far, which is fully in line with the nature (internal) of the Operational Development Plan for the agricultural sector.
However, The Agricultural Bank has a considerable number of newly requested dairy projects under evaluation. A total of 29 projects is under study by the Bank, with a total initial raw milk output of 102 million litres per annum, which amount represents an additional quantity of about 50% of the current raw milk production, not including the growth of herds.

Geographically, the planned dairy farms are concentrated in Al-Kharaj (40%), Hail (15%), Riyadh (12%) and in the eastern part of the country (9%).
Worthwhile mentioning is that the Agricultural Bank is increasing its involvement in financing the production of fodder crops during the current (fifth) development period. More than 200 projects for forage production are presently under the process of loan evaluation.

The total increase in production would amount up to nearly 600,000 tons per annum, which quantity represents an increase of about 200% compared to total installed capacity under the Bank's financing efforts so far.

The geographical distribution of the forage projects corresponds more or less to the dairy project under evaluation: Al-Kharaj (50%), Eastern (20%) and Hail (10%).

3. The Saudi Industrial Development Fund (SIDF)

The Saudi Industrial Development Fund of the Ministry of Industry and Electricity is the major financing institute for industrial investments.

Investments in dairy plants have been cofinanced by the SIDF. The Fund participated in the financing of 22 dairy processing projects over a period of about 12 years, with a total loan volume of SR 250 million. The Fund thus contributed to the establishment of about 80% of the totally installed capacity in the country.

Although some rescheduling of repayment on instalments was approved by the Fund because of liquidity problems in the sector partly due to extension of operations, it seems from a banker's point of view, that the dairy processing sector belongs to the stronger industrial sub-sectors of the economy.

Details on the Bank's position regarding the provision of loans to the dairy industry were not revealed. But, due to the general loan conditions as delineated below, the Fund has built up a considerable knowledge of the dairy sub-sector, for both fresh milk production and processing and the recombining industry.
However, as to the Fund's own observations about two years ago a wide range would exist of efficiency in both fresh milk production and processing and the recombining industry, for which reason the Fund appeared reluctant to provide representative data on related subjects.

A further strengthening of the role of the bank is supported by the Government. A total loan volume with an amount of SR 4.5 billion is envisaged to be realized during the current national development plan for the entire industrial sector (ref. 21).

General loan conditions

Loans are provided without interest charge, but the Fund will charge pre-determined evaluation charges to cover its costs of studying and evaluating of the application and follow-up costs as billed by the Fund during the relation with the project (ref. 6 and 7).

The Fund participates in a project up to 50% of the cost. Project costs are defined as costs of fixed assets, pre-operating expenses and working capital are equal to the first three months operating expenses. The Fund is not cofinancing the purchase of used machinery or equipment.

The Fund required security on its loan. The Fund will mortgage the fixed assets, and/or personal or corporate guarantees, and possibly outside security in case riskier projects are involved.

The Fund sanctions loans repayable over a maximum term of fifteen years. The grace period, repayment instalments, and maturity dates are determined on the basis of the results reached through the study of the potential cash flow.

Once loans have been drawn down, the project has to meet the following conditions: presentation of an audited statement at least once a year, unaudited quarterly statements every three months and acceptance of visits (twice a year) by representatives of the Fund.

Principal and fees to be repaid on due dates, however, the Fund will provide assistance on request to help resolve problems in managerial, technical, marketing, financial and accounting matters.

Loan policy

New projects for the recombining of regular dairy products were excluded from financing some years ago, because sufficient capacity would have been installed so far: about 500,000 tons (dairy products only and not considering non-dairy products).

However, loan requests concerning diversification of the product range (cheese, ice cream, retail packaging of milk powder) in the recombining industry are still favourably considered.

Projects in the field of processing of raw milk are still subject to financing assistance by the Fund. Reportedly no recent requests have reached the Fund.

The participation in financing for extending the product range in the fresh milk processing industry by non-dairy products (juices, jams, pastes) appears not to constitute an integral part of the current lending policies of the Fund.

4. National Agricultural Development Company (NADEC)

The National Agricultural Development Company is a private company with the Government holding 20% of its share capital. The NADEC has taken many initiatives in agricultural production and processing in the Kingdom.

The Company is managing a dairy farm and processing plant and with the present production of raw milk it is third largest processor in the country. The farm started in 1985 and reached a daily milk production of 35,000 litres at the end of 1986, while a daily output of about 100,000 litres is foreseen at the end of 1991. Further expansion of the activities is under preparation and the realized growth rate will most likely be continued during the coming years.

The Company is characterized by a dynamic management which applies most modern production and processing techniques, executes research, occasionally in close cooperation with universities, and actively broadens its product assortment.
The Company reflects in fact, also due to Government's participation and involvement, the high standard of the dairy production and processing sub-sectors in the Kingdom.

5. Production and Processing Cooperatives

In the dairy sub-sector, cooperative organizations are virtually non-existing. Important reasons are that the modern medium- and large scale projects have been established too recently to experience a strong need for the formation of joint activities and especially, internal and external difficulties (e.g. marketing operations) have not provided sufficient reasons to initiate a cooperative approach of activities so far.

Although in the traditional sub-sector milk production is considerable, production locations are too scattered and individual output is too limited for starting feasible cooperative organizations.

An attempt to establish a cooperative among medium-scale, specialized dairy farmers (about 150 cows/farm) failed a few years ago. A group of 22 dairy farmers established a cooperative: The United Dairies Farms Company. The aggregate output amounted to about 40,000 ltr/day, with a plan to increase daily production to 100,000 ltr/day, which increase would partly be realized by the participation of smaller farmers in the region.

The activity started mid 1987, but due to insufficient financial means, organizational problems and external price offers from leading companies exceeding the internal farm gate prices, the company ended its joint processing and marketing activities by the end of 1989. Although the cooperative had the possibility to rent a dairy processing plant, the initiative never matures to a fully fledged cooperative organization.
Presently, the cooperative limits its operations to joint purchase of production means for some of its members.

6. Financial Institutions

Commercial banking for financing private investment projects has only recently started to emerge, especially under the development efforts of the Government to strengthen bank's capabilities to further increase their involvement in the provision of long term loans.
Commercial banks have always mainly concentrated on the issue of short term loans only, because about 90% of their financial basis is in short term liquid deposits.

The current (1991) percentage for short term loans (up to one year) is about 8 %. For a credit package covering a medium term period the current interest rate amounts to about 11.5%.

7. Interregional Organizations and Companies

The Gulf Cooperation Council (GCC)
The Cooperation Council of the Arab States of the Gulf (GCC) has started its existence in 1981 with the aim to realize an economic integration. A large single common market. The collective approach includes not only trade and economic integration, but also military technology and import-schemes.

The following states participate in the Council (between brackets the population in thousands in the year 1988). United Arab Emirates (1,305), Bahrain (421), Saudi Arabia (14,016), Oman (2,242), Qatar (404), Kuwait (1,958). The total number of inhabitants of the Member States together amounts to million 20,344 (ref. 9 and 10).

Arab Company for Livestock Development (ALCOLID)

Alcolid is a corporate entity emanating from the Arab Council for Economic Unity on the basis of its resolution in 1974, and was established as a company in 1975.
Among the shareholders total of ten Arab countries participate in the company: Jordan, United Arab Emirates, Saudi Arabia, Sudan, Syria, Somalia, Iraq, Qatar, Egypt and Yemen.

In addition two investment companies belong to its share-holders, The Arab Company for Investment and the Kuwait Company for Trading, Contracting and External Investments.

The headquarters of Alcolid is in Damascus, Syria, while the regional office is situated in Riyadh. Alcolid has developed enterprises in the field of animal production in nearly all Member States. A relatively high participation in risk-bearing capital (share capital) in the initial stages of projects refers to the crucial development capacity of Alcolid.

In the Kingdom of Saudi Arabia, the company is actively involved in all aspects of development of livestock resources. The company has a farm for the production and processing of fodder in Al-Qassim (Al-Asiah area). The area of the project covers 5,000 hectares.

In the same area, Alcolid started a fish farm, aiming at an annual production of 100 tonnes of Tilapia at an initial stage. The water requirement is fully integrated in the fodder production unit, since the pumped water from the underground aquifer has to be cooled prior to use for irrigation purposes.

New projects that receive due attention for realization in Saudi Arabia are: production and processing of dairy products, a laboratory for the diagnosis of virus diseases and manufacturing of poultry and dairy farm equipment (satisfying about 20% of the demand in the Arab world).

Alcolid also has a Consulting Unit for Technical & Economic Studies. Feasibility studies and evaluations are carried out for public bodies and authorities and private companies in the Member States.

8. National Training and Education Facilities

At the Ministry of Agriculture and Water are two centres for training and research in different agricultural sub-sectors:

A) Agricultural training Centre
Training courses are conducted for employees working at the Ministry. Governmental Institutions and different private companies. The training course itself generally takes about two weeks.

B) Regional Agriculture and Water Research Centre
This centre is to conduct research to improve the quality, nutritional value, safety and wholesomeness of foods and feed. Additionally, there are food processing pilot plants for studies. Another important aspect is the training of Saudis and natives of the other Gulf countries in all phases of the research and the food processing pilot plant studies

At University level, two Agricultural Faculties exist

A) King Saud University in Riyadh, with a branch in Al-Qaseem
B) King Faisal University in Hofof
Each faculty has a department of food science. During their study students have to follow practical training during 1 to 3 months in food processing plants, among others dairy plants

Annex II - List of references

1. Saudi Consulting House, Annual Report, 1988, Ministry of Industry and Electricity

2. The Directory of Saudi Industries, 1409H (1989G), Ministry of Industry and Electricity

3. Saudi Economic Survey, Weekly Review of Saudi Arabian Economic and Business Activities, Volumes XIX (1986) - XXIV (1991)

4. Saudi Arabian Agricultural Bank, Twenty Sixth Annual Report, 1409/1410 H ('89/'90)

5. Saudi Arabian Agricultural Bank, Overview Loan Programme, 1409/1410 H ('89/'90)

6. Annual report 1989/'90, Saudi Industrial Development Fund (SIDF), Ministry of Finance and National Economy, Riyadh

7. Guide to Industrial Loans, Saudi Industrial Development Fund (SIDF), Ministry of Finance and National Economy

8. Commercial Bank Credit by Economic Activity, SAMA, Banking Control Department (in Quarterly Bulletin of the Central Bank of the Kingdom of Saudi Arabia.

9. The first Five Years of the GCC, An Experiment in Unification (1981 - 1986), Speeches and Interviews of the Secretary General of the GCC, Cooperation Council of the Arab States of the Gulf (GCC), The Secretariat General Riyadh (1987)

10. Statistical Information on the Member States of the Cooperation Council of the Arab States of the Gulf (GCC), The Secretariat General Riyadh (1990)

11. Fourth Development Plan (1985-1990), Ministry of Planning, Kingdom of Saudi Arabia

12. Fifth Development Plan (1990-1995 D.), Ministry of Planning, Kingdom of Saudi Arabia

13. Towards A Perspective Future, Report of a Survey in the Field of Milk-processing and milk-marketing in Saudi Arabia, 1989. by Bos, B.C., Doornbos, J, and Al Mukhdad, M., Ministry of Agriculture and Water, Riyadh, Saudi Arabia.

14. Dairy Production Sector of the Saudi Ministry of Agriculture and Water, Daily report of consultancy visit (1985), internal report No.:155, by Dr.Ir. Osinga, M.Sc. and Ing. Van Bruggen

15. National Dairy Development Plan, Quantifications, Planning, Projections, General Policy, 1978, Ministry of Agriculture and Water and the Danish Agricultural Council

16. Draft Saudi Standard for Pasteurized Milk (including references to previously issued standard regulations), 1991; Saudi Arabian Standards Organization (SASO)

17. Draft Saudi Standard for Sterilized Milk (including references to previously issued standard regulations), 1991; Saudi Arabian Standards Organization (SASO)

18. Milk Production Characteristics, Statistical Yearbook, 1988 and 1989, Ministry of Finance and National Economy

19. Agricultural Statistical Year Book, 1988, Sixth Volume, Ministry of Agriculture and Water, Department of Economic Studies and Statistics

20. Agricultural Statistical Year Book For Traditional and Specialized Farms 1986/1987, Fifth Volume, Ministry of Agriculture and Water, Department of Economic Studies and Statistics

21. Agricultural Sector Development "Graphical Indicators" Ministry of Agriculture and Water, Department of Economic Studies and Statistics

22. Agricultural Production and its Impact on Foreign Trade (period 1984/1988) Ministry of Agriculture and Water, Department of Economic Studies and Statistics

23. Quantity of Raw Milk Produced (Litres) by Specialized Projects By Principal Amarahs, Table 4-9 (1990 estimations), Ministry Agriculture and Water, Dept. Economic Studies and Statistics

24. Statistics on the marketing of dairy products in Saudi Arabia; various volumes:
a) Saudi Retail Audit Powdered Milk (1991);
b) Saudi Retail Audit Milk (1990/1991);
c) Milk Market Development (1989/1990/1991), internal document Middle East Marketing Research Bureau Ltd. (MEMRB), Cyprus

25. Purchase Pattern of Milk-products by Supermarkets, with special reference to so called returns (excess expiry date);
Survey especially executed by the leading supermarket chain in the Kingdom, during the field work of the joint mission on dairy development by the Saudi Consulting House (SCH) of the Ministry of Industry and Electricity and International Dairy Consultants (IDC) The Netherlands, in cooperation with United Nations Industrial Development Programme (UNIDO), July 1991

26. Food Balance Sheets 1974 - 1084 (Arabic), Ministry of Agriculture and Water, Dept. of Economic Studies and Statistics

27. Food Balance Sheets '74/'76 - '83/'86, Ministry of Agriculture and Water, Department of Economic Studies and Statistics

28. Study for the Marketing of Fresh Dairy Products, 1989/1990, by Committee of University Staff Members, study executed at the joint request of the Fresh Dairy Production and Processing Industry in the Kingdom of Saudi Arabia (Arabic)

29. Cost of Living Index for Middle-Income Saudi & Non-Saudi Households (1991), Ministry of Finance and National Economy

30. Cost of Living Index All Cities Index Households (1991), Average Quarterly Indexes for Groups and Subgroups Ministry of Finance and National Economy, Central Dept. of Statistics

31. Wholesale Price Index (1990), Ministry of Finance and National Economy, Central Department of Statistics

32. Prices and Indexes, Statistical Yearbook, 1988 and 1989, Ministry of Finance and National Economy

33. Price Averages in Ten Cities in the Kingdom of Saudi Arabia (May/Shawal 1991), Ministry of Finance and National Economy

34. Saudi Arabia Population Figures, informal data, Ministry of Finance and National Economy, Central Department of Statistics

35. Saudi Arabia Population Registration, Continuous Registration System, Ministry of Planning, Riyadh

36. World Population Projections, 1989-1990 Edition, Short and Long-Term Estimations, International Bank for Reconstruction and Development (IBRD), Washington

37. Price Prospects for Major Primary Commodities 1990 - 2005, Volume II: Food Products and Fertilizers, and Agricultural Materials, International Bank for Reconstruction

Annex III - Production Figures

Table 1: Milk production specialized dairy farms (present situation 1989)

Table 2: Traditional farms (total number of cattle)

Table 3: Milk production traditional farms (estimated)

Table 4: Milk production specialized/traditional farms (cows)

Table 5: Traditional farms movements in cattle %

TABLE 1

Milk Production Specialized Dairy Farms

Present Situation (1989)

Amarahs	Milky Cows	No. of Projects	Tons Raw Milk Production	Population x 1000	Available ltr. per Capita
Eastern Region	9,417	8	47,754	1,235	38.7
Riyadh	27,396	21	144,099	2,042	70.6
Qaseem	414	4	1,101	508	2.2
Hail	1,016	2	2,652	417	6.4
Northern Region	1,742	3	11,645	673	17.3
Madinah				832	
Makkah				2,815	
Aseer				1,093	
Al-Baha				298	
Jizan				647	
Najran	274	1	960	237	4.1
	40,259	39	208,211	10,797	19.3

Source: Statistical Year Book 1989
Population: MEMRB
(Official Data Annex 2 C35)

TABLE 2

Traditional Farms

TOTAL NUMBER OF CATTLE

Amarahs	Cows	Milky Sheep	Goats	Camel
Eastern Region	8,007	59,778	15,681	5,205
Riyadh	19,791	724,221	291,058	106,613
Qaseem	10,701	555,723	135,370	44,795
Hail	970	457,947	193,734	28,280
Northern Region	2,611	54,925	108,561	11,150
Madinah	1,082	153,689	229,745	14,940
Makkah	9,739	542,225	510,664	81,902
Asser	31,308	1,898,899	1,079,235	64,901
Al-Baha	6,905	276,147	243,390	7,429
Jizan	41,095	504,721	497,352	14,328
Najran	6,209	61,206	40,482	9,822
	138,418	5,289,481	3,353,272	389,365

Source: Statistical Year Book 1989

TABLE 3

Milk Production Traditional Farms (Estimated)

Amarahs	Milky Cows	Milk 1) Production	Population x 1000	Available ltr. Per Capita
Eastern Region	8,007	16,014	1,235	13.0
Riyadh	19,791	39,582	2,042	19.4
Qaseem	10,701	21,402	508	42.1
Hail	970	1,940	417	4.7
Northern Region	2,611	5,222	673	7.8
Madinah	1,082	2,164	832	2.6
Makkah	9,739	19,478	2,815	6.9
Aseer	31,308	62,616	1,093	57.2
Al-Baha	6,905	13,810	298	46.3
Jizan	41,095	82,190	647	127.0
Najran	6,209	12,418	237	52.4
	138,418	276,836	10,797	25.6

Source: Statistical Year Book 1989

1) Calculated by the Estimation of an Average Yield per Cow of 2,000 liter/year.

TABLE 4

Milk Production Specialized and Traditional Farms (Cows)

Amarahs	Specialized Farm	Traditional Farm	Total ltr. Capita/Year
Eastern Region	38.7	13.0	51.7
Riyadh	70.6	19.4	90.0
Qaseem	2.2	42.1	44.3
Hail	6.4	4.7	11.1
Northern Region	17.3	7.8	25.1
Madinah	-	2.6	2.6
Makkah	-	6.9	6.9
Aseer	-	57.2	57.2
Al-Baha	-	46.3	46.3
Jizan	-	127.0	127.0
Najran	4.1	52.4	56.5
	19.3	25.6	44.9

Source: Statistical Year Book 1989

TABLE 5

Traditional Farms Movement in Cattle % %

Amarah	Cows 1986 = 0		Sheep 1986 = 0		Goats 1987 = 0		Camels 1986 = 0	
	1987	1988	1987	1988	1987	1989	1987	1988
Eastern Region	-21.5	-23.4	-7.2	-6.4	-29.3	-29.3	-43.8	-44.8
Riyadh	-14.6	-16.7	-18.7	-18.2	+10.3	+10.1	+2.4	+0.5
Qaseem	-5.0	-7.2	-6.0	-5.5	+53.0	+52.8	+12.7	+10.7
Hail	+0.4	-2.1	+2.7	+3.3	+81.9	+81.7	+97.7	+94.1
Northern Region	+86.6	+82.1	-17.6	-17.0	+15.9	+15.8	-34.9	-36.0
Madinah	-50.2	-51.4	-17.9	-17.4	+15.6	+15.5	-21.1	-22.5
Makkah	+11.9	+9.2	-30.4	-30.3	+2.5	+2.3	+20.4	+18.2
Aseer	-12.0	-14.1	-2.6	-2.1	+10.7	+10.6	+1.5	-0.4
Al-Baha	-38.6	-40.1	+3.8	+4.4	+22.4	+22.3	+1.8	-0.1
Jizan	-6.5	-8.7	-13.3	-12.8	-17.3	-17.4	+10.1	+8.0
Najran	+28.2	+25.1	-34.5	-34.2	+16.5	+16.4	-30.0	-31.3
	-12.0	-9.9 est.	-10.6	-10.1 est.	+8.6	+8.5 est.	+5.3	+3.4 est.

Source: Statistical Year Book 1989

Annex IV - Results of the questionnaire on dairy plants

Under the auspices of the Saudi Consulting House, the Agricultural Consulting Unit staff (Dr. Ghanem S. Haddad) has carried out a statistical survey combined with some field visits to the dairy processing plants throughout the Kingdom.
The survey was organized among 47 dairy plants of which 37 responded to it. The results of this inquiry are summarized below:

1. Type of dairy plant

Out of the 37 respondents:

13 fresh milk plants
23 recombined dairy plants
1 plant processing fresh milk as well as recombined milk

2. Type of products produced

Products produced	Fresh milk plants (13)		Recombining plants (23)	
	number	%	number	%
Pasteurized milk	10	(77)	2	(9)
UHT milk	3	(23)	8	(35)
Laban	10	(77)	10	(44)
Yoghurt	7	(54)	15 *1	(65)
Labaneh	7	(54)	6	(26)
Cream and butter	8	(62)		
Cream			3	(13)
Cheese (fresh)	2	(15)	7	(30)
Processed cheese	1	(8)		
Ice cream			13 *2	(57)
Juices			8	(35)
	48	**(100)**	**72**	**(100)**
Average	3.7 products/plant		3.1 products/plant	

3. Personnel

The 37 plants employ 3819 men which represent 103 men/plant. About 93 % of all personnel are of non-Saudi nationality.

4. Automatization (one or more systems)

About 48% of all plants can be characterized as semi-automatic, 39% as automatic and 13% as computerized.

Annex IV - continue

5. Transport (distribution vehicles)

The 37 plants have in total 1187 distribution vehicles in operation. This means 32 cars per plant. About 92% of all vehicles are refrigerated.

6. Area distribution

Only 38% of the plants have a more or less local distribution area only, while 62% of the plants even distribute quite far away from the processing plant.

7. Distribution channel

About 60% of the total output is distributed to retailers (shops/stores), 27% to wholesalers and only 13% directly to consumers.

8. Current problems

The 37 plants indicate different problems among which the most important are:

- all recombined plants complain about the high prices to be paid for the basic materials and propose to reduce or even to abolish the import duties
- the costs of packaging are frequently too high
- one third of the plants have problems with regard to product development
- one third of the plants complain about the availability of trained technicians for quality control and analyses in the laboratory, sometimes the availability of modern instruments is a real problem
- maintenance costs are very high and trained technicians are not always available
- over 80% of the plants complain about the high marketing costs versus the low selling prices; the same high percentage of plants face strong competition of products produced by other plants in the Kingdom or of imported products
- one third of the plants stress the unavailability of training programmes and the relatively high costs of national personnel

Annex V - Marketing information and consumer prices

Contents

Annex V - continue

Table 1 Composition of the national dairy market as to most important products: milk-powder; recombined milk/Laban and fresh milk/Laban in 1991 (figures in percentages)

Type of product (LME *1)	Share (%)	
Milk-powder	39.0	*2/*3
Recombined Industry *4		
- UHT milk	15.5	
- Laban	1.5	
Fresh Milk Industry *5		
- Pasteurized milk	7.5	
- Laban	35.0	
- Milk (UHT)	1.5	
T O T A L	100.0	

Source: Consultants' compilation
Statistics of the MEMRB (Middle East Marketing Research Bureau Ltd.); references 24 (a, b and c)

Legend: For quantitative figures is referred to section 2 of the report

(1) The figures relate to Liquid Milk Equivalents (LME)
(2) The production of other dairy articles such as yoghurt, labneh and cream are not included. Yoghurt production in fresh milk processing industry is 10%-15% of the total milk and Laban production. In the recombining industry output ratio between milk and yoghurt/laban/labneh is about 6
(3) About 70% of total milk-powder sales is realized in tins with contents of 1700/2000 grammes; 10% in tins of 2500 grammes and 13% and 7% in tins of 900 and 400 grammes respectively
(4) About 50% of total milk/laban sales is realized in units smaller than 1 litre (0.5 - 0.2 litre)
(5) About 35% of total fresh milk/laban sales is realized in units smaller than 1 litre (0.5 - 0.19 litre), however, considerable differences occur between individual processors

Annex V - continue

Table 2 Indicative specification of national market shares as to suppliers of raw milk and recombined dairy products in 1991 (figures in percentage of total/product group)

	Producer	Milk *1	Laban
A. Dairy farming/ -processing	1	19 *2	44
	2	13 *3	31
	3	2	8
	4	2	2
	5	1	3
	6	3	2
	7	- *4	1
Sub-total		40	90
B. Recombining industry	8	48	3
	9	5	-
	10	4	-
	11	1	4
	12	1	-
	13	-	2
	14	-	-
	15	1	1
Sub-total		60	10
T o t a l		100	100

Source: Consultant's compilation

Legend: Negligible
Not included in the figures is the quantity of sales on milk-powder in retail packaging; statistics indicate that the turnover represents about 60%, in liquid milk equivalents, of the total milk and laban market, or 40% (LME) of the total milk market

(1) The quantity of long-life milk (UHT) that is made of raw milk has been included in the figures
(2) Including 4% for UHT milk
(3) Including 1% for UHT milk
(4) Share in UHT milk-market negligible

Annex V - continue

Table 3 Geographical distribution of milk products as to most important consumption areas by three leading producers (figures in percentage of individual total output)

Consumption area	Supplier				
	Recombined milk	Fresh milk	Laban	Fresh milk	Laban
1. Jeddah	36	20	22	33	41
2. Western (other)	14	2	14	3	15
3. Median	9	2	3	6	9
4. Southern	7	-	14	7	21
5. Riyadh	21	64	37	32	8
6. Central (other)	4	3	6	-	-
7. Dammam (AlKhobar)	6	4	2	15	4
8. Eastern (other)	3	5	2	4	2

Source: Consultants' compilation

Legend: Negligible

Annex V - continue

Table 4 Specification of marketed quantities, in winter, of selected liquid milk-products and milk-powder as to consumption area *)
(figures in percentage of total as to product-group)

Consumption area	Type of production process and milk product					
	Raw milk			Recombined		Import
	UHT	Milk	Laban	Milk	Laban	Powder *1
1. Jeddah	2.8	10.9	55.3	31.0	0.1	28
2. Western (other)	1.8	2.6	65.1	30.5	-	11
3. Median	1.5	8.9	51.5	38.1	-	6
4. Southern	1.7	4.5	76.4	17.0	0.4	11
5. Riyadh	3.2	24.8	44.0	26.7	1.3	22
6. Central (other)	1.6	[illegible].6	67.3	24.3	1.2	6
7. Dammam(Al-Khobar)	3.5	27.8	39.6	18.3	10.8	8
8. Eastern (other)	1.9	26.7	35.0	15.7	20.7	8
9. National average	2.5	14.8	53.7	26.4	2.6	100

Source: Statistics of the MEMRB (Middle East Marketing Research Bureau Ltd. (reference 24)
Consultants' compilation

Legend: *) For details on seasonal fluctuations is referred to tables 2 and 3 of the section on market structure analysis
Refer to relevant section for data on population distribution in the country

(1) Figures refer to total sales of milk-powder in retail pack.
In Liquid Milk Equivalents (LME), milk-powder purchase represents about 90% of the fresh milk and laban market, and about 190% of totally produced quantities of recombined milk and laban

Negligible

Annex V - continue

Table 5 Distribution pattern of fresh-milk, recombined products, and milk powder as to type of outlet *1 (figures in percentage)

Type of Product	Type of outlet *2			
	Super market	Selfserv. stores	Groceries (medium)	Shops (small)
A. Fresh milk industry				
- Fresh milk	18	18	31	34
- Fresh Laban	5	12	33	49
- UHT milk	26	22	31	21
Average	8	14	33	45
B. Recombining industry				
- Recombined milk	11	11	29	49
- Recombined Laban	2	15	40	42
Average	10	11	31	48
C. Milk powder *3				
- milk powder	14	15	27	44 *4

Source: Consultants' compilation
Statistics of the MEMRB (Middle East Marketing Research Bureau Ltd.), references 24

Legend: *1 For details on seasonal fluctuations is referred to tables 2 and 3 of the section on market structure analysis

*2 Classification of outlet refers to size of daily turnover, but has not been quantified; indicative daily turnover
(ltr.) is:
1) supermarket: . . . . . 500 - 1,000 litres
2) self-service shops:. . . 100 - 250 litres
3) groceries: . . . . . 50 - 150 litres
4) small shops: . . . . . 15 - 75 litres

*3 About 70% of all sales is realized in tins with contents of 1700/2000 grammes; 10% in tins of 2500 grammes; and 13% and 7% in tins of 900 and 400 grammes respectively

*4 Comparing to supermarkets and self-service shops, small shops are relatively more involved in the sales of the leading brands

Annex V - continue

Table 6 Composition of Sales of Selected Dairy Products as to Type of Outlet (figures in percentage)

Type of Product	Type of outlet			
	Super market	Selfserv. stores	Groceries (medium)	Shops (small)
Fresh milk	29.2	19.5	14.3	10.8
Fresh Laban	30.2	51.2	55.8	57.5
UHT milk	7.6	4.4	2.4	1.1
Subtotal	67.0	75.1	72.5	69.4
Recombined milk	32.2	21.8	24.2	28.2
Recombined Laban	0.8	3.1	3.3	2.4
Subtotal	33.0	24.9	27.5	30.6
T o t a l	100.0	100.0	100.0	100.0

Source: Consultants'compilation
Statistics of the MEMRB (Middle East Marketing Research Bureau Ltd. (reference 24)

Legend: For details on seasonal fluctuations is referred to tables 2 and 3 of the section on market structure analysis

Annex V - continue

Table 7 Overview consumer prices of most important milk products (prices in SR per unit, and per kg or ltr)

Product type *2	Packing material *3	Unit (ltr/kg)	Price/unit (range) *1	Price (ltr/kg)
Fresh milk				
1. Milk/Laban	plastic can	2 ltr	8.0	4.0
2. Milk/Laban	carton	1 ltr	4.0	4.0 *4
3. Milk/Laban	carton	1/2 ltr	2.0	4.0
4. Milk/Laban	carton	1/4 ltr	1.0	4.0
5. Laban	plast.bag	1 ltr	3.0	3.0
6. Milk (UHT)	pack	1 ltr	3.5-4.5	3.5- 4.5
7. Milk(camel)	carton	1/2 ltr	4.5-5.0	9.0-10 0
8. Yoghurt	plast.cont.	150 gr	1.0	6.7
9. Yoghurt	plast.cont.	180 gr	1.0	5.6
10 .Yoghurt	plast.cont.	380 gr	2.0	5.3
11. Yoghurt	plast.cont.	400 gr	2.0	5.0
12. Strain.Yurt	plast.cont.	500 gr	5.0	10.0
13. Labneh	plast.cont.	200 gr	3.0	15.0
14. Labneh	plast.cont.	430 gr	7.0	16.3
Recombined milk				
1. Milk (UHT)	pack	1 ltr	3.5	3.5 *5
2. Laban	carton	1 ltr	3.0	3.0
3. Laban	carton	1/2 ltr	1.5	3.0
3. Labneh	plast.cont.	1/4 ltr	3.5	14.0
4. Labneh	plast.cont.	450 gr	4.0	8.9
5. Labneh	plast.cont.	500 gr	5.0	10.0
6. Yoghurt	plast.cont.	200 gr	1.0	5.0
7. Yoghurt	plast.cont.	300 gr	1.0	3.3
8. Yoghurt	plast.cont.	500 gr	2.0	4.0

Source: Consultant's compilation - Observation in grocery shops, super markets and internal data various companies

Legend:

*1 prices for fresh milk and laban are equal for all trade marks; prices equal for full fat and low fat products;

*2 the assortment is not necessarily representing the full range of one producer only; selected items represent the most common assortment of products; super markets deal with a total number of about 170 dairy items (kind, brand and unit size) out of which 50% originate from locally produced fresh milk

*3 packing material used refer to the regular cartons, the sealed carton for long-life produce, and plastic containers and cups of different contents;

*4 a newly introduced brand is presently available for 3.0 SR/litre reportedly, supplies are too low for decreasing the prevailing price level; more importantly, sales are very slow because consumers seem to have developed some distrust concerning low price

*5 prices are considerably lower for bulk purchase (12 litres per carton); price range is between 32 SR - 36 SR per carton; about 60% of sales is realized on such basis.

Annex V - continue

Table 8 Overview of consumer prices of milk powder, evaporated and condensed milk, and cream (prices in SR per unit, and per kilogram or litre)

Product type *1	Packing material	Unit (ltr/kg)	Price/unit (range) *2	Price (ltr/kg)
1. Milk powder	tin	2.5	35.00-36.25	14.0-14.5
2. ,,	tin	1.8	25.00-32.00	13.9-17.8
3. ,,	tin	0.9	14.75-18.00	16.4-20.0
4. ,,	tin	0.4	7.75- 9.00	19.4-22.5
1. Evap.milk *3	tin	0.170	1.00-1.25	5.9-7.4
2. ,,	tin	0.255	1.50	5.9
3. ,,	tin	0.410	2.25-2.50	5.5-6.1
1. Cond.milk *3	tin	0.170	1.25	7.4
2. ,,	tin	0.397	3.50	8.8
1. Cream *4	pack	0.2	4.50	22.5
2. ,,	pack	0.5	10.00	20.0
3. ,,	pack	1.0	16.00	16.0
4. ,,	tin	0.170	2.25-2.50	13.2-14.7
5. Cream (rec.)	pl.cup	0.2	3.00	15.0
6. Sour Cr.(18%)	pl.cup	0.25	5.00	20.0
7. Breakfast Cr.	pl.cup	0.10	3.00	30.0

Source: Consultant's compilation
Observation in grocery shops, supermarkets and internal data various companies legend:

*1 There are about 20 different brands available in the market, with generally the following contents of retail units: 2,5; 1,8; 0.9; and 0.4 kilograms; low-fat milk-powder is hardly sold in the market

*2 Prices are given in a range; prices collected from supermarkets and shops; prices in small shops are normally about 1.5% higher compared to those in supermarkets; only little (less than 3%) geographical differences were registered, especially were observed for the more current brands; the lower price figures of a range mainly refer to brans that enjoy a low level of popularity

*3 Prices relate to single units; a regular discount of 10% - 15% on bulk-purchase is granted

*4 Imported produce; all creams are UHT products

Annex V - continue

Table 9 Overview of consumer prices of cheeses, butter and ghee (prices in SR per unit, and per kilogram)

Product type	Unit (ml./gr)	Price/unit (range)	Price (ltr/kg)
1. Cream cheese (glass)	240-260	5.00-6.00	20.8-25.0
2. Feta cheese 40+ (pack)	200	2.75	13.8
(pack)	500	5.75	11.5
(unpacked)			10.0
3. White cheese (Egypt)			14.0
4. Domyati cheese			13.8
5. Danish Mozarella 40+	2,000	48.75	24.4
6. Cheddar sliced 45+			31.0
7. Danish Blue 50+	100	3.75	37.5
8. Emmenthaler sliced 45+			31.0
9. Emmenthaler sliced 45+	100	5.00	50.0
10. Beledam 40+	2,000	39.75	20.0
11. Gouda pepper	250	7.00	28.0
12. Butter *1	227	3.50	15.4
13. Butter	454	6.75-9.50	14.8/20.9
14. Ghee (tin)	454	6.25	13.8
15. Ghee (tin)	900	13.25	14.7
16. Ghee (tin)	2,270/ 2,000	29.00-30.25	12.8/15.1

Source: Consultant's compilation
Observation in grocery shops, supermarkets and internal data various companies

Legend:
*] The higher prices refer to locally repacked butter; the lower prices are mainly connected to produce from New Zealand

Annex VI - Cost price calculations

Contents

TABLE 1 : INDICATIVE COST CALCULATION OF RAW MILK PRODUCTION ON LARGE-SCALE FARMS IN SAUDI ARABIA
(figures in SR per litre and percentage)

	CST/LITRE	PERCENT (total costs)
I OPERATING EXPENSES		
green cut	0,160	11,17
silage	0,121	8,43
hay	0,105	7,35
concentrates	0,357	24,86
other feed	0,073	5,12
salaries	0,055	3,84
employees benefits	0,046	3,17
indirect materials	0,043	3,03
utilities	0,010	0,68
repairs and maintenance	0,038	2,67
administration	0,038	2,67
rental fees	0,003	0,22
sub-total	1,051	73,19
II OVERHEAD EXPENSES		
veterinary expenses	0,079	5,48
services and administr.	0.058	4,07
general	0,047	3,24
sub-total	0,184	12,79
III CAPITAL EXPENSES		
depreciation	0,168	11,67
interest	0,016	1,08
insurance	0,005	0,36
livestock death	0,013	0,90
adjustment deprec.	0,000	0,00
sub-total	0,201	14,02
IV TOTAL OF I,II and III	1,435	100,00

TABLE 2 : INDICATIVE COST CALCULATION OF FRESH MILK AND LABAN PROCESSING IN SAUDI ARABIA (figures in SR per litre)

	CST/LITRE	PERCENT (total costs)
I OPERATING EXPENSES		
raw milk	1,705	68,13
processing material	0,003	0,14
packing material	0,272	10,86
indirect materials	0,034	1,36
salaries (all-in)	0,061	2,43
utilities	0,015	0,59
repairs and maintenance	0,031	1,23
administration	0,008	0,32
rental fees	0,001	0,02
sub-total	2,128	85,07
II OVERHEAD EXPENSES		
services and administr.	0,091	3,63
general	0,045	1,82
sub-total	0,136	5,45
III CAPITAL EXPENSES		
depreciation	0,226	9,04
interest	0,008	0,32
insurance	0,003	0,12
adjustment deprec.	0,000	0,00
sub-total	0,237	9,48
IV TOTAL OF I, II and III	2,502	100,00

TABLE 3 : INDICATIVE COST CALCULATION OF FRESH YOGHURT PROCESSING IN SAUDI ARABIA
(calculation based on 380 grammes per unit)

	CST/UNIT (380 gr)	PERCENT (total costs)
I OPERATING EXPENSES		
raw milk	0,647	48,18
processing material	0,140	10,40
packing material	0,280	20,88
indirect materials	0,012	0,91
salaries (all-in)	0,027	2,02
utilities	0,017	1,28
repairs and maintenance	0,026	1,92
administration	0,002	0,16
rental fees	0,000	0,01
sub-total	1,151	85,77
II OVERHEAD EXPENSES		
services and administr.	0,051	3,78
general	0,029	2,16
sub-total	0,080	5,94
III CAPITAL EXPENSES		
depreciation	0,106	7,90
interest	0,004	0,29
insurance	0,001	0,09
adjustment deprec.	0,000	0,00
sub-total	0,111	8,29
IV TOTAL OF I, II and III	1,342	100,00

Annex VI - continue

TABLE 4 : INDICATIVE COST CALCULATION OF RECOMBINED MILK (UHT) PROCESSING IN SAUDI ARABIA (figures in SR per litre)

	CST/Ltr. (SR)	PERCENT (total costs)
I OPERATING EXPENSES		
stabilizer	0,022	1,27
butter oil	0,219	12,70
whole milk powder	0,050	2,88
skim milk powder	0,474	27,53
powder LH	0,045	2,60
sub - total	0,808	46,97
packing materials (incl. 3% loss)		
pack 1 litr.	0,357	20,74
miscellaneous	0,035	2,05
trays/cartons	0,045	2,63
sub - total	0,438	25,43
salaries (all-in)	0,062	3,57
utilities	0,038	2,21
repairs and maintenance	0,049	2,85
administration	0,007	0,41
rental fees	0,001	0,05
sub-total	0,157	9,09
II OVERHEAD EXPENSES		
services and administr.	0,095	5,53
general	0,046	2,69
sub-total	0,141	8,21
III CAPITAL EXPENSES		
depreciation	0,167	9,68
interest	0,007	0,42
insurance	0,003	0,19
adjustment deprec.	0,000	0,00
sub-total	0,177	10,30
IV TOTAL OF I, II and III	1,721	100,00

TABLE 5 : INDICATIVE COST CALCULATION OF RECOMBINED YOGHURT PROCESSING IN SAUDI ARABIA (calculation based on 450 cc plastic cups)

	CST/LITRE (SR)	PERCENT (total costs)
I OPERATING EXPENSES		
stabilizer/homogenizer	0,119	f 4,49
butter oil	0,239	f 9,03
whole milk powder	0,000	f 0,00
skim milk powder	0,906	f 34,25
yoghurt starter	0,000	f 0,00
sub - total	1,263	47,77
packing materials (incl. 3% loss)		
cups/lids (plastic)	0,549	f 20,77
foil	0,139	f 5,26
cartons	0,208	f 7,88
sub - total	0,897	33,91
salaries (all-in)	0,066	f 2,50
utilities	0,040	f 1,50
repairs and maintenance	0,050	f 1,90
administration	0,008	f 0,30
rental fees	0,001	f 0,05
sub-total	0,165	6,24
II OVERHEAD EXPENSES		
services and administr.	0,096	f 3,63
general	0,046	f 1,75
sub-total	0,142	f 5,38
III CAPITAL EXPENSES		
depreciation	0,166	f 6,29
interest	0,008	f 0,31
insurance	0,003	f 0,11
adjustment deprec.	0,000	f 0,00
sub-total	0,177	f 6,71
IV TOTAL OF I,II and III	2,644	f 100,00

Annex VII - Indexes on monthly sales of milk products

Contents

TABLE 1: Monthly Index of Farm Milk-production in 1989 and 1990, Cost Price (1990) and milk-giving cows in 1989 (January = 100)

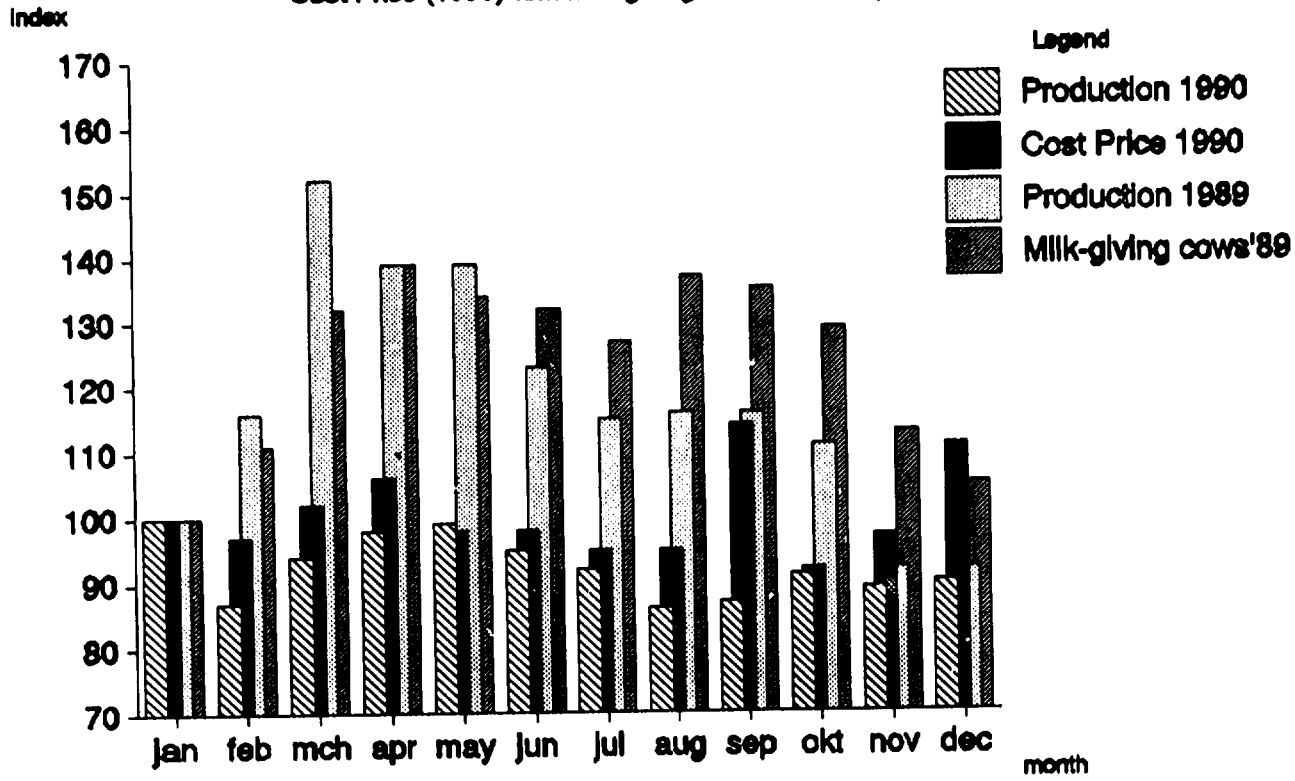


TABLE 2: Index of Monthly Sales of Milk and Laban in 1990
(sales in total litres of 1/4-ltr packages in January = 100)

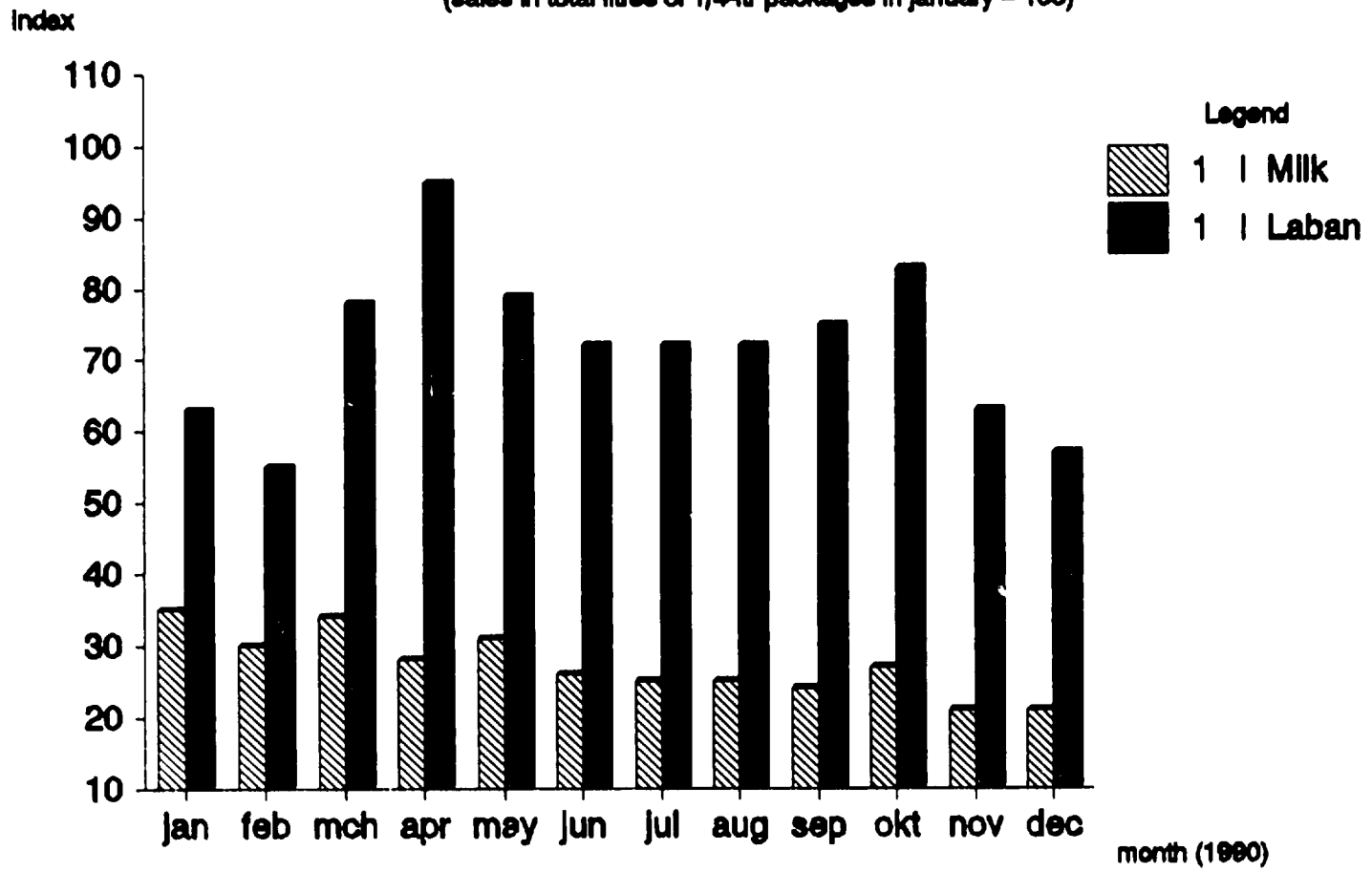


TABLE 3: Index of Monthly Sales in 1/2-Litre packs of Milk and Laban in 1990

(Laban sales of 1/4-ltr packages, in Litres, in January = 100)

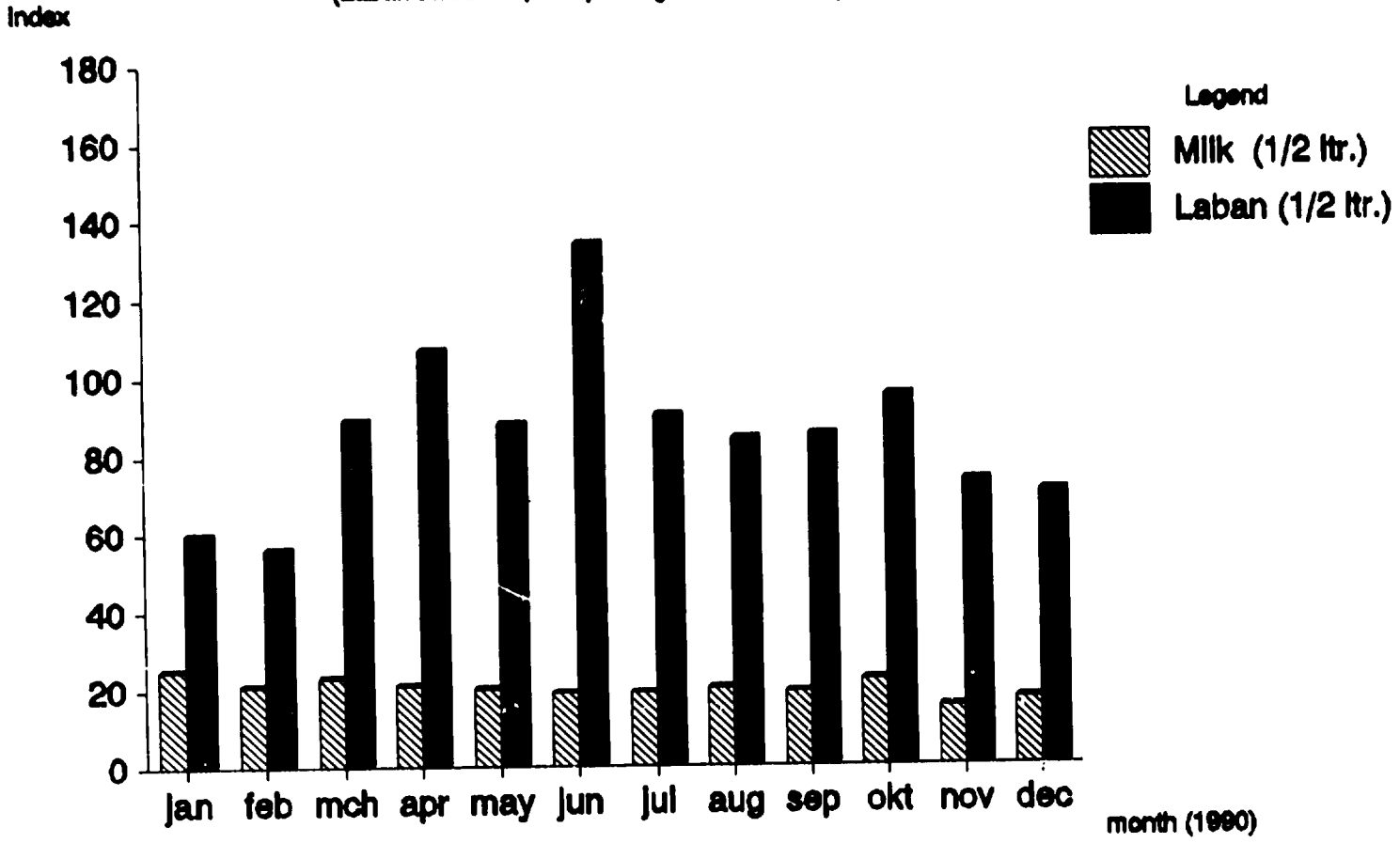


TABLE 4: Index of Monthly Sales of Laban in 1990

(sales in total litres of 1/4-ltr packages in January = 100)

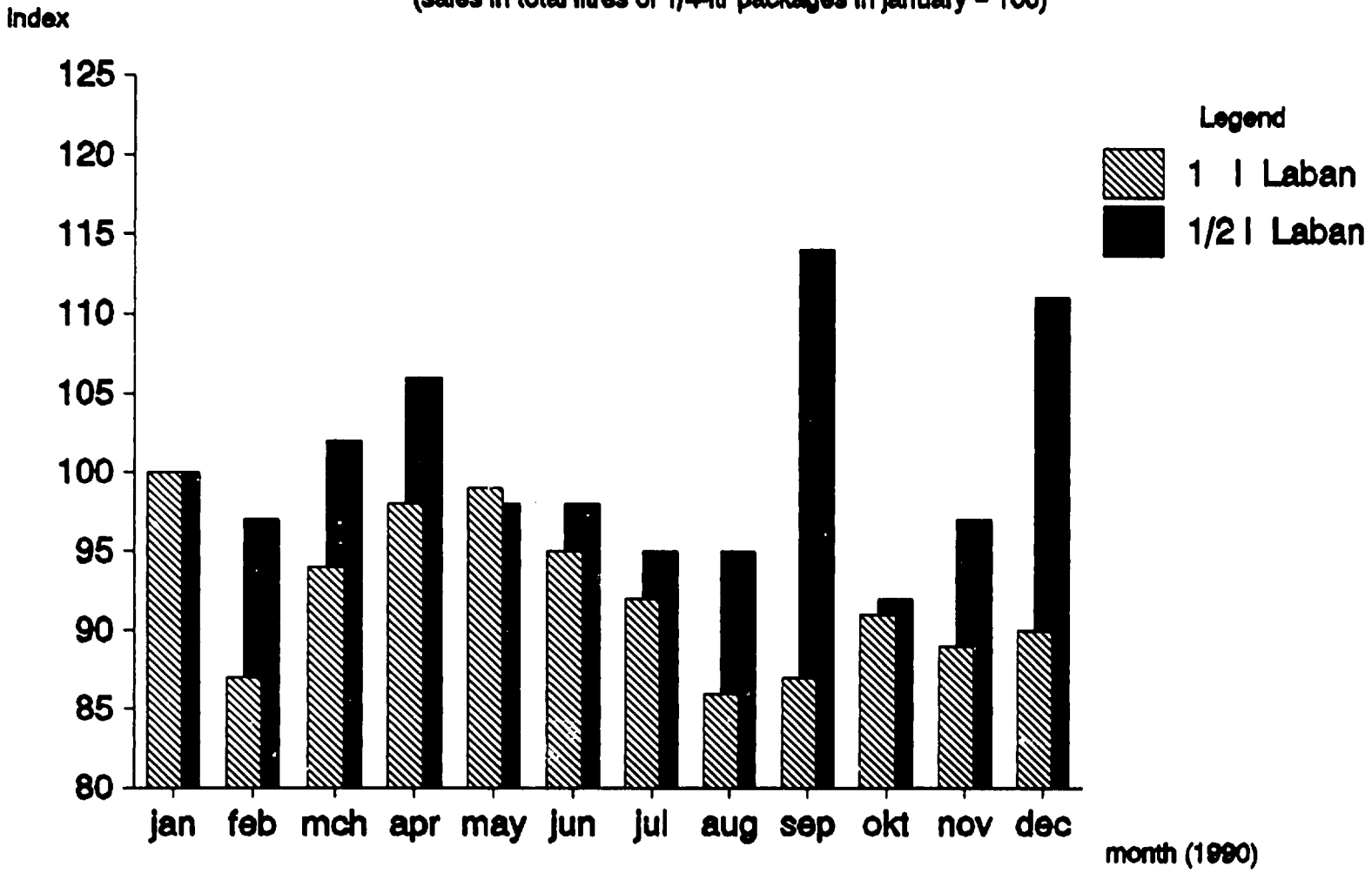
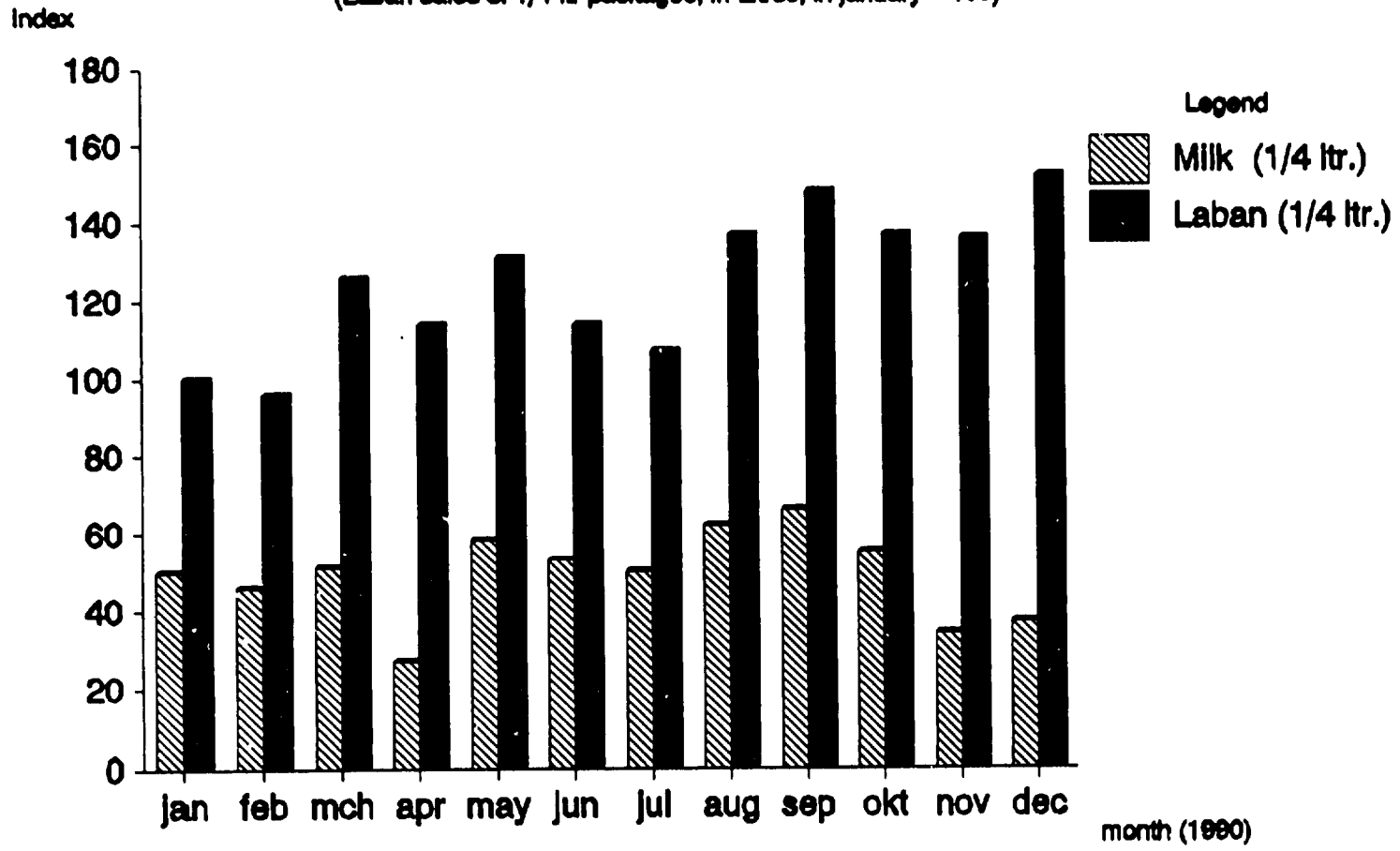


TABLE5 : Index of Monthly Sales in 1/4-Litre packs of Milk and Laban in 1990

(Laban sales of 1/4-ltr packages, in Litres, in January = 100)



Annex VIII - Institutions being visited during the mission

During the mission period the team visited a period a number of Ministries, institutions, organizations, dairy farms, dairy plants, etc. throughout the country. The most important institutions visited in the light of the terms of reference of the mission are the following:

- Ministry of Industry & Electricity (Riyadh):
  - Saudi Consulting House (SCH)
  - Saudi Industrial Development Fund (SIDF)
  - Saudi Arabian Standard Organization
- Ministry of Agricultural & Water (Riyadh):
  - Animal Resource Department
  - Planning Department
  - Water Resource Department
  - Economic Studies and Statistics
  - Saudi Arabian Agricultural Bank (SAAB)
- Ministry of Planning, Riyadh
- Ministry of Commerce, Riyadh
- Ministry of Finance (Central Bureau of Statistics), Riyadh
- UNDP Office, including UNIDO - Officials in Riyadh
- World Bank Office, Riyadh
- FAO Office, Riyadh
- King Saud University, Animal Production Division, Riyadh
- NADEC (National Agricultural Development Co.) at Riyadh.
- Panda United Corporation (Supermarkets),Riyadh
- Al-Rai (Milk Plant at Hofuf)
- Nada (Dairy Farm and Plant at Hofuf)
- Afandi (Dairy Plant at Dammam)
- Almatrood (Dairy Farm and Plant at Al-Khobar)
- Saudi Catering Dairy (Dairy Plant at Dammam)
- Fadeco (Dairy Plant at Al-Khobar)

- Gulf Danish Dairy Co. (Dairy Plant at Dammam)
- Al-Rabie (Dairy Plant at Riyadh)
- Al-Marai (Dairy Farm and Plant at Al-Kharj and office at Riyadh)
- Al-Aziziah (Dairy Farm and Plant at Al-Kharj and office at Riyadh)
- Sanabel (Dairy Farm and Plant at Al-Kharj)
- Al-Safi (Dairy Farm and Plant at Al-Kharj and office at Riyadh)
- Al-Jada'an (Dairy Farm at Al-Kharj)
- Abnaee (Dairy Farm at Al-Kharj and office at Riyadh)
- Alban Alhana (Dairy Farm and Plant at Al-Ghat)
- Najoyah (Dairy Farm and Plant at Al-Zulfi)
- Jamjoom Foremost Ltd. (Dairy Plant at Jeddah)
- Danish Saudi Dairy Co. Ltd. (Dairy Plant at Jeddah)
- Al-Marai (Dairy Plant at Jeddah)
- Modern Dairies (Dairy Plant at Jeddah)
- The Savola Company (Headquarters at Jeddah)
- Halwani Bros. (Food and Dairy Plant at Jeddah)
- Saudi Dairy Factory (Dairy Plant in Jeddah)
- Najran Dairy Co. (Dairy Farm and Plant at Najran)
- Asir Directorate for Agriculture & Water at Abha.
- Gulf Cooperation Council, Riyadh
- The Arab Company for Livestock Development, Riyadh
- The United Dairies Farms Company (office at Riyadh)

Annex IX - Investment profile

A - Fresh soft and hard ripened cheeses

B - Canned cream

C - Instant whole milk powder / baby milk powder

D - Ice-cream

Listed investment profiles are for information only and do only indicate general direction on scope.

Raw milk quality standards

General	Normal appearance, flavour and taste. Free from durt or any other extraneous matter
Fat free dry solids	8.5%
Freezing point	- 0.53°C
Density at 20°C	1.3424 gr/ml
Acidity	< 20 °N
Coagulation	should not occur by 70% alcohol at 15-25°C
Sedimentation	according to norms of sediment test
Mastitis	according to norms of mastitis test
Bacteria count	< 100,000 ml
Colibacteria	not to be found in 0.1 ml/milk

Annex IX A

Investment profile

Fresh soft cheese feta

1. Product description : White pickled cheese, closed and homogeneous texture without eyes.

2. Quality of raw milk : See raw milk quality standard

3. Processing line : See attached flow chart

4. Equipment needed and its costs : Flexible depending on equipment.
: Depending on level of automation and level of used processing technology ranging from US$ 5 - 6 million. Excluding land, civil works and local infrastructure

5. Source of technology and equipment : Germany, Denmark, Sweden

6. Minimum economic production capacity : 150,000 l. fresh milk/day

7. Labour requirement :

management	4
laboratory	3
operators	10
c.i.p.	3
store	15
maintenance	10
others	15
Total	60

Excluding administration and distribution

Hard cheeses: Gouda and Edam cheese

1. Product description : Cheese is a product made with the purpose of the conservation of the most valuable parts of milk.

2. Quality of raw milk : See raw milk standard
Quality of the fresh cheese : Norm values for good managed factories (norm pro gramme or ml.)

Total count:	
raw milk	$1x10^5$
after thermization	$5x10^4$
before pasteurization	$5x10^4$
Thermoresistantstrepto cocci:	
cheese milk after pasteurizer	10^4
cheese after 24 hour	10^7
cheese after 2 weeks	10^6
Coli bacteria:	
culture milk before enting	0
pasteurized cheese milk	0
raw cheese milk	10
whey from filling equipment	50
cheese after 5-24 hours	10^3
cheese after two weeks	$5x10^2$
Lacto bacillen:	
pasteurized cheese milk	0
raw cheese milk	20
cheese after 2 weeks	$2x10^5$
cheese after 4-6 weeks	$2x10^6$

3. Processing line : See attached flow chart.

4. Equipment needed and : Flexible depending on equipment.
and its costs : Depending on level of automation and level of used processing technology ranging from US$ 5 - 6 million. Excluding land, civil works and local infrastructure

5. Source of technology : The Netherlands, Sweden, Denmark,
and equipment : Germany, Italy

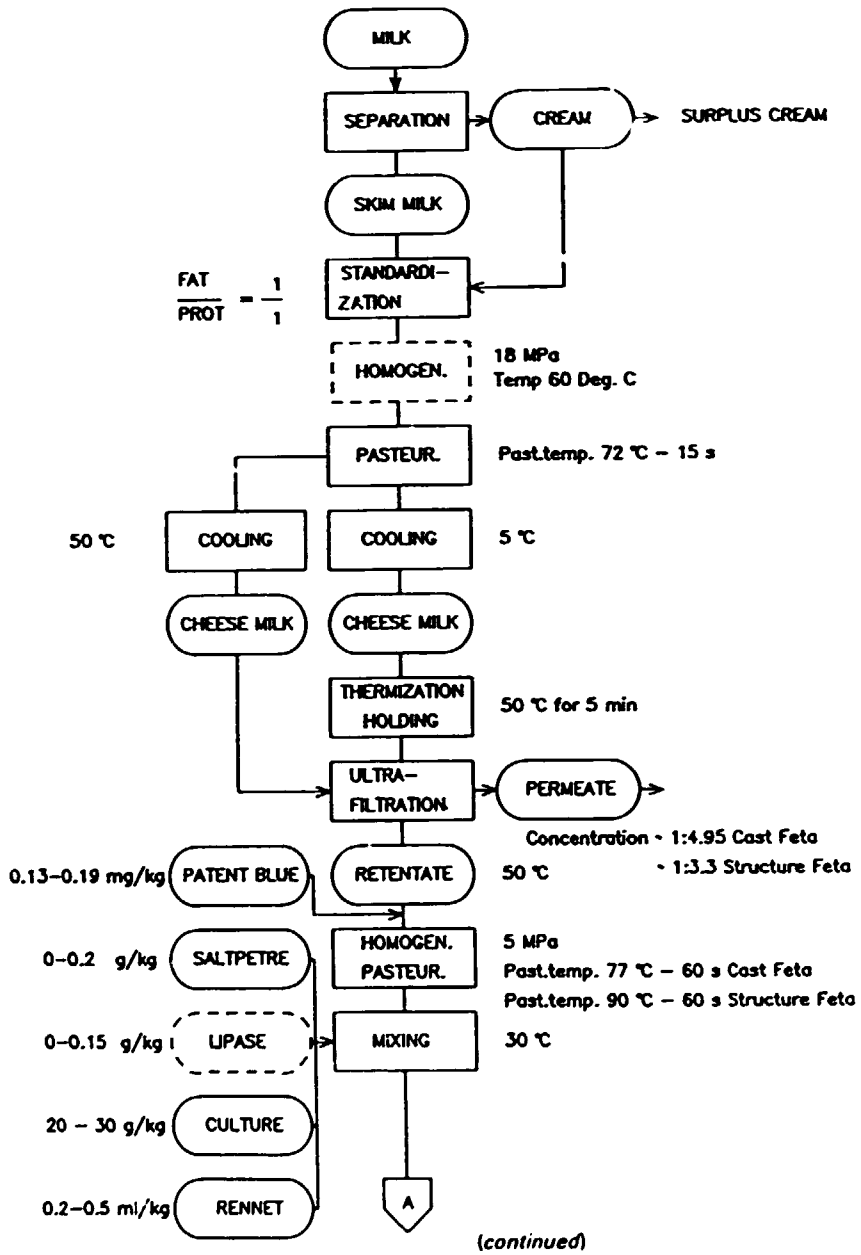
6. Minimum economic production capacity : 150,000 ltr. raw milk/day

7. Labour requirement :

management	4
laboratory	3
operators	10
c.i.p.	3
store	25
maintenance	10
others	15
Total	70

Excluding administration and distribution.

Manufacture of Feta cheese — industrial



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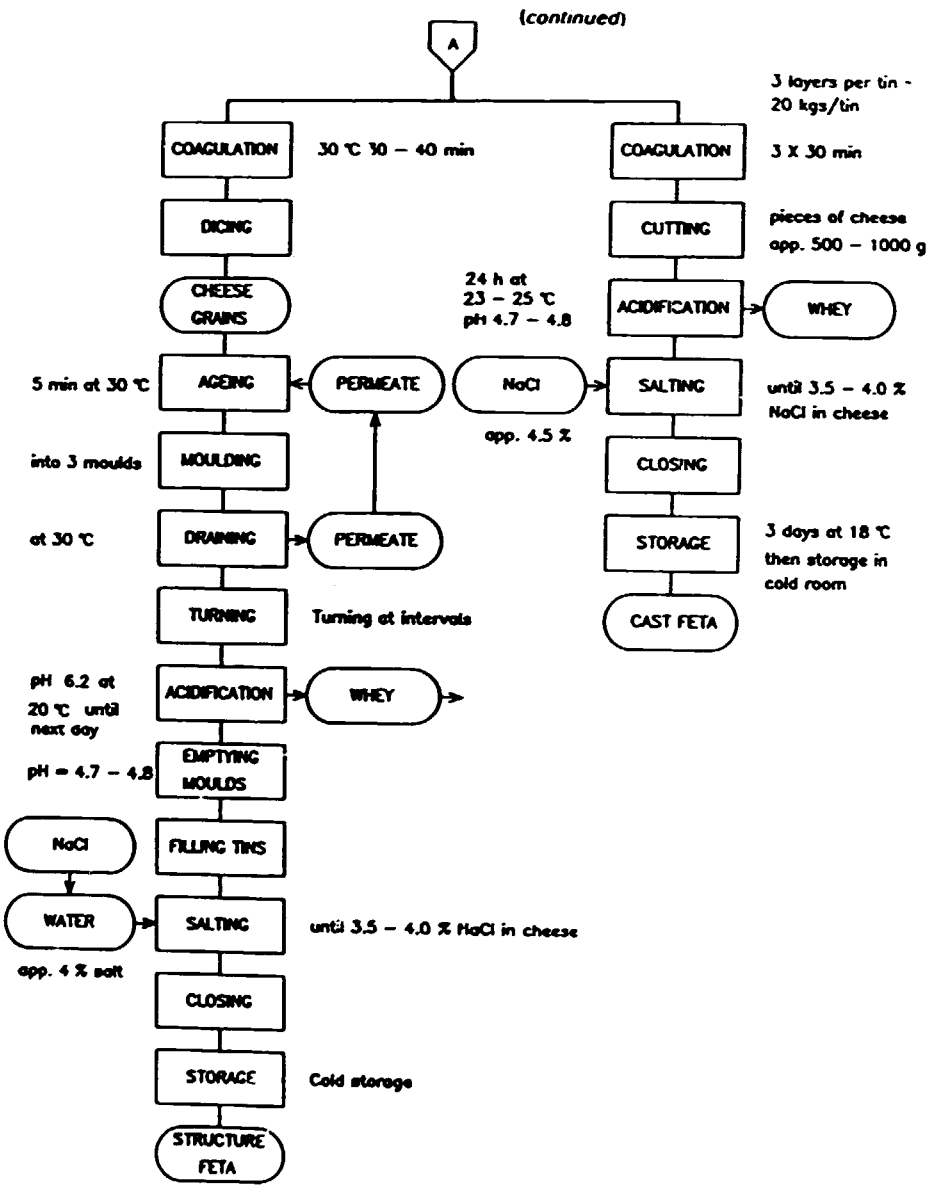
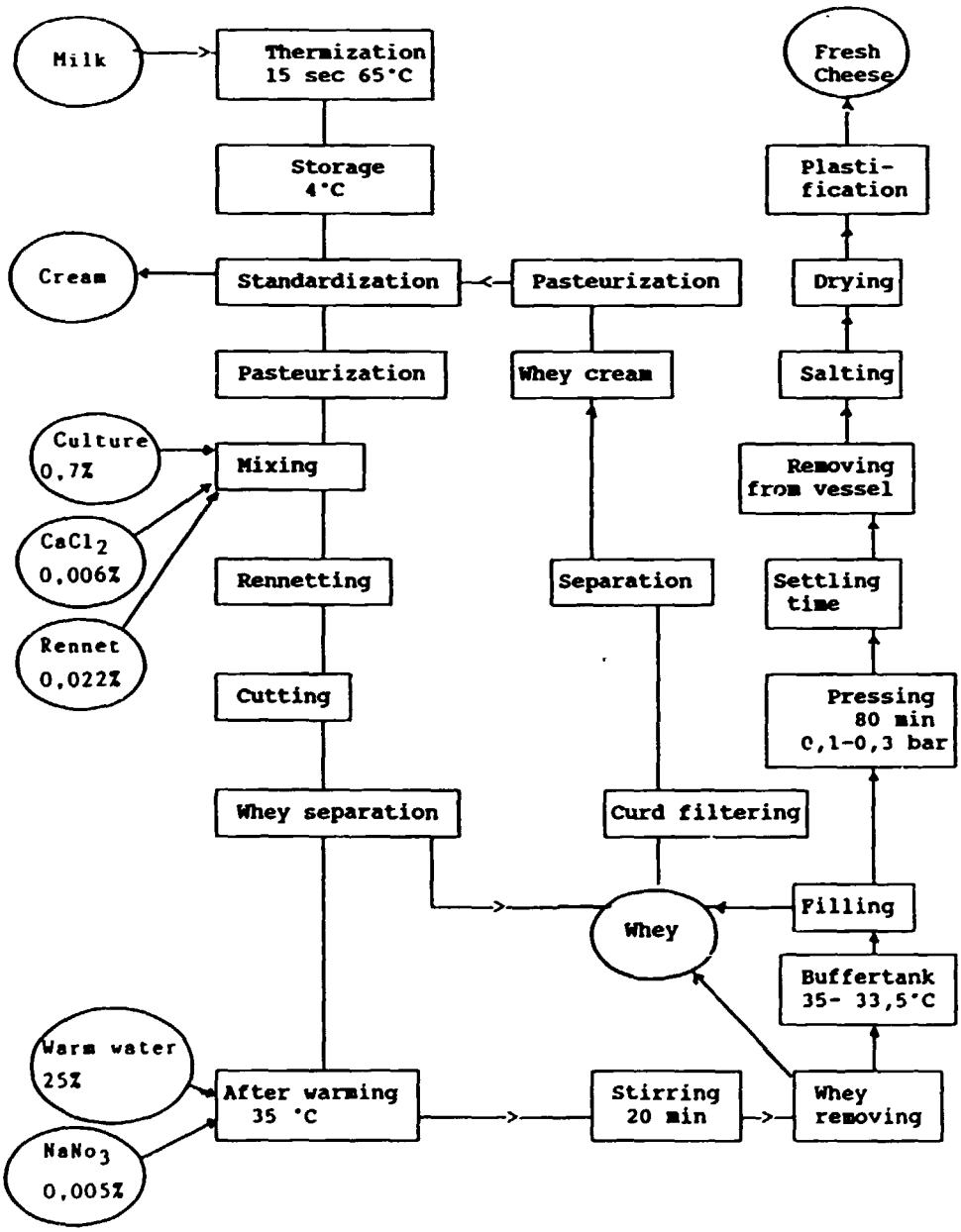
Manufacture of Feta cheese — industrial



FLOW - CHART GOUDA CHEESE PRODUCTION



Annex IX B

Investment profile

Canned cream

1. Product description : Cream intended for direct human consumption is produced in a variety of different fat contents and under various names, subject to governmental legislation. The most important cream products are:

   * light cream, usually sterilized, with a fat content of about 20%
   * whipping cream, usually sterilized, with a fat content of about 35-40%
   * cultured cream with a fat content of about 20% fermented with a lactic acid bacteria

2. Quality of raw milk : See raw milk standards
   Quality of the product: Acidity not higher than 20 °N, except when lactic acid or lactates or a combination of these are present. Neither by cooking or adding alcohol 70 volume % denaturation should occur. The sedimentation test should give not more than a slight spores of dirt. Phosphatase should be negative, or peroxidase should be negative. No other additives than stabilizors, natrium and calciumchloride, natrium and calcium nitrate, or the phosphate of natrium and calcium. Coli bacteria should not be present in 0.1 ml.

3. Processing line : See attached flow chart.

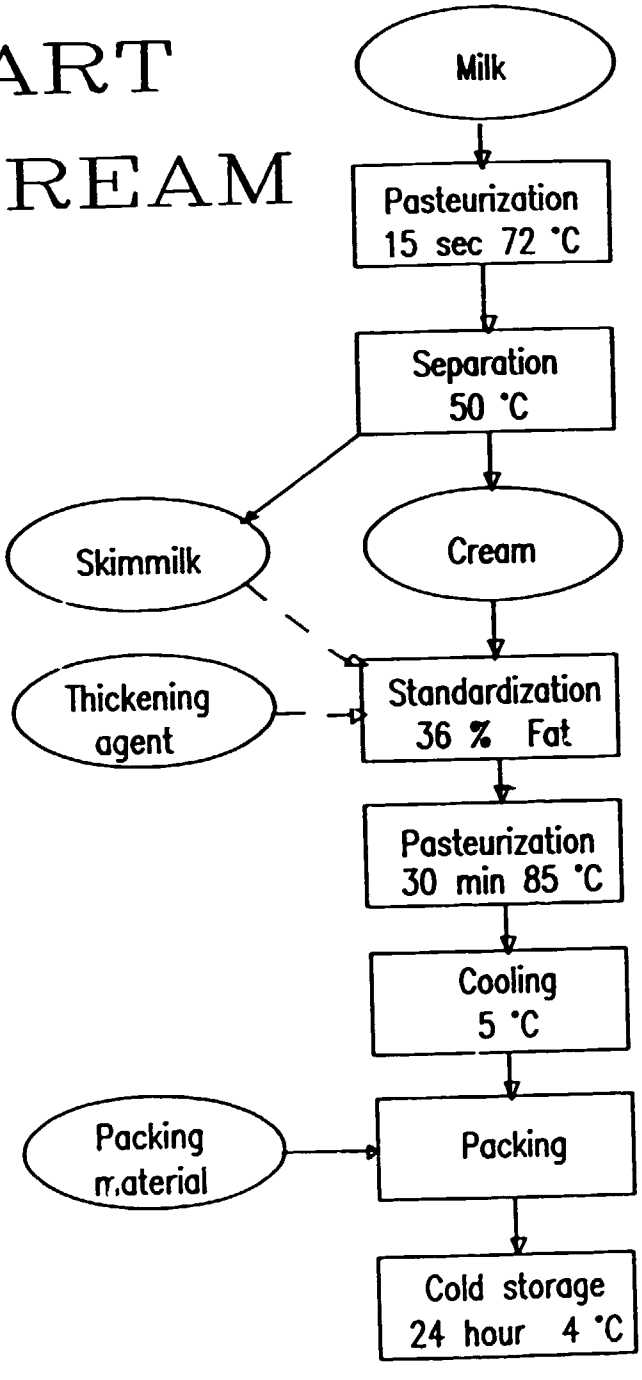
4. Equipment needed and its cost : Depending on level of automation and level of used processing technologies ranging from:
   - processing line US$ 2 million
   - canning line US$ 2 million
   Excluding land, civil works and local infrastructure

5. Source of technology and equipment : Denmark, Sweden, The Netherlands

6. Minimum economic production capacity : 100,000 ltr raw milk intake
   200,000 ltr raw milk intake if canning factory is attached to the plant

7. Labour requirement : Total 55 persons
   Excluding administration and distribution.

FLOW—CHART WHIPPED CREAM



Annex IX C

Investment profile

Instant whole milk powder

1. Product description : Powder made from milk by removing the water from the dry solids.

2. Quality of raw milk : See raw milk standards
   Quality of the product: Moisture content - maximum 3.0%
   Titratable acidity - maximum - ADMI method 0.15%
   Solubility index - maximum - ADMI method 0.1%
   Scorched particles - ADMI method - Disc B or better
   Copper content - maximum 1.5 mg/kg
   Iron content - maximum 10 mg/kg
   Bacterial estimate: maximum
   Viable plate count/gram 50,000
   Yeast and mould - maximum 10/gramme

   Free from any objectionable odour or flavour

3. Processing line : See attached flow chart.

4. Equipment needed and its cost : Total cost of a baby food milk powder plant with a capacity of 25,000 - 30,000 litre fresh milk/hour US $ 15 million, inclusive reception, milk storage, packaging, powder storage, laboratory fluidbed, but exclusive buildings and distribution system.

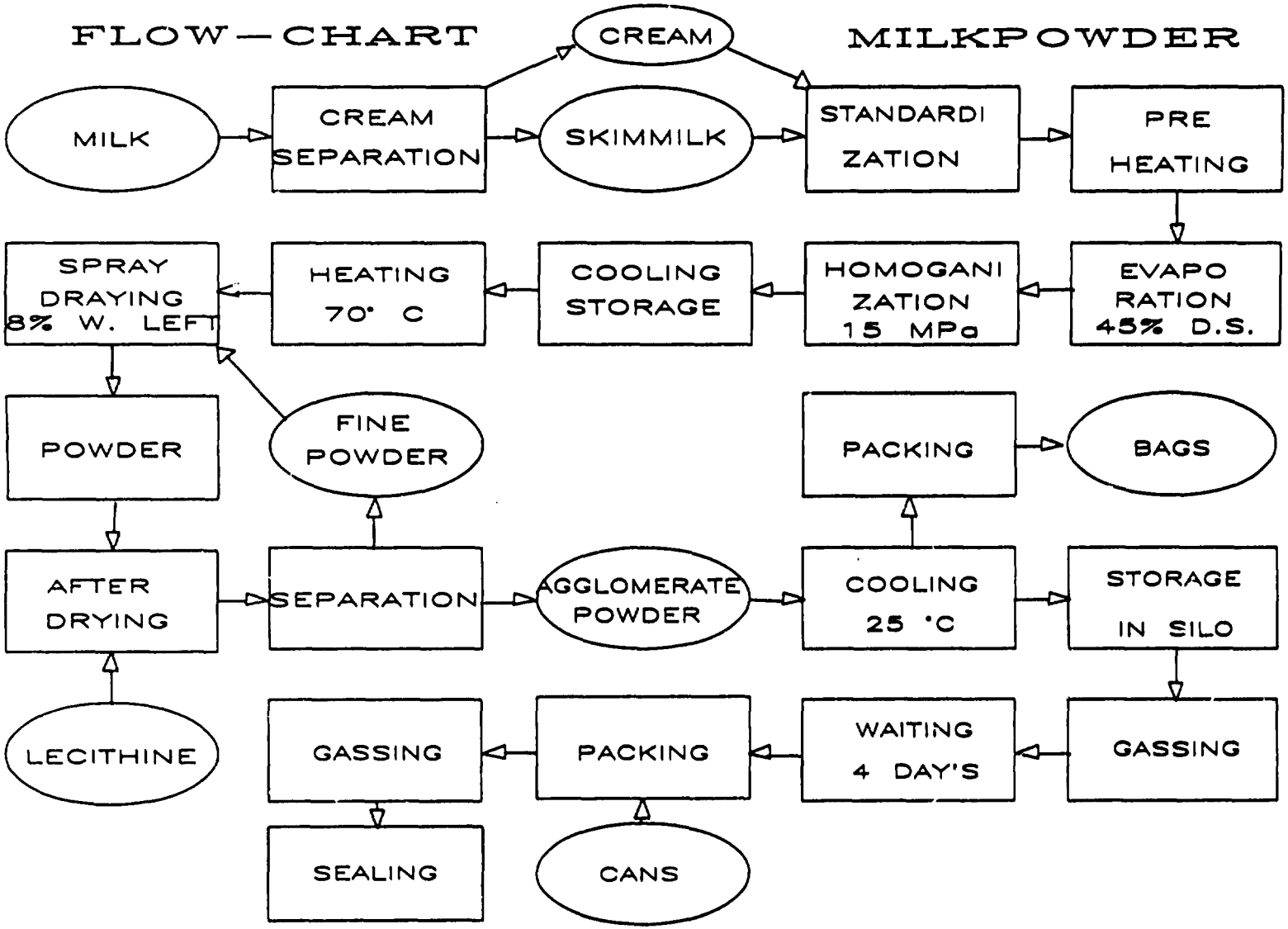
   Total cost of an instant whole milk powder factory with a capacity of 25,000 - 30,000 litre fresh milk/hour US $ 12 million inclusive milk recep-tion, milk storage packing, powder storage, laboratory exclusive the buildings and distribution.

5. Source of technology and equipment : Denmark, Finland, The Netherlands

6. Minimum economic production capacity : 15,000 litre raw milk intake/hour

7. Labour requirement : Approximately 80 persons in one shift

   Excluding administration and distribution.


FLOW—CHART
MILKPOWDER
CREAM
MILK
CREAM SEPARATION
SKIMMILK
STANDARDI ZATION
PRE HEATING
SPRAY DRAYING 8% W. LEFT
HEATING 70° C
COOLING STORAGE
HOMOGANI ZATION 15 MPa
EVAPO RATION 45% D.S.
POWDER
FINE POWDER
PACKING
BAGS
AFTER DRYING
SEPARATION
AGGLOMERATE POWDER
COOLING 25 °C
STORAGE IN SILO
LECITHINE
GASSING
PACKING
WAITING 4 DAY'S
GASSING
SEALING
CANS

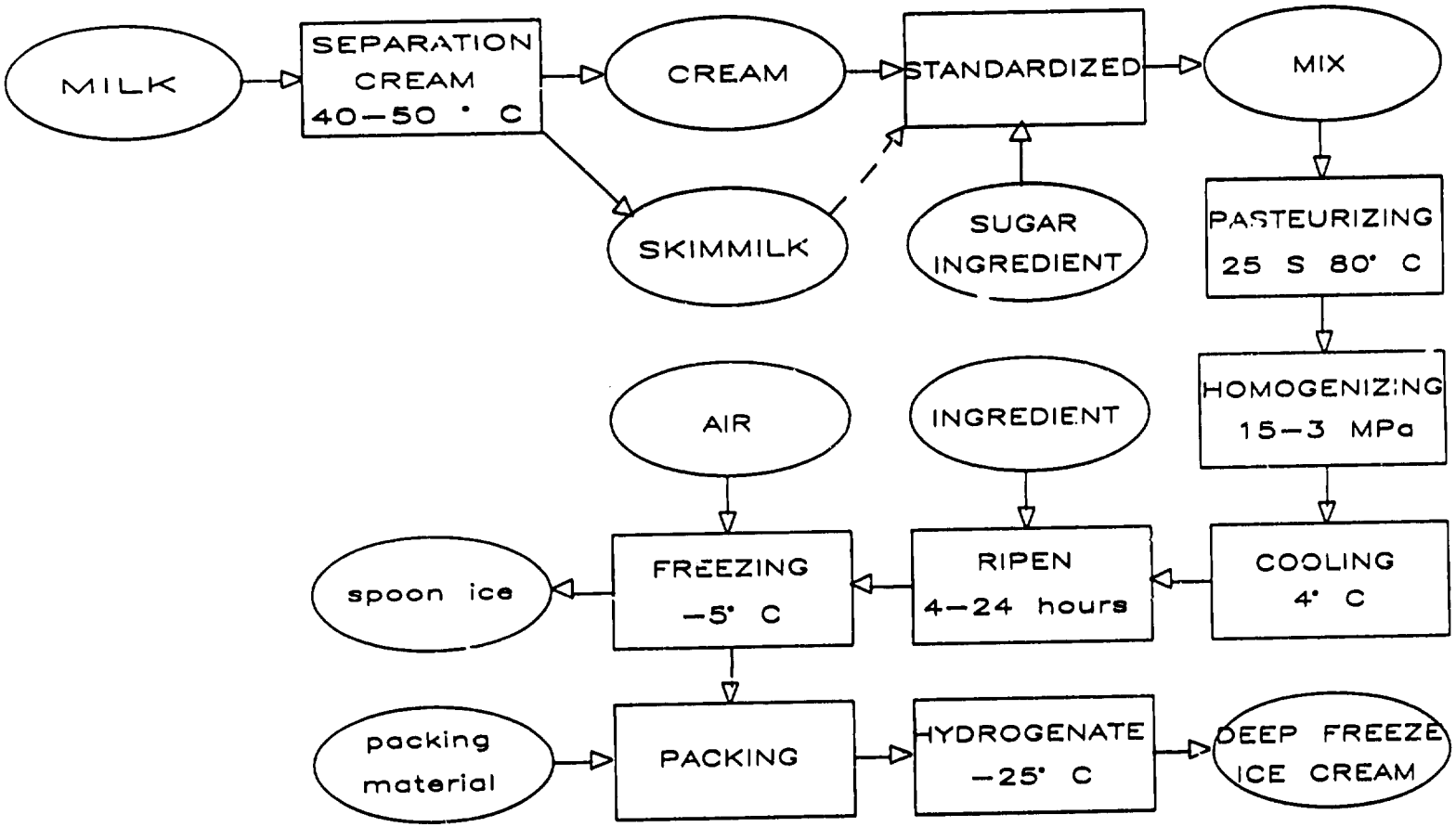
Annex IX D

Investment profile

Ice-cream

1. Product description	:	Sweet or sweet sour product which has been cooled down below a temperature of 0 °C.
2. Quality of raw milk	:	See raw milk standard
Quality of the product:		Pro ml. ice mix the total count should be maximum 100,000
		No coli bacteria in 0.1 ml. ice mix
		No pathogenic bacteria in the ice mix
3. Processing line	:	Mixing in mixing tank, homogenization, pasteurization, cooling, storage, freezing, filling, hardening, storage. See attached flowchart.
4. Equipment needed and its costs	:	Depending on level of automation and level of used processing technology ranging from US$ 1 to 1,5 million, excluding land, civil works and local infrastructure.
5. Source of technology and equipment	:	Sweden, Denmark, Italy, Germany
6. Minimum economic production capacity	:	10,000 litre ice cream/day
7. Labour requirement	:	10 - 15 people
		Excluding administration and distribution.

FLOW —CHART
ICE CREAM



Annex X - Technical Assistance Profiles

Activity: **Study on the establishment of a national dairy organization.**

Background
Within Saudi Arabia various ministries and parastatal organiza-tions are involved with the development of the dairy farming and processing sector. However, in the private sector no institutio-nalized cooperation exists. The complete lack of such a cooperation contributes in in-efficiencies at nearly all stages of processing, supply and marketing. Therefore the establishment of a intraprofessional organization, as exists in the Western countries, should be encouraged.

Objectives and description
A study should be conducted for the establishment of a national dairy organization for the entire dairy industry (fresh and recombined sector).
The study should define the blueprint for the structure of such an organization as well as its function duties, activities and staffing.

Suggested activities of such an organization are:

- Establish quality/product standards (other than SASO standards) and milk promotion activities
- Market analysis and information services
- Organization of storage and transportation
- Information and training on new technologies
- Negotiations with governmental organizations on structural changes in government policies

Estimated inputs
2 manmonths - institutional development specialist
- dairy economist/marketing
- dairy technologist

Annex X - continue

Activity: Farm management survey

Background
Dairy farming developed rapidly in Saudi Arabia. Large scale farms are dominating the sector. At present over 40 specialized dairy farms are in operation. In order to give optimal support to the development of new dairy farms and to improve the technical assistance given to the existing farms, a detailed farm management survey on the current systems and scale of operation is needed.

Objectives and description
Execution of a detailed farm management survey on dairy farming to current production systems, and scale of operations.
Issues should relate to

- Economic development of existing units
- Consequences of a changing (adjusting) scale of operations/ farming
- Increasing costs due to water availability
- Financial consequences of costs due to regionalisation of dairy farming throughout the country
- Evaluation of support services of the Government and future requirements
- Profound evaluation of quality and availability of production inputs (financial services, concentrates, health control etc.).

Estimated inputs

3 manmonths
- agro-economist
- animal production/nutrition specialist
- veterinarian

Annex X - continue

Activity: Consumer Food budget and preference survey

Background
Fundamental data on consumer behaviour and preferences for food items are not available. For planning purposes more information is needed, especially under the current readjustment of economic development programmes in the Kingdom, the rapidly and constantly changing conditions in the food market and the strengthening and promotion of regional development (affecting consumer preferences).

Objectives and descriptions
The national wide consumer budget and preference survey on food consumption should assess

- The consumption pattern of the population/regions
- The increase in population and its purchasing power
- The changes in the consumption pattern for the future
- The price and income elasticity
- The acceptance of milk towards pricing, quality, packing and availability

The survey should not be limited to dairy products but should also include important food items such as meat (types), eggs, fish, fruit and vegetables, pulse crops, cereals and other essential consumer items (housing, transport etc.).

Estimated inputs

Have to be determined in relation to sectors to be covered.

Annex X - continue

Activity: Support to regional development of dairy farming

Background
Although milkproduction within Saudi Arabia is known to be mainly produced by large scale dairy farms. Over 135,000 dairy cows are kept on small scale farms.
Those farms are mainly traditional "rural" farms with a mixed production output. Farm management is based principally on a logic of survival rather than on a logic of development. This is expressed in a propensity to minimize risk rather than maximize profit.
However, within the Government aim to increase the national milk production their is a great scope to encourage those farmers to develop their milk production activities.

Objectives and description
A study is needed to assess the scope and activities of development of the dairy farming at the rural farming sector. Study should also define location and size of the geographic region and estimated potential of milk increase.
Further study should define needed inputs, technology level, organizational structure as well as financial aspects.
In short, where and how should the stimulation takes place and which conditions should be satisfied.

Estimated inputs

4 manmonths	- agro-economist
	- animal husbandry specialist
	- animal nutritionist/feed and forage spec.
	- agricultural support/milkcollection spec.

Annex X - continue

Activity: Establishment national dairy technology Training Centre

Background
Although Saudi Arabia is lacking in any specific education facilities in dairy technology on primary, secondary and college level, it is not recommended to establish such a particular education system if the relatively low numbers of students to be trained are taken into account.
However, there is certain a need for one national or some regional vocational training centres where dairy plant employees (at all levels) can receive tailor made refreshment courses.

Establishment of national or regional "technology training centres" will definitely increase the understanding of the processing technology and skills of labourers and management.
Main issues for training should be:

- processing technology management
- product quality control and development
- preventive maintenance and repair

This centre should not only be engaged in organizing training courses, but should also provide advisory services (trouble shooting) and should compile specific technical bulletins to be distributed to all dairy plants.

A third activity of this "technology training centre" could comprise activities directed to a "quality promotion office".

Objectives and descriptions
The study should evaluate in great detail the existing training and education system on dairy technology.
Proposed technology training centre should be evaluated in regard to:

- need
- scope of activities
- location
- input required
- financing
- ownership/sponsorship

Estimated inputs

2 manmonths	- dairy technology specialist
	- agricultural education and training spec.