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ABSTRACT OF THE REPORT ON THE DEVELOPMENT OF  
THE SUGAR INDUSTRY IN THE REPUBLIC OF IRAQ <sup>1/</sup>

by

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## INTRODUCTION

1. The Government of Iraq, for the purpose of implementing the third stage of the industrial development survey, had formed a committee to examine the status of the sugar industry and the prospects of its development during the next ten years. The inter-departmental committee under the guidance of the Ministry of Industry undertook the responsibility of evaluating the market trends, the productivity of the existing sugar industrial projects and the techno-economical aspects of beet and cane sugar projects to be implemented in stages between 1975 and 1985. Many alternatives were presented for the proposed expansion programme of sugar production. In the meantime, another preliminary study for expanding the local sugar industry was carried out independently by the Ministry of Planning and the Ministry of Agriculture and Agrarian Reform with the help of an FAO expert who had supervised some field experiments on sugar beet in one location.

2. In order to formulate a practical programme in approaching the whole question of the sugar industry, the Ministry of Planning sought the assistance of the Regional Adviser in the Formulation of Industrial Projects at ICWA to review all data and reports and assess the merits of various proposals and alternatives outlined in the above-mentioned studies.

3. The detail of the assignment was presented in a report in Arabic to the Industry Department, Ministry of Planning, following the review and discussion of all findings with the counterpart. The following sections represent a summary of the major issues raised with respect to the proposals of the sugar industry in Iraq.

## THE LOCAL MARKET

4. The discrepancy among data on apparent local consumption obtained from various sources and the abnormality of the market trend as determined accordingly made it very difficult to establish a logical base-line for present and future consumption. However, since the state-controlled Public Sale Administration, became the sole wholesaler of sugar in Iraq in 1965, the records of local consumption appear to be more realistic as far as the trend is concerned. Such records indicate that the annual per capita consumption has increased at a much higher rate than the world average. This can be

attributed to the high rate of increase in the per capita income during the sixties. But the possibility of waste and smuggling of sugar to neighbouring countries exists since the sugar is a highly subsidized commodity in Iraq. Moreover, it was noticed that the trend of imports and local sale was a function of world price changes and the internal political situation during the sixties which resulted in unsteady growth of apparent consumption (table 1).

5. Based on a mean average of sugar sale at the turn of the decade and given population statistics, the per capita consumption is calculated at 28 kg in 1970, and by taking the trend of marketing in both the developing and the central planning countries where per capita consumption has not reached the point of saturation, the annual rate of increase in consumption in Iraq may be forecasted as 5 per cent during 1970-1975 and as 4 per cent during 1975-1978, giving the following figures for total and per capita consumption:

1975	339,000 tons	and 30.5 kg
1980	413,000 tons	and 32.0 kg
1985	502,000 tons	and 34.0 kg

6. A maximum actual per capita consumption may not rise beyond 3 kg per month in 1985 although certain statistics estimated the present apparent per capita consumption to be just over or about 36 kg p.a. in 1971. This will make the total consumption about 565 tons. But in view of the critical world sugar situation and the possibility of marketing control to avoid consequences of crucial problems facing expansion and increased world production of sugar it is suggested that the subsidized amount of sugar in the local market should be limited to 24 kg per capita annually. This can be controlled by rationing a certain type of "near white" sugar to the inhabitants of Iraq.

#### LOCAL PRODUCTION

7. The sugar industry in Iraq started in the late fifties with a small sugar beet project (in the north) whose plant has an 800 tons beet processing and 200 tons of crude sugar refining capacity per day. The plant capacity was increased and a new sugar cane project (in the south) put on stream at the turn of the decade. These two with the second sugar beet project which is under implementation in the north may produce over 300,000 tons of refined sugar.

8. Operating projects have not reached their expectation, and the major problem seems to be an agronomical one. The sugar beet project relies on the production of beet in private farms delivered to the plant as specified by a contract signed with the state-owned Mosul Sugar Company. On the other, the sugar cane farm and plant are owned and operated totally by the state-owned Misan Sugar Company.

9. Unsatisfactory performance is attributed mainly to the insufficient cultivated areas and their low productivity. Moreover, the yield of sugar from beet and cane has been much below the estimated figures (table 2). As a result the plants were not fully utilized for processing crops and they were running at 37 per cent and 27 per cent of their optimum capacities for beet and cane respectively.

10. Major problems identified by experts and consultants can be summarized as follows:

- Ineffective farm management and supervision of cultivation activities in the privately owned small beet farms which are scattered over a large area, with low harvest mechanization and transportation services;
- Non-complete experimentation to evaluate the suitability of the area for beet cultivation particularly with respect to beet variety, water availability and soil that affect usually the yield and the length of the harvesting season prior to the planning of the project;
- Ineffective control of birds, insects and plant diseases that hit the beet plant at various stages of its growth;
- Resalination and improper functioning of the drains system applied to the sugar cane farm which in turn promoted significant soil and water salinity effect in reducing the yield;
- Perennial weeds, frost damage and occasional winds that lower cane farm productivity;
- Delay in harvesting the cane due to occasional rainfall and low mechanization;
- The novelty of these crops and the shortage of trained people for effective cultivation management.

11. Agronomical constraints resulted in increased cost of production and it was the refining of imported raw sugar that contributed towards balancing part of the economical burden of these projects. During the last few years, the local production of sugar formed only 4 per cent while refining of imported raw sugar accounted for 21 per cent of the total apparent consumption in Iraq.

12. In spite of all difficulties, some progress was made during the sixties in improving sugar beets. Also, the last season production of sugar cane indicated some improvement after the partial control of drains and harvest mechanization were applied. But, the overall performance is discouraging particularly for the sugar beet project which was commissioned fifteen years ago.

#### ANALYSIS OF THE PROPOSED DEVELOPMENT PROGRAMME

13. The development of the sugar industry in Iraq is urgently sought to narrow the gap between consumption and production or to stop the import of such an essential commodity as sugar. All preliminary investigation carried out in the past indicated that there is a big scope for the development of the cane sugar industry in the southern region and the beet sugar industry in the middle and northern region of the country. However, these investigations were not supplemented by highly intensive research (with the probable exception of the Nisan sugar cane project and the most recently accomplished Musayab experiments on beet) to determine the right location and capacity of the field to produce cane or beet suitable for the environmental conditions in the particular region.

14. The pre-feasibility studies carried out in this respect for the new or suggested projects were based on the results of few simple experiments (except for those of the Musayab Agricultural Project) and the notion that:

- (a) The development of the land and irrigation system can be done with minimum efforts and expenditure;
- (b) The competitive international trade of sugar and quick price fluctuations in the world market necessitate an urgent expansion of sugar industry in Iraq in order to reduce their effect on the national economy;
- (c) The development of infrastructure for the sugar industry can be accomplished at the required rate.



15. In formulating various projects, certain assumptions were made from the point of view of raw material, overlooking past performance of existing projects. The most critical assumptions are those dealing with yield and properties of beet and cane crops, e.g.:

	<u>Sugar cane</u>	<u>Sugar beet</u>
Sugar content	13%	15%
Purity	81%	82
Yield (ton/acre)	50%	28%
Recovery of white sugar	9.45%	11.2%

16. Based on the maximum yield of the proposed farms and the data on the expenditure of certain land reclamation projects in the past, the costs per ton of crops were calculated at ID 4.1 (US\$ 12.3) per ton of cane and ID 7.5 (US\$ 22.5) per ton of beet. Moreover, it was suggested that in certain areas in the northern region at high altitudes, multi-seasonal crop cultivation can be attained, thus elongating the beet campaign and increasing production.

17. The criteria adopted to develop the sugar industry covered the following scheme:

- (a) Improving the conditions of the existing farms and developing new state-owned farms to produce beet and cane in enough quantities so that the existing plants utilize fully their capacities;
- (b) Developing new beet and/or canefarms with processing units to produce raw sugar to feed the refining units of the existing plant in order to stop importing crude sugar;
- (c) Installing complete sugar plants in newly developed irrigation projects where crops can be grown in large quantities for the sake of making the local production of sugar bordering 700,000 tons in 1985.

18. The proposed programme comprises the installation of process units and complete plants (processing and refining units) in various locations of the country in stages. Certain alternatives were given but the same assumptions were maintained. Locations proposed as new sites for the plants and necessary

farms were not thoroughly investigated, and field work was limited to very few places where small experiments were conducted for short periods, mainly in the northern region around Sulaymania where the new factory is under construction.

19. A three stage development plan was proposed. It was suggested that at the end of the second stage the local production of white sugar from beet and cane should exceed 450,000 tons, and the third stage of activities may be determined then.

20. The major debatable points, which were not settled, among different alternatives are:

- the reliance on beet vs. cane as the major sugar crop during the second stage;
- the possibility of beet grown in the southern region where the climate is relatively hot and humid and the salinity is rather high;
- the production of raw sugar from beet in one location to be refined in other plants at another location;
- the cultivation of beet and cane in the same location to be processed in one plant with a multi-purpose unit; and,
- the suitability of certain locations and the cost of field development.

21. Due to the lack of sufficient information on the proposed location and the absence of reliable results of intensive experiments, it was not easy to come to any conclusion. Moreover, in the absence of reliable data on the performance of existing projects, particularly costing data according to well defined accounting centres in each, the valuation of the productivity of the envisaged projects could not be made intelligently.

22. It is of importance to note that the investigation conducted under the auspices of the Ministry of Agriculture and Agrarian Reform and the Ministry of Planning concluded that the sugar industry in Iraq should be limited to beet processing. Based on field work carried out in the Great Musayab Agriculture project, the study recommended the establishment of 15 projects for beet production in all regions of the country for the production of 4.5 million ton of beet to be processed in the three existing plants and five new

process units (to produce 105,000 tons/year of raw sugar for export) plus seven complete plants (to produce 210,000 tons of refined sugar annually).

23. Preference of beet sugar projects to cane sugar projects was not very definite since it was not based on research work, and the comparison of the performance of the existing projects was not precise. Moreover, it is not practical to generalize the results of the experiments of the Great Musayab Project on all locations whose climatic conditions, soil and other natural resources are quite different, particularly in the southern region.

#### RECOMMENDATIONS AND CONCLUSIONS

24. Although the climatic conditions are suitable for growing beet in the middle and northern regions and for growing cane in the southern region, two major factors ought to be considered while planning the large expansion of the sugar industry in Iraq:

- the development of suitable locations with minimum expenditure and,
- the development of suitable management.

25. In today's world sugar situation, any project sounds economical where raw material (beet or cane) is or can be grown with minimum efforts and at a short time. Therefore, a feasibility study should be carried out from the point of view of the availability of raw material. Cost of processing equipments, economy of scale, degree of refining, use of multi-purpose units to process both beet or cane, and operation of refining units at reduced or full capacity are secondary factors in determining the effect of the sugar industry on the national economy. More important to consider in this respect are:

- Considerable reduction in the imports of sugar as local consumption increases;
- Cost of locally processed sugar vs. import of white sugar and/or processing of imported raw sugar for local refining;
- The economy of locally grown sugar crops vs. major field crops which can be grown in the same area;
- Expenditure and cultivation problems of beet vs. cane production;

- Economical utilization of by-products; beet pulp (as animal feed vs. locally produced material, crops, farming remnants, meal, etc.), beet sugar molas for recovering sugar (by the Steffen process which is already employed in the Mosul factory) and other products that have been produced from molas and dates (alcohol, yeast, and vinegar) or can be produced (acetic and tartaric acids ...), and baggas which can be utilized with other long fibre pulp in the existing paper industry whose plans for expansion are underway.

26. With reference to the above presentation and in view of the low performance of existing projects and the limited number of experiments, the following programme is suggested to improve the productivity and better utilization of idle processing capacities of the existing plants:

- Improving agricultural conditions in the existing beet and cane farms to raise the yield and improve crops properties by improving: (i) physical management of the soil and water system (for irrigation and drainage); (ii) mechanization and transportation systems; (iii) disease, pest, and weed control; and, (iv) varieties of cane and beet.
- Developing new farms for beet and cane in the vicinity of the existing farms (or where some preliminary investigation was carried out near the Sulaymania Sugar Factory which is under construction).
- Developing of trial plantations in the existing or newly developed land reclamation and irrigation projects which are within reaching distance of the existing factories, and where the roads are good enough to have the crops delivered for processing within 24 hours after harvesting. Examples of such projects are: Ishaqi, Hawija, Khalis, Abu Ghraib and Aski Mosul for beet, and Nahr Saad and Dijaila for cane.
- Refining imported crude sugar which can be obtained by long term contracts (as it is done now) in order to utilize fully the refining capacities of the existing plants.

27. The anticipated production (in tons of sugar per year) of this programme, if it is carried out efficiently, will be:

	<u>Sulaymania</u> (beet plant)	<u>Losul</u> (beet plant)	<u>Nisan</u> (cane plant)	<u>Total</u>
Processing of local crops	20,000	21,000	32,000	73,000
Refining of import raw sugar	55,000	92,000	88,000	235,000
Total	75,000	113,000	120,000	308,000

The programme will require 44,000 acres for beet production and 7,000 acres for cane production annually.

28. Vertical expansion of sugar industry in Iraq can be attained by developing new farms to produce the required amount of crude sugar that can be refined in the existing units, substituting part or all imported quantities of raw sugar. However, to save time and much excess expenditure, the trial plantations referred to in the previous section may be the ideal nucleus since they are located in already developed agriculture projects with well established roads and probably after two seasons of intensive trials may prove to be very successful commercially. Such plantations may be the right place to establish crop processing plants to produce raw sugar. A good example of these locations are Nahr Saad and Dijaila projects where cane processing may produce raw sugar at a rate equivalent to 80,000 tons refined sugar per year.

29. Horizontal development of sugar industry shall be achieved by the establishment of entirely new projects in new locations. This may encounter higher expenditure and much more time due to the fact that planning such projects should be preceded by the following activities:

- The establishment of experimental station to determine the suitability of land and water availability, the economical factors that affect its development for commercial production, the right variety of crops, and to take into consideration social factors, orientation and training of farmers, future expansions, links with other sugar projects, and the economical aspects of other field crops that may be cultivated in the same area.

- Research programme to select or develop the most suitable variety of beet and cane in each location.

30. It is during the last stage that the question regarding the viability and advantages of beet or sugar projects can be determined. The adoption of either or both crops to be processed separately or in multi-purpose units will depend solely on the outcome of the experimental stations and trial plantations as well as the results of intensive research proposed in the preceding paragraphs. Moreover, since such investigation programme may take 2 to 3 seasons, the uncertainty of techno-economical aspects of multi-purpose units may be cleared since the adoption of such unit is questioned in the developed countries and the utilization of lands with limited area and resources to suit both crops need to be proved feasible.

31. The only entirely new project which can be implemented at this stage is the one suggested for the Musayab area since the results of intensive experiments proved its viability. However, due to the limitation on lengthening the harvesting season, a large capacity is recommended for a complete plant to process beet at a rate of 5,000 tons/day (instead of only 3,000 tons/day as proposed) to produce refined sugar at a rate of 50,000 tons per year.

32. It is believed that if the total programme outlined in the last few paragraphs is carried out between 1975 and 1980, the overall local production will be

(a) 200,000 tons of refined sugar from local crops: and,

(b) 155,000 tons of refined sugar from imported raw sugar.

33. The overall local production may form about 86 per cent of the total local consumption by 1980, and about 56 per cent of it comes from local crops. If the per capita of the retail subsidized quantity of sugar is limited to 24 kg. per annum, the total consumption may be reduced and it could border the overall local production.

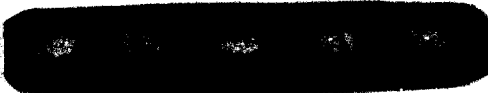
34. One of the methods which may be adopted to limit per capita consumption is to produce near white sugar, relying on imported crystallized sucrose and locally produced beet sucrose or direct consumption cane sugar which can be sold at reduced (subsidized) prices at a rate of 2 kg. per capita per month. Gross amount needed to fill the gap between the subsidized quantity and total consumption can be imported white sugar at open market prices.

TABLE 1. Imports, production and consumption of sugar in Iraq  
(in '000 tons raw value)

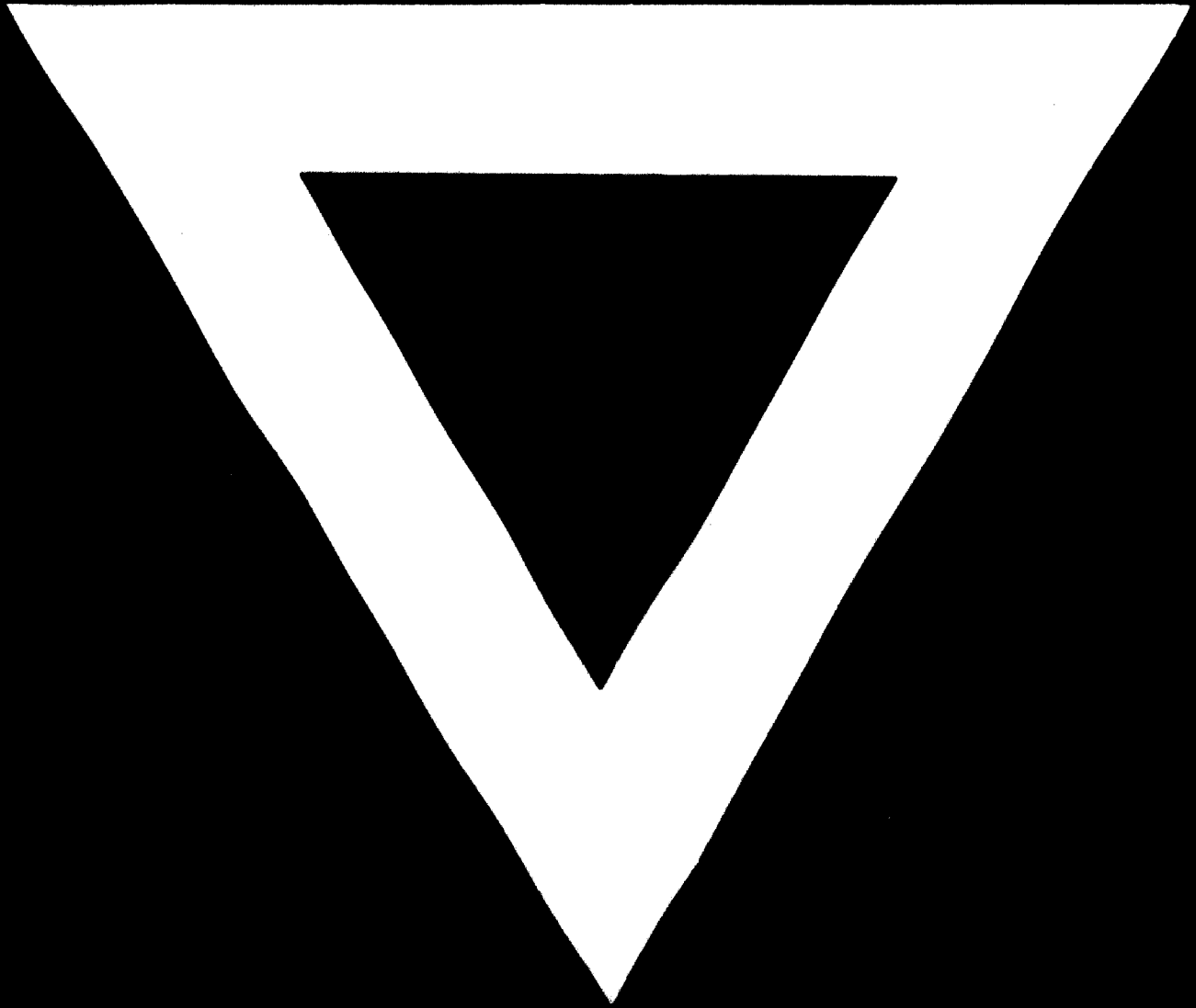
	Imports	Production		Wholesale
		overall	local	
1960	210.2		0.8	
1961	232.2		0.8	
1962	224.3		1.1	
1963	135.1		2.4	
1964	147.4	33.2	2.8	
1965	435.1	46.8	2.8	231.0
1966	205.9	54.3	2.8	255.5
1967	323.2	59.1	3.8	267.3
1968	246.7	57.7	3.9	280.2
1969	254.2	65.7	3.1	250.5
1970	221.9	60.0	2.9	273.6
1971	272.3	64.6	3.9	272.6
1972	225.4		4.1	
1973	435.8			

TABLE 2 - Production capacities of existing projects and average production during the last three seasons

Project	Annual cultivation		W. sugar production			Productivity tons/acre	
	area acre	crops tons	sugar content%	annual tons	yield %	crop	white sugar
<b>1. Sulymania (beet)</b>							
planned	3,750	112,500	16.4	11,250	10	30	3
actual				(not in operation yet)			
<b>2. Mousol (beet)</b>							
planned	6,925	180,000	14-17	21,600	12	26	3.12
actual	3,378	66,686	14.6	5,250	7.8	17.8	1.56
<b>3. Misan (cane)</b>							
planned	5,000	400,000	12	32,000	9.45	80	6.4
actual	3,071	106,880	10.8	6,431	7.0	34.8	2.1







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