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CONTENTS

* Purification of Water for Use in the Arab Gulf States	3
Alan D. Pethybridge	
* Some Remarks on the First Stage of Military Infiltration of the Arab Gulf Region	9
Siegfried Richter	
* Search for Raising the Output of Food and Related Products in the Republic of Iraq for Advancing the Arab-Gulf Economy	15
K. Das, K. P. Sharma and N. A. Shukri	
* Natural Resources of Arab Gulf States and Some Suggestions for the Exploitation with Special Reference to Animal Production	35
Professor M. P. Johrt	
* The Fishery Potentialities of the Republic of Iraq	41
Sufian Kamel Al-Nasiri and K. P. Sharma	
* Observations on the Biology and Life History of <i>Oryctes Elegans</i> in the Field and Laboratory Conditions	55
Dr. H. A. Ali and Dr. M. I. Siddiqi	
* English Speech Errors Made by Iraqi University Students	61
Nature, Cause, and Prevention	
Yacoub Yousif Yacoub and Abdul Sahib El Sheikh	
* Optimal Oil Production and Economic Development	77
A Case Study of the Arabian Gulf States	
Dr. Zakaria A. Basha	

PURIFICATION OF WATER FOR USE IN THE ARAB GULF STATES

by

Alan D. Pethybridge

**Department of Chemistry, University of Reading,
Reading Berkshire, England**

Water has always been of vital importance to mankind but recently the movement into the cities and expanding populations have created increased demand for water all over the world. Even a country like Great Britain, where it is popularly thought that it is always raining, has experienced shortages in most years as demand exceeds supply. However, few people give much thought to water supply provided it comes out of the tap when they want it to.

The answer to providing more water is often to build dams in the hills to store the water during the wetter seasons for use during the drier seasons either directly in the public water supply or indirectly via the natural watercourses. There are several disadvantages to this approach for the countries bordering on the Arab Gulf, the most important being the distance of the mountains from the place where water is required, the cost of building the dam and the high temperature during the summer which can

cause massive and wasteful loss from the reservoir by evaporation (up to 5 m per year).

Consequently we must consider what alternative sources we can tap to produce potable water for use in the home, in industry and in agriculture. Water for these purposes should contain less than 200 parts per million (p.p.m.) of dissolved solids. The only large-scale reserves of water which can be tapped are the sea (36,000 p.p.m. of dissolved salts) and underground water which is obtained by drilling boreholes but is frequently too salty to use directly, containing up to 5,000 p.p.m. of dissolved solids.

The processes by which the water can be removed from the dissolved solids are collectively called *desalination* processes and I intend to discuss the physical principles behind the most important processes and discuss their relevance to the supply of pure water for the Arab Gulf States. All desalination processes require expensive equipment and considerable quantities of energy and are only economically viable at the present moment in places where water is a valuable commodity and energy is fairly cheap. Such places are the countries surrounding the Arab Gulf where natural gas is sometimes burned to waste because an economic use cannot be found for it. Already several British companies, as well as others from different countries have cooperated with individual Arab Gulf countries to instal some desalination plant but there is room for a careful study of the problem in the context of the whole Gulf, rather than individual countries.

The important processes can be divided into three distinct groups which I shall discuss in turn.

1. Distillation processes

When an aqueous solution is boiled and the vapour produced is condensed separately, the condensed liquid is pure water and the liquid remaining in the boiler is a more concentrated solution which can be discarded. This is the basis of all distillation processes but as described is extremely waste-

ful of energy because it takes six times as much energy to change 1 kg of water to steam as it does to heat it from 25°C to 100°C. It is necessary to design the plant so that incoming sea water is used to condense the steam, itself becoming hotter in the process. Even so the energy efficiency is not sufficient for the process to be economically viable unless a second modification is applied. Water boils at a lower temperature if the confining pressure is reduced. (Water boils at a lower temperature high on a mountain than it does at sea level). So hot water can be made to boil again, although at a lower temperature, by passing it into a container at a lower pressure.

So we arrive at the process known as **MULTI-STAGE FLASH DISTILLATION (MSFD)** in which water heated to 100°C is passed through a succession of up to 20 chambers each at a lower temperature and pressure than the previous one. In each unit a small amount of water boils or 'flashes' off to be condensed and collected leaving a slightly more concentrated solution. In this way about half the total water content of sea water can be recovered and the rest is discarded with the salts as a more concentrated solution. MSFD and related processes have proved to be the only viable large-scale process for the desalinating of sea water. One British firm, Weir-Westgarth Limited., has supplied MSFD plants all over the world but particularly to Arab Gulf States such as Abu Dhabi, 6 x 2 m.g.d. plants (1 m. g. d. is one million gallons per day which is the same as 1/20 cubic metres per second); Kuwait, 7 x 1 m.g.d. plants; and Qatar, 4 x 1 m.g.d. plants. These quantities may not be large in comparison with the flow of water down the Shatt al Arab, but for small communities seeking to enrich their life in a near-desert environment, they are vital.

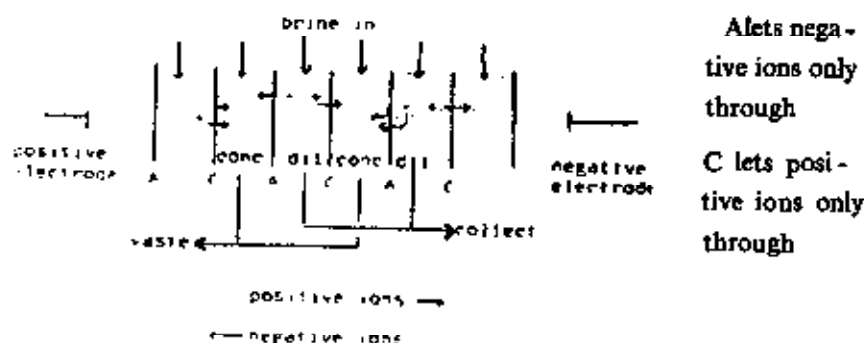
The use of solar energy for the large-scale production of pure water is not at present feasible, but solar stills for producing small amounts of water are available.

The other major source of water is from underground but this water is frequently too salty for use either as drinking water or for irrigation.

Two important methods are available for purification, the former on a large scale.

2. Electrophoresis

If a direct electric current is passed through the solution, the positive and negative ions into which the salt is always split when dissolved in water, move in opposite directions. The impure water is passed between alternate layers of two special kinds of membrane, one of which will only allow positive ions (e.g. sodium) to pass and the other of which will only allow negative ions (e.g. chloride) to pass. In this way, the flow of salty water is gradually split into a series of two streams separated by the membranes. Alternately one stream contains a more concentrated solution and



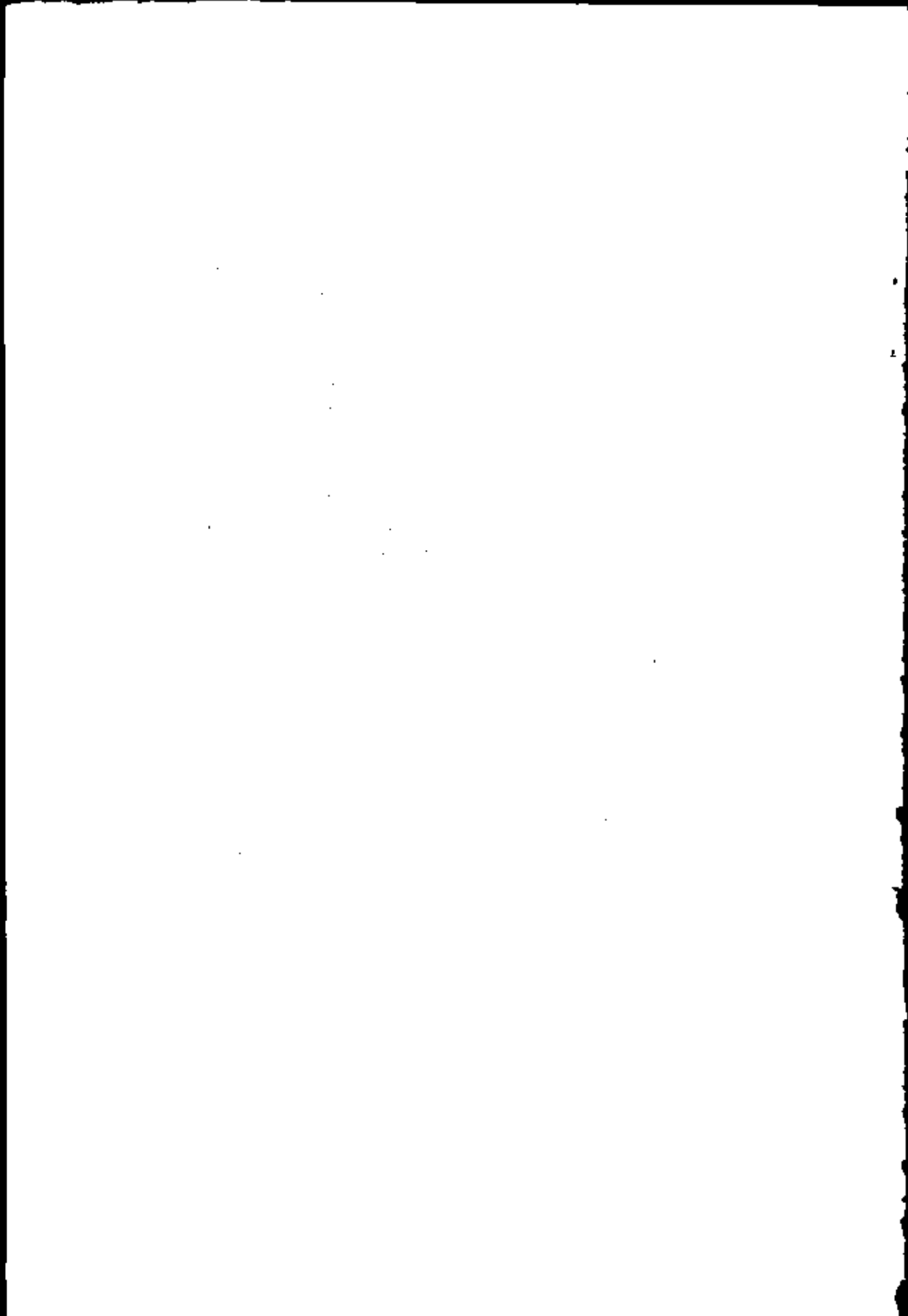
the other a more dilute solution. By having many layers of these membranes (up to 300) it is possible to produce large quantities of water with a low salt content suitable for drinking and irrigation. One British firm, Permutit-Boby, has recently installed a plant with a $4\frac{1}{4}$ m.g.d. capacity to supply the water for the city of Benghazi in Libya.

3. Reverse Osmosis

Water will naturally move through a semi-permeable membrane from a dilute solution to a concentrated one until the concentrations become

equal . To stop this movement a pressure called the osmotic pressure must be applied to the concentrated solution. If a greater pressure is applied water will move across the membrane in the opposite direction from concentrated solution to the dilute one, i.e. in the direction wanted to obtain pure water from salty water. This is called Reverse Osmosis or Ultrafiltration. Much research work has been done on the suitability of various membranes but commercial units use either cellulose acetate sheet on a porous support or, increasingly, a hollow nylon fibre the thickness of a human hair . A unit containing some 900,000 of these fibres in a tube 10 cm in diameter and 2m long will produce about 1000 gallons of drinking water per day. Such units, supplied by the British firm Elgar Products, have recently been installed at the service areas of pumping stations on oil-pipeline in Iran. Advantages of this method are the small size of the unit, the low energy consumption and the fact that the water produced is free of bacteria and pyrogens. It is likely that the next few years will see a massive expansion in the use of reverse osmosis for purifying water .

In conclusion one can see that desalination is a field where oil consumers and oil producers can fruitfully combine. The former have developed various desalination processes and have the scientific and technological expertise to instal desalination plants around the world. The latter have the need for pure water, the cheap sources of energy required to produce it and now the money with which to buy the plant. Long may this fruitful cooperation continue.



**SOME REMARKS ON THE FIRST STAGE OF MILITARY
INFILTRATION OF THE ARAB GULF REGION
(MASIRAH)BY US IMPERIALISM**

Siegfried Richter
University lecturer

**Near East Research Centre
KMU Leipzig & German Democratic Republic**

During the last few weeks the progressive international press carried reports on the further extension of the aggressive imperialist system of bases and on military movements in the Indian Ocean and the Arab Gulf area.

The Arab Gulf area, which has the capitalist world's largest oil deposits, is at present a special target under the imperialist strategy of maintaining bases in the Indian Ocean. As shortly ago as in late November 1974 the CENTO-Pact, with active US participation, staged what have so far been its biggest naval exercises, codenamed "Midlink 74", in the North - Western region of the Indian Ocean to demonstrate the military presence of imperialism at the approaches to the Arab Gulf oil deposits. By threatening again and again to use military force to secure their oil supplies, the aggressive circles of the USA trample upon the right of the Arab peoples to make sovereign use of their natural resources. This aggressive purpose is served by inclusion of the island of Masirah (Oman) in the chain of bases ranging from North West Cape (Australia) via the Cagnew Base (Ethiopia), Muhar-

rag (State of Bahrain) as far as Diego Garcia (Tschagos Islands) and Mahe (Seychelles).

The people, the working-class party and State leadership of the GDR have followed with concern the activities of the USA threatening international peace and the sovereign interests of the Arab States. Therefore, any socialist historian in the GDR who is chiefly concerned with the Middle East considers it a fundamental obligation and concept to stand up with the means of science for our Arab friends in a common anti-imperialist front against the policy of maintaining bases pursued by the USA and its reactionary associates and directed against security in the Indian Ocean and the Mediterranean.

As follows from unpublished documents, reports and letters of colonial, military and secret service officers and His Britannic Majesty's Government from the time of World War II, the first stage of US military efforts to gain a foothold in the South-East of the Arab peninsula to secure US oil interests began as early as right after the USA had entered the war on 11 December 1941. The assistant consul of the British Government in Muscat reported in his cable No. 125 of 21 September 1942 that, after negotiations with the sultan in Oman in August and September 1942, Captain Cofran of the United States Army Air Engineer Corps in Asmara had received the latter's permission to set up facilities for the United States Air Force on Masirah, Salalah and Ras al-Hadd, after the sultan had been discussing the matter for months with the British authorities. In a top-secret memorandum on Masirah of 1 April 1945 concerning the establishment of a "permanent RAF base" submitted to the British War Cabinet the basic importance of a base on Masirah is seen from the following angles:

1. Securing communications both in times of war and peace between Europe and South-East Asia
2. Providing a mobile instrument that would always be ready for use to defend oil interests in the Arab Gulf.

To underline the strategic value of the Masirah island the memorandum says the following:

"It is clear that in any future war in the Far East the security of our convoy routes in the Arabian Sea and West Indian Ocean and the availability of a secure transit route for reinforcement and transport aircraft to India and the Far East will be of great importance. It is therefore essential that our right to air facilities at Masirah should be placed on a permanent footing . "

The memorandum coordinated with the Foreign Office, India Office, Colonial Office and Treasury continues to say:

"Masirah lies close to the mouth of the Persian Gulf. The oil resources in this area both present and potential are likely to be one of the main prizes in any future war."

In the Anglo-American negotiations in the spring and summer of 1942 on setting up US bases in the Sultanate of Oman/ Muscat, there was complete accord among the parties concerning the high strategic value of Masirah. Thus it was very much in line with imperialist thinking that the USA took advantage of the difficult situation facing Great Britain during the war to step up, also vis-a-vis Great Britain, the imperialist new division of the capitalist world without taking account of the interests of the peoples. While the world's democratic forces were fully engaged in the struggle against fascism, the USA increasingly used its financial , economic and military means to expand its spheres of influence in the Arabian Gulf and the Arab peninsula.

Here are some facts and details to throw light on this policy:

1. The British intelligence officer in Muscat wrote in his summary report No. 16 (covering the period from 16 to 30 September 1942) that three engineer officers of the United States Army Corps(USAAC)had visited the British RAF bases at Salalah, Ras al-Hadd and Masirah and had fixed that work on the American bases was to begin during the first week of October 1942.

(Source: Public Record Office, FO 371, Pol. Eastern 1943, Arabia, No. 34892)

2. The USAAC, garrisoned during the war in Asmara, built bases for some 300 air-borne and technical personnel of the United States Air Force with the assistance of the British Air Ministry Works Directorate. The bases of Masirah and Salalah were to take up 100 personnel each, and 60 were to be posted at Ras al-Hadd.

3. Led by US Lieutenant Moore, the United States of America Survey Mission mapped out the areas of what was then Trucial Oman and Muscat / Oman.

(Source: Cables of 4 June 1945 and 22 August 1945 to the Political Resident, Bushire-FO 371, Pol. Eastern 1945, Arabia, No. 45194).

4. Units of the United States Air Training Corps were posted at Sharjah. Furthermore the military infiltration of Saudi-Arabia began. Colonel Hoskins, Personal Envoy of President Roosevelt, agreed with King Saud in August 1943 to post a so-called military training team at Taif. The 64-man team was led by Major Anderson. At the same time arms were delivered to the Saudi-Arabian army under the lendlease terms, although Saudi-Arabia had not yet declared war on Hitlerite Germany at the time.

The entire scope of US imperialist activities and the consequent changes in the constellation of forces in the Arab Gulf area was obvious from a letter to the Foreign Office, dated 10 May 1943, in which the India Office opposed the systematic advance of the USA into a so-called purely British sphere of influence and notified that the USA had practically assumed military and civil control of the air over the Arab Gulf starting from spring 1943.

(Source : FO 371, Pol. Eastern, 1944, 39903).

At Anglo-American talks in London on 12 and 18 April 1944, the British side was forced into respecting the US interests on Bahrain. At the same

time, the USA pointed to their interests in Qatar and Trucial Oman. To politically implement and defend its objectives in Oman the US side argued as follows:

1. It pointed to the need to respect the sovereignty of the sultan which had been assured to him in a Joint French-British Declaration to settle a conflict of colonial interests in 1862, and -
2. To its traditional relations with Muscat/Oman. As far back as 1833 the USA had established treaty relations with Oman, the first East-Arabian country to have been recognised by the USA. In 1834, the first US ship, the "Peacock", under the command of Captain Edmund Roberts, had called at the port of Masirah. The purpose of this formal argumentation was to politically underpin US "open-door" policies in the British sphere of influence and to ensure that the USA would be able to further strengthen its positions after the war. Characteristic of the beginning change of political supremacy in the Gulf area as reflected in a gradual pushing back of the rivalling British by the USA would be able to further strengthen its position after the war. Characteristic of the beginning change of political supremacy in the Gulf area as reflected in a gradual pushing back of the rivalling British by the USA might be a resigned quote from a letter addressed by senior officers of the Foreign Office Middle-East Department to Mr. Peel of the India Office dated 23 April 1945: "We have no alternative".

British documents from that time in the Public Record Office in London, which have become accessible only now, bear out the aggressive, never changed strategic US policy objectives with regard to the Arab peoples. But, they also show that the US advance met with the fierce resistance of the Arab peoples. To save time, let me just give a few examples to illustrate this:

- September 1942 The Muscat Infantry at the British base of Bait al-Falaj (Oman) goes on a four-day strike for higher pay.

- 28 September 1942 300 workers on Masirah go on strike to protest low wages.
 - October 1942 Most of the population flee the island of Masirah so that workers must be brought in from Aden and Muscat.
- (Source: Muscat Intelligence Summary No. 16, 16 to 30 September 1942)

Examples of resistance also include the struggle of tribes against the Sharjah base and that of BAPCO workers for higher wages and political rights.

Although written in the vapid style of conservative colonial officers, these documents, while warning of amisinterpretation of so-called pro-Arab US policies and providing information on the first stage of military infiltration by the USA, supply facts confirming what the progressive forces in the Arab Gulf States had recognised as the nature of US imperialism.

**SEARCH FOR RAISING THE OUTPUT OF FOOD AND RELATED
PRODUCTS IN THE REPUBLIC OF IRAQ FOR
ADVANCING THE ARAB-GULE ECONOMY**

**K. Das, K.P. Sharma and N.A. Shukri
College of Agriculture,
University of Basrah, Basrah**

Abstract

The productivity is vitally related with the economy of any country. An attempt has been made in this regard to analyse the trend in production of essential commodities of the Republic of Iraq and to find out solutions for its improvements.

Statistical data for the production of various foods and their products including related agricultural and animal produces are presented. Comparative figures are shown for the annual production of individual items during the period 1961-65 and in the following years. Major items covered in the paper for discussion are cereals, fruits, vegetables, milk, meat, fish, Sugar, live-stocks, poultry, hide and skins, seeds and related products. The paper also deals with a list of essential commodities which are either partially produced or not grown in the country.

The last part of the paper has been devoted to assess the gap between the country's need and total output at present. This problem of deficiency

in productivity in agriculture has been discussed in detail and possible suggestions and recommendations are incorporated in the paper.

Introduction

Statistics reveal that as in other countries, the rising trend in population is unabated with relation to limited natural resources available in the Republic of Iraq. This is a problem concerning both scientists and policy-makers. Food and agricultural resources undoubtedly top the list of primary needs of human beings. But the output of these essential commodities is restricted by various factors such as lack in irrigation, reclamation of fallow lands, use of improved agricultural knowledge and techniques or lack in proper storage and scientific methods of preservation and processing etc.. With a view to improve the production by the application of the knowledge of modern technology, the present study has been designed (i) to analyse available agricultural resources of the country with respect to their trends in production and effects on population rise, and (ii) to find out ways and means for improvement in production, processing and distribution of foods and related products which may contribute towards economic upliftment of Arab Gulf States.

The population of the Republic of Iraq in 1961 was estimated to be 7.17* millions (M) and by the year 1970 it rose to about 9.7 M (1). During the period 1961 to 1972, increase in population is recorded to be 44.9% as a result of which the population in 1972 was 10.39 M. The economically active population in agriculture in the year 1960 was 1.84 M and in 1970 was about 2.4 M. During the same years, the agricultural population rose from 3.69 to 4.52 M.

The total area of the country including area under inland water bodies is 43.5 million hectares (M. ha), out of which agricultural area is 10.23 M. ha, land under forests and woodlands is 1.85 M. ha and other lands are 31.42 M. ha.

The average production of cereals per ha during 1961-65 was 657 kg which had gone up quite significantly to the extent of 1416 kg in 1972.

*Unless otherwise stated, most of the statistical data used in the paper were extracted or derived from *FAO Production Year Book*, Vol. 26, 1972

Available Resources and Their Quantum Cereals

It was estimated that out of total production of different food and food-products, cereal production was 1.85 millions metric tons(M.m.tons) in 1961 which was increased by 2.1 times by the year 1972. Statistics showing the trend in the production of cereals is presented in table 1.

Table 1. Statistical data indicating the trend in production of Cereals

Name	Total acreage under cultivation/year, ha		Yield kg/ha		Production/yr m. tons		Trend
	1961-65	1972	1961-65	1972	1961-65	1972	
Wheat	1,346,000	1,915,000	637	1371	857,000	2,625,000	+ 3
Rice Paddy	64,000	94,000	1,073	2851	68,000	268,000	+ 3.9
Barley	1,041,000	726,000	875	1350	911,000	980,000	+ 1.07
Maize	3,000	9,000	631	1778	2,000	16,000	+ 8
Millet	6,000	6,000	565	909	3,000	5,000	+ 1.7
Sorghum	7,00	6,000	762	1167	5,000	7,000	+ 1.4

The table shows that during the period 1961-72, the continuous trend of increase in terms of both yield and production of wheat has been maintained. This indicates that a good attention has been paid towards wheat production either growing high yielding varieties of seeds or by other means.

The situation is different so far the production of rice paddy is concerned. The trend in yield and production of paddy is good and the area

under its cultivation has also been slightly increased no doubt, but the total acreage for harvest is comparatively very small .

In the case of barley, an improved yield of about $1\frac{1}{2}$ times during this period is observed, whereas total production remains almost same throughout the period.

Figures for maize indicate that yield and production were increased many times, but the area, under its harvest is very small. In other words, little attention has been paid towards further use of land for maize growing in Iraq.

For millet, great fluctuations are observed so far area for its harvest and subsequent yield and production are concerned . The area was 1000 ha in 1961 which rose to 7000 ha during 1965-67 and again fell to 6000 ha in 1972. The yield also varies from 565 kg/ha to 1288 kg/ha during 1961 and 1967 respectively and then to 909 kg/ha in 1972. Similar fluctuations are also seen in total production. This shows that there had not been scientific development in the production of millet.

Appreciable increase in both yield and production of sorghum is observed , though there has not been a developing trend in area used for its production . Even then , this is indicative of the adoption of scientific methods for its production .

Fruits and Vegetables

The trend in the production of fruits and vegetables during the period 1961-72 is shown in tables 2 and 3 respectively .

Table 2. Data indicating the trend in the production of fruits.

Name	Total acreage under cultivation/yr, (ha)		Yield, (kg/ha)		Production/yr, (m. tons)		Trend
	1961-65	1972	1961-65	1972	1961-65	1972	
Tomato	24,000	32, 000	6,722	11,875	160, 000	380,000	+ 2.4
Cucumber &							
Gherkins	11,000	22,000	6,518	6,591	73,000	146,000	+ 2.0
Water-							
melons	27,000	54,000	10,866	10,909	294,000	588,000	+ 2.0
Cantaloupes & other							
melons	13,000	19,500	7,955	10,000	104,000	197,200	+ 1.9
Grapes	15,000	18,000	3,000	3,333	45,000	58,500	+ 1.3
Dates	-	-	-	-	336,000	300,000	+ 1.1
Apples	-	-	-	-	21,000	25,000	+ 1.2
Figs	-	-	-	-	500	1,000	+ 2.0
Oppals,							
edible	-	-	-	-	20,914	30,337	+ 1.4
Oranges	-	-	-	-	21,000	23,000	+ 1.1
Lemons &							
Limes	-	-	-	-	8,000	42,000	+ 3.0

Table 3. Data showing the trend in production of vegetables.

Name	Total acreage under cultivation/yr, (ha)		Yield, (kg/ha)		Production/yr, (m.tons)		Trend
	1961-65	1972	1961-65	1972	1961-65	1972	
Potato	1,000	1,000	10,000	12,000	10,000	12,000	+ 1.2
Beans							
Dry	9,000	15,000	750	667	7,000	10,000	+ 1.4
Broad Beans							
dry	13,000	20,000	1,000	1,000	14,000	20,000	+ 1.4
Beans							
green	1,000	1,000	3,557	4,545	2,000	5,000	+ 2.5
Cow Peas							
dry	5,000	5,000	848	1,000	4,000	5,000	+ 1.2
Chick Peas	5,000	5,000	623	700	3,000	4,000	+ 1.3
Lentils	10,000	9,000	660	556	7,000	5,000	- 1.4
Pumpkin Squash							
gourds	6,000	7,800	9,264	9,264	53,000	70,000	+ 1.3
Egg plants	8,000	11,000	14,864	11,818	121,000	130,000	+ 1.1
Chillipeppers							
green	1,000	2,000	13,696	5,217	13,000	12,000	- 1.1
Onions shallot							
green	5,000	7,000	6,793	10,000	37,000	70,000	+ 1.9
Onions dry	9,000	16,000	6,230	6,250	55,000	100,000	+ 1.8
Carrots	-	1,000	9,942	10,000	5,000	9,000	+ 1.8
Garlic	1,000	1,000	1,349	2,000	1,000	2,000	+ 2.0
Cauliflower	1,000	1,000	10,470	11,200	3,000	3,700	+ 1.3
Cabbage	1,000	1,000	12,728	14,348	8,000	17,000	+ 2.1

It is observed that there has been an increasing trend in both yield and production of tomatoes. The acreage for its harvest has also been increased during the period.

Production of cucumber and gherkins is in increase no doubt, but the yield has not been significant in subsequent years compared to that of 6518 kg/ha during 1961-65.

In the case of watermelons, both production and the area for its cultivation has been doubled during the period under reference. Same trend in cantaloupes and other melons are also observed.

Although the production of grapes shows an increasing trend which is recorded to be 1.3 times more than that in the period 1961-65, the opposite picture is found in the case of dates, the most important fruit of the Republic. This decreasing trend in production of dates needs attention for proper replantation and other scientific methods for its development. It is seen that the production of other important fruits like apples, orange and lemons has also been increased. This indicates that proper attention has been given for growing these crops.

Potato shows an increasing trend in yield and production. But beans dry shows a decreasing trend in yield, although production has been increased about 1.4 times due to increasing area for its harvest. The production of broad beans dry was also been increased by about 1.4 times by increasing its area, but the yield has not been improved. It is more or less same throughout the period. In the case of beans green, the production has been significantly increased without increasing area.

Both yield and production of cow peas dry are recorded to be in increasing trend. But this is not the case with chick peas. The record shows that although there is an increase in yield, the production has remained constant and sometimes reduced.

Amongst other vegetables, the area for cultivation of lentils has been increased , but the yield and production are showing a decreasing trend. Similarly the area for cultivation of pumpkins squash gourds has been increased , but the comparative increase in production is not observed. Area has also been expended in the case of egg plants , but the corresponding production has been less during 1970-72 as compared to that in earlier period.

The cultivable land for chilli peppers green has almost been doubled during the period 1961-72, but the production rather shows a decreasing trend . This is not the case with onions shallots green in which growing area has been slightly increased, but the production shows almost 2 times increase. This increasing trend in both area and production is also observed in the case of dry onions. The area for harvest of garlic has been kept constant during the period, but its production shows an increase of 2 times by this time probably due to improved techniques for its cultivation.

Other important vegetables are cabbage, cauliflower and carrots. Although the land for cultivation of cabbage has been same from 1961 to 1972, both yield and production show a good rising trend, rather production has been more than double. For cauliflower, the area has also been kept constant during the period, but it is encouraging to note an increase in both yield and production. Carrots show almost double increase in production.

Milk, Meat and Other Foods

Production for milk, meat , poultry , fish, sugar and related food products are recorded (table 4).

Table 4. To show the trend in production of milk, meat and other foods.

Name	Production/yr,		Trend	
	numbers		m. tons	
	1961-65	1972	1961-65	1972
Live-stocks :				
Total	15,341,000	21,858,000	—	— +1.5
a) Cattle	1,500,000	2,000,000	—	— +1.3
b) Buffalo	238,000	290,000	—	— +1.2
c) Camels	200,000	300,000	—	— +1.5
d) Sheep	10,380,000	16,000,000	—	— +1.6
e) Goat	2,209,000	2,500,000	—	— +1.1
f) Horses	159,000	128,000	—	— -1.3
g) Mules	95,000	50,000	—	— -1.9
h) Asses	560,000	590,000	—	— +1.05
i) Chickens	4,538,000	6,600,000	—	— +1.5
Hen eggs			6,000	11,000 +1.8
Beef & buffalo				
meat (indigenous)			39,000	54,000 +1.4
Mutton & goat				
meat (indigenous)			62,000	92,000 +1.5
Meat from				
slaughtered animals:				
a) Poultry			4,000	9,000 +2.2
b) Cattle &				
buffalo (total)			110,000	162,000 +1.5
Fish :				
a) Fresh water			13,086	19,773 +1.5
				(1970)
b) Marine			644	1,079 +1.6
				(1969)
Milk:				
a) Cow			192,000	250,000 +1.3
b) Buffalo			29,000	35,000 +1.2
c) Sheep			183,000	288,000 +1.6
d) Goat			53,000	60,000 +1.1

table contd ...

table 4 contd.

Name	Production/ yr,				trend
	Numbers		m. tons		
	1961-65	1972	1961-65	1972	
Cheese					
a) Cow & buffalo	—	—	5,812	7,551	+ 1.3
b) sheep	—	—	17,614	27,800	+ 1.6
c) Goat	—	—	6,627	7,500	+ 1.1
Butter & ghee	—	—	6,934	9,855	+ 1.4
Sugar (centrifugal raw)		—	2,000	10,000	+ 5.0

(*) *Technical-Economic Report for developing fishing economy in the Republic of Iraq by the Organisations of the Ministry of Fishing Economy. Rep. USSR, Moscow (I-III)1971.*

There is a rising trend in live-stocks from 1961 to 1972. Sheep and camels show a significant rise. But the number of cattle and goat has remained poor as compared to that of sheep, whereas both horses and mules show a considerable reduction during the period.

There is an indication of improvement in poultry and poultry-products. The production of chickens has gone upto about 5 times during the period. Similarly the production of hen eggs has also been doubled by 1972.

A rising trend in the production of beef, mutton and other meats is further noted from 1961 to 1972. Poultry meat has been increased more than 2 times. The fish production has also been increased, although the quantity produced is far below the present need.

Looking to the quantity of milk and milk-products available, this can be inferred that it is too less in quantity for the country's need.

An encouraging attempt is observed to raise the production (5 times) of sugar during the period.