PRODUCTION, IMPORTATION AND MARKETING OF WHEAT IN LEBANON, 1970-1971

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I. INTRODUCTION

Although wheat is widely grown, Lebanon imports about 85% of its total wheat requirements during good years (U.S.D.A., 1965, p. 16).

This dependency on foreign sources has been a major concern to the government. The government has approached the problem by establishing a Cereals and Sugarbeet Office to stabilize prices of wheat and wheat flour and encourage local production of wheat.

Section 1 looks at the production of wheat in Lebanon based on a small sample survey of Mexipak growers who also grew traditional wheat varieties. Section 2 looks at the overall marketing and importation of wheat in Lebanon. This study should give a clearer picture of the wheat industry in Lebanon as a whole.

Each section has been discussed in turn. Final recommendations have been discussed at the end of the paper.

II. SECTION ONE

PRODUCTION OF MEXIPAK AND TRADITIONAL WHEAT VARIETIES IN LEBANON, 1970-71[1]

(1) The data for this section were taken from the M.S. thesis of Mr. Maurice Issi completed in October 1972 under the senior author.

A. LIST OF TABLES

B. INTRODUCTION

Excluding legumes, grains occupy the largest area of any agricultural enterprise in Lebanon. Out of an estimated 842,000 decares for all grains, wheat occupies about 665,000 decares[1] (Clawson **et al.**, 1971, pp. 133).

However, area planted to grains has declined in recent years as more land has been diverted to fruit and vegetable production (U.S.D.A., 1965, pp. 12). With regard to wheat, area planted has declined from an estimated 70,000 hectares (700,000 decares) in 1957 to 43,200 hectares (432,000 decares) in 1969.[2] Production also declined from 70,000 tons in 1957 to 34,600 tons in 1969. Yields have remained more or less constant at 0.7 to 1.0 ton per hectare (Farhat, 1972, pp. 147). Simple linear projections suggest that area may increase to 59,200 hectares (592,000 decares), and production to 47,400 tons by 1976, but that yields will remain constant. Projections to 1981 show no change over 1976 (Farhat, 1972, pp. 94).

The significance of declining wheat production lies in the fact that Lebanon imports around 85% of its total wheat requirements (U.S.D.A., 1965, pp. 16).

In order to encourage local production, Mexipak wheat varieties were introduced into Lebanon in the 1967/1968 season. By 1969, over 20,000 decares of Mexipak were harvested (unpublished data, Ministry of Agriculture).

Should results from the introduction of Mexipak varieties be favorable, it is possible that the projections to 1976 and 1981

(1) These appear to be 1967 figures. All units are metric.

(2) Preliminary 1970 Agricultural Census results estimate 475,616 decares and 43,005 metric tons.

can be increased thus leading to less dependency on imported wheat.

Thus, for example, within the space of 20 years, 1944 to 1966, Mexico changed from a deficit wheat producing country where over 50% of wheat requirements were imported and national average yields were 75 kilos per decare (Borlaug, 1968, pp. 2-7) to self-sufficiency with national average yields of 279 kilos per decare (Borlaug, 1968, pp. 7-11). High yielding dwarf varieties were responsible for this increase. These varieties later became known as Mexipak wheat varieties after their success in India and Pakistan.

In India, national average yields of wheat rose from 88.9 kilos per decare in 1967 to 128.6 kilos per decare in 1968 (Borlaug, 1968, pp. 16-17). The highest yields ranged between 500 and 1,000 kilos per decare. High yielding varieties were sown on about 18% of total wheat area in the 1967/1968 season and this has since increased to almost 40% of the total wheat area or 13 million acres (52.7 million decares) (Paarlberg, 1970, pp. 15-17).

In Pakistan, 20% of the total wheat area was sown to high yielding dwarf varieties in 1968/1969. The national average wheat yields increased from 80.2 kilos in 1967 to 116.7 kilos per decare in 1968. Dwarf varieties were estimated to have produced 43% of the total wheat harvest (Borlaug, 1968, pp. 12-13).

In Lebanon, an estimated 20,000 decares or four per cent of the total wheat area of 475,616 decares was sown to Mexipak varieties in 1969/70. A study of 43 farmers in the main wheat growing area of Lebanon, the Beqa'a, showed that Mexipak varieties outyielded traditional varieties by about 25% or 263 kilos per decare compared to 213 kilos per decare (Unpublished Report, Republic of Lebanon, 1970). Since then, some farmers have learned how to plant Mexipak to obtain maximum yields. Naturally, good water and fertilization are required. Lack of water is probably one of the main factors limiting the increase in areas sown to Mexipak. However, the goal need not be to sow the

total wheat area to Mexipak but only as much as 20 or 40%, depending on water availability.

The role of Mexipak in local wheat production therefore merits attention.

C. METHODOLOGY

Mexipak and traditional wheat varieties were compared with respect to:

1. Cost and returns.[1]
2. Overall economic problems.
3. Attitudes of farmers towards their cultivation.
4. Possibilities of increasing local wheat production.

For this purpose, out of a total population of 342 farmers who had purchased Mexipak seed from the Cereals and Sugarbeet Office (CSO) in 1970/1971, a sample of 52 farmers was randomly selected to include 20% of the Mexipak growers in the North and South regions of Lebanon, and 11% of the farmers in the Beqa'a region. The final sample was 18, 20, and 14 farmers in the North, Beqa'a and South, respectively. Out of 52 farmers, 48 grew both Mexipak and traditional wheat varieties. A total of 44 villages were visited. An interview schedule was pretested prior to the survey and data were collected during the summer of 1971.

Major limitations to this study were:

1. Most farmers did not keep written records of input and output data.
2. The dunum in the Beqa'a ranges from 917 to 1,000 square meters. All data were adjusted to the latter figure equivalent to one decare.
3. Mount Lebanon was excluded due to unavailability of a list of farmers who had bought Mexipak from the CSO.

(1) Value of family labor was calculated using local wage rates. All items included in these estimates are detailed in Appendix C of this section.

4. Actual area of farm sampled was not measured by tape or aerial photography.
5. Yields were estimated by weighing a sample of sacks and not by sample cuttings.
6. The use of one researcher limited the study to the availability of his labor and time only. Details may have suffered as a result.

D. RESULTS AND DISCUSSION

A total of 52 Mexipak wheat farmers were sampled of whom 48 grew traditional wheat varieties (such as Florence Aurore, Senator Cappelli, Hourani, Salamooni and others). Data on management practices for Mexipak fields were compared with those for traditional varieties.

1. Economic Data

A. Wheat Yields

Mexipak yields were on the average 73% greater than traditional varieties. Average Mexipak yields were 321 kilos/decare compared to 186 kilos/decare for traditional (Table 1).

The main reason for the wide differences in yield in addition to the variety difference was the following: no wheat farms in the North or South were irrigated while many Beqa'a farms (35% of sample) were irrigated.

The resulting range in yields was as follows: For Mexipak, yields in kilos per decare varied from 90-440 in the North, 200-706 in the Beqa'a and 65-463 in the South. For traditional wheats, the range was 60-290 in the North, 135-400 in the Beqa'a and 60-230 in the South (Appendix A).

B. Total Returns

The following selling prices were used to estimate returns. Mexipak sold for 27.4, 28.2 and 28.7 P.L./kg in the North, Beqa'a and South, respectively, while traditional wheat[1] sold for 29.8, 31.3, and 32.9 P.L./kg in the same regions. Better baking qualities for traditional varieties influenced their prices.

(1) Mexipak is a soft wheat while traditional varieties are, in general, hard wheats. The latter are more in demand for making local bread.

Table 1. Average yields for different wheat varieties in Lebanon, by region, 1970-71 (kg/decare).

(Figures rounded)

Area	Yields (kg/decare) Mexipak	Traditional	Yield increase (kg/dec.)	% increase
	(1)	(2)	(3) = (1) — (2)	(4) = 3/2 x 100
North	262	146	116	80
Beqa'a	479	285	194	68
South	223	127	96	76
Average	321	186	135	73

Despite lower selling prices and lower returns of wheat straw (Appendix B) total returns for Mexipak were 42% higher than from traditional varieties (Table 2). Returns from Mexipak were significantly higher than from traditional varieties in the North and the Beqa'a but not in the South. However, the North and the South were much the same with regard to total returns for Mexipak and for traditional varieties.

C. Costs of Production

Average rent for land growing Mexipak was 21, 31, and 15 L.L./decare and for land growing traditional varieties, 17, 29, and 15 L.L./decare for the North, Beqa'a and South, respectively. Little difference existed except between unirrigated and irrigated land but only 7/52 or 13% of the Mexipak growers irrigated their wheat compared to 4/48 or eight percent of the traditional growers.

Costs of ploughing were similar for all varieties except in the North where draft animals were used on fields growing traditional varieties. This appeared to have increased costs.

Table 2. Average total returns for different wheat varieties in Lebanon, by region, 1970-71 (L.L./decare).

(Figures rounded)

Area	Total (L.L./decare)		Increase in total returns (L.L./decare)	% increase
	Mexipak	Traditional		
	(1)	(2)	(3)=(1)—(2)	(4)=(3)/(2)x100
North**	81	58	23	41
Beqa'a**	142	96	46	48
South	80	60	20	33
Average*	101	71	30	42

* z-test significant at 5% level.
** t-test significant at 5% level.

Seeding rates for Mexipak averaged 13-14 kg/decare as compared to 16-18 for traditional varieties. Purchasing prices for Mexipak varied from 26-28 P.L./kg and for traditional varieties from 30-33 P.L./kg (Table 3).

Prevailing interest rates were 11, 11, and 10% for the North, Beqa'a and South, respectively.

Harvesting was primarily by machine. Eighty-eight percent of Mexipak fields were harvested by machine compared to 85% for fields with traditional varieties. Threshing costs were not applicable in the Beqa'a where combine harvesting was the rule.

Larger amounts of fertilizer (ammonium sulphate and nitrate, super-phosphate and potassium chloride) were applied to fields growing Mexipak than to those growing traditional varieties. However, there was no significant difference in average rates of fertilization between Mexipak and local wheat varieties for

the sample as a whole, or for the Beqa'a or South, while there was a significant difference in the North (Table 4). Average costs for fertilizer were 11, 15 and 8 L.L./decare for Mexipak fields compared to 6, 14 and 7 L.L./decare for traditional in the North, Beqa'a and South, respectively.

Table 3. Seeding rates and costs for Mexipak and traditional wheat varieties in Lebanon by region, 1970-71.

Item	Mexipak varieties			Traditional varieties		
	North	Beqa'a	South	North	Beqa'a	South
kg/decare	14.21	13.27	14.30	17.70	18.20	16.20
P.L./kg	2870	26.40	28.70	30.20	33.30	32.70
P.L./decare	407.83	350.30	410.50	534.00	568.15	530.14

Table 4. Fertilizer rates and costs for different wheat varieties in Lebanon, by region, 1970-71.

(Figures rounded)

Area	kg/decare		L.L./decare	
	Mexipak var.	Traditional var.	Mexipak var.	Traditional var.
North**	54.8	33.2	11.3	6.2
Beqa'a	82.3	68.5	14.9	14.1
South	36.8	32.9	7.6	6.5
Average	58.0	46.5	11.2	8.9

** t-test significant at 5% level.

D. Total Costs of Production

On the average, total production cost for Mexipak was significantly higher than for traditional varieties and was 66 L.L./decare compared to 59 L.L./decare[1] (Table 5). The increase in costs for Mexipak production averaged 7 L.L./decare and were highest and significant at the 5% level only in the North where the increase in cost over traditional wheat was 11 L.L./decare or 20%. Detailed costs of production are itemized in Appendix C.

E. Net Returns

Net returns per decare were around three times greater for Mexipak than for traditional varieties averaged over all regions. The greatest increase over traditional wheats was in the North with Mexipak returning L.L. 4.50/decare as compared to 1 L.L./decare for traditional wheat varieties (Table 6).

The average net return per L.L. of total costs of production for Mexipak were 51% compared to 20% for traditional varieties (Table 7). Thus, for one L.L./decare spent on production, the farmer obtained a net return of 1.50 L.L./decare, on the average, from Mexipak, and 1.20 L.L./decare from traditional wheats. This figure was highest in the Beqa'a where one L.L./decare invested in production of Mexipak yielded 1.93 L.L./decare as net returns or an average return of 93%.

F. Wheat Area

Farmers in the Beqa'a and South planted about 30% of their wheat area to Mexipak and over two times as much area to traditional varieties. This compared to farmers in the North who planted 46% of their wheat area to Mexipak (Table 8). Detailed distribution of wheat area can be seen in Appendix D.

(1) Costs of production were estimated at 77 L.L./decare for wheat under traditional methods and 107 L.L./decare for improved methods in a recent study in the Beqa'a for the wheat variety *Triticum aestivum*. This represented an average using Ministry of Agriculture and research station data (Stickley and Kizirian, 1970, pp. 3, 56, 71).

Table 5. Average total production costs for different wheat varieties in Lebanon, by region, 1970-71 (L.L./decare).

(Figures rounded)

Area	Total costs (L.L./decare) Mexipak	Traditional	Total costs increase	% increase
	(1)	(2)	(3)=(1)—(2)	(4)=(3)/(2)x100
North**	65	54	11	21.0
Beqa'a	73	68	5	8.0
South	59	54	5	9.0
Average*	66	59	7	12.0

Source: Appendix C

* z-test significant at 5% level.

** t-test significant at 5% level.

Table 6. Average net returns for different wheat varieties in Lebanon, by region, 1970-71 (L.L./decare).

(Figures rounded)

Area	Net returns L.L./decare Mexipak var.	Traditional var.	Increase in net returns	Ratio of net returns Trad./Mex.
North[1]	15.8	3.5	12.2	1:4.50
Beqa'a**	68.5	27.5	40.9	1:2.50
South[1]	21.2	6.4	14.8	1:3.30
Average*	35.2	12.5	22.7	1:2.80

1 Ratio of net returns higher than average. Therefore, a t-test was not necessary to test for a significant difference since this was obvious by inspection.

* z-test significant at 5% level.

** t-test significant at 5%level.

Table 7. Percent average net returns per one L.L. of total cost of different wheat varieties in Lebanon, by region, 1970-71.

Area	% net returns per one L.L.[1]	
	Mexipak varieties	Traditional varieties
North	24.2	6.6
Beqa'a	93.2	40.5
South	36.2	11.9
Average	51.2	19.6

1. % net returns/L.L./decare = $\frac{\text{Net returns/decare}}{\text{Total costs/decare}} \times 100$

Table 8. Average sampled wheat area planted to different wheat varieties in Lebanon, by region, 1970-71 (Decares).

(Figures rounded)

Region	Wheat Area (Decares)					
	Mexipak		Traditional		Total	
	Area	%	Area	%	Area	%
North	118	46	140	54	258	100
Beqa'a	171	30	399	70	570	100
South	86	31	190	69	276	100

G. Agricultural Rotations

The majority of the farmers followed a vegetable-wheat, peanut-wheat, legume-wheat or fallow-wheat rotation on their Mexipak fields. On fields growing traditional wheat, the vegetable-wheat rotation was by far the most common followed by fallow-wheat or peanut-wheat rotations (Appendix E).

H. Seeding and Harvesting Dates

Eighty-nine percent, 95% and 46% of the farmers sampled planted Mexipak in November and December in the North, Beqa'a and South, respectively. Thirty-six percent of farmers in the South planted Mexipak in January (Appendix F). A similar pattern occurred with traditional varieties.

All Mexipak farmers in the North, and the majority of those in the South (95%) harvested Mexipak in May and June while those in the Beqa'a all harvested in June and July (Appendix G). The same pattern existed with traditional varieties.

I. Estimates of Potential Production

Estimated total wheat area in 1967 was 665,000 decares with production at 67,800 metric tons[1] (Clawson **et al.**, 1971, pp. 133). This local production was approximately 15% of the country's total requirements of 452,000 metric tons (Unpublished figures, Ministry of Agriculture).

Assuming that potential wheat area was 665,000 decares and that this area was planted to Mexipak and had average yields of 340 kg/decare, then potential production would be 285,000 metric tons or 63% of total requirements (Clawson **et al.**, 1971, pp. 133).

(1) Preliminary results from the Census of Agriculture in Lebanon, 1970, show 475,616 decares of wheat with a production of 43,005 metric tons, or an average yield of 90 kg/decare. This compares to a National average of 128 kg/decare for India and 116 kg/decare for Pakistan in 1968 (see page 16).

National average yields for Mexipak wheats in the present study were 321 kg/decare which if assumed to come from 665,000 decares would give a local production of 213,735 metric tons or 47% of the country's requirements.

Assuming a wheat area of 665,000 decares and average yields of 480 kg/decare (the average obtained for the Beqa'a region in this study), total production would be 319,000 metric tons or nearly 71% of total requirements.

Assuming: (1) a wheat area of 680,510 decares of which 52% (353,570 decares) are in the Beqa'a, 21% (141,830 decares) are in the North and 24% (165,660 decares) are in the South (Table 9); (2) Mexipak varieties are planted on this total acreage; (3) that average Mexipak yields remained or approached the average figures found in this survey (Appendix A), i.e. 480 kg/decare for the Beqa'a; 260 kg/decare for the North; 223 kg/decare for the South.

Then, total potential production would be 243,530[1] metric tons or about 54% of total requirements.

Finally, if we assume that (1) 20% (133,000 decares) of the total wheat acreage of 665,000 decares could take advantage of all the inputs required to maximize Mexipak yields; (2) that these yields go up from the present Beqa'a average of 480 kg/decare to 600 kg/decare[2]; and (3) that the remaining 80% (532,000 decares) shrinks by 50% to 266,000 decares with average yields (250 kg/decare), using Mexipak under poor conditions; total production could be 146,300[3] metric tons or 32% of total requirements.

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(1) 353,570 x 480 = 169,713; 141,830 x 260 = 36,875; 165,660 x 223 = 36,942 or a total of 243,530 metric tons.

(2) The average yield for seven irrigated Mexipak farms in the present Beqa'a sample was 645 kg/decare (Appendix A).

(3) 133,000 x 600 = 79,800; 226,000 x 250 = 68,500; total = 146,300 metric tons.

Table 9. Estimated total area of wheat planted in Lebanon, by region, 1968, 1969, 1970 (Decares).

Area	1968 decares[1]	%	1969 decares[1]	%	1970 decares*	%
North	141,830	21	94,795	22	93,689	20
Beqa'a	353,570	52	192,800	44	224,141	47
South	165,660	24	123,760	29	133,878	28
Mt. Lebanon	19,450	3	20,565	5	23,908	5
Total	680,510	100	431,920	100	475,616	100

1 Republic of Lebanon, 1968, 1969, Agricultural Statistics.

* Unpublished figures. Ministry of Agriculture. Div. of Agricultural Economics. Preliminary results of 1970 Agricultural Census.

In all cases, local production would at least double. It should be noticed, however, that Mexipak varieties are now (1970-1971) only planted on an estimated three percent or 20,000 decares out of 665,000 decares (or four percent of 475,616 decares). In addition, greater demand exists in the local market for harder wheats than for the soft Mexipak varieties. However, the majority of Mexipak growers (96%) and traditional growers (92%) sold all their wheat to either merchants or the CSO (Appendix H). In other words, the majority buy their bread and, therefore, mixing could be done by the millers over a time period that mixing would not cause a noticeable reaction from consumers. In this way, more self-sufficiency in wheat requirements could be met.

2. Social Data

A. Attitudes Toward Consumption of Mexipak

The majority (67%) of farmers who grew Mexipak had not tried it in their bread. Of the remaining 33% who had tried it, 50% (or half of them) did not like it and 50% did like it. None of the farmers sampled had tried mixing Mexipak flour with the traditional wheat flour (Table 10).

The main reason for dislike or distrust of Mexipak flour appeared to be that the dough was too elastic and that it absorbed too much moisture if retained for another day resulting in a fungal-type growth on its surface. However, all those who had tried it thought it was good for Burghol.

B. Other Social Factors

The majority of Mexipak growers (90%) said they would continue to grow Mexipak. The reason for this preference was the higher yields from Mexipak over the traditional wheats.

The majority of Mexipak growers (39/52 or 74%) had no contact with extension agents. Their main source of information on the use of Mexipak was from the Cereal and Sugarbeet Office (21%) and from friends and neighbors (67%) (Appendix I).

Table 10. Attitudes of Mexipak farmers toward use of Mexipak dough in Lebanon, by region, 1970-71.

Attitudes	North	Beqa'a	South	Total	Percent
Good in dough	5	3	1	9	17
Not good in dough	2	4	2	8	16
Good when mixed	0	0	0	0	0
Did not try it	11	13	11	35	67
Total	18	20	14	52	100

The majority of Mexipak growers (87%) purchased seed from the Cereals and Sugarbeet Office (Appendix J). Average distance of farmers from the seed source was 14 km. for the Beqa'a compared to 26 km. in the North and South. However, as we have seen, farmers in the North used Mexipak on more of their land than those in the Beqa'a. Therefore, no significant association between distance and adoption of Mexipak seeds appeared to exist.[1]

The same was true for the association between education and Mexipak use. Distribution of levels of education among the farmers sampled appeared similar in the North and the Beqa'a (Appendix K).

(1) A chi-square test was applied only to the effect of age on adoption of Mexipak and no association was found. This test was not used to see the relationship between other social factors and adoption as more than 20% of the cells for each factor (farming experience; education; visit of extension agents; information sources) had an expected frequency of less than 5.

E. SUMMARY

The main objective of this section of the larger study on the Wheat enterprise in Lebanon was to compare production data for Mexipak with that of traditional wheat varieties.

A sample of 52 farmers, drawn randomly from a total population of 432 Mexipak wheat growers, was stratified by region to include 18, 20 and 14 farmers from the North, Beqa'a and South of Lebanon respectively. Of these 52 farmers, 48 also grew traditional wheat varieties. Thus, a comparison of management practices could be made. Data were collected in the summer of 1971 for the 1970-71 cropping year.

The following aspects of wheat production were discussed: yields; total returns; costs of production; total costs of production; net returns; area; rotations; seeding and harvesting dates; estimates of potential production; attitudes toward consumption of Mexipak and other social factors.[1]

The main findings of this sample were:

1. The average yield for Mexipak for three regions of Lebanon taken as a whole was 321 kg/decare compared to 186 kg/decare for traditional wheat varieties, or a 73% increase.

2. Of 20 farmers growing Mexipak in the Beqa'a, ten had yields of 500 kg/decare or more and eight of these ten had yields of 600 kg/decare or more (7 out of these eight had irrigation, Appendix A).

(1) Other details can be seen in Issi, M., Unpublished M.S. thesis, Faculty of Agricultural Sciences, American University of Beirut, 1972.

3. Mexipak gave an average of 42% greater total returns per decare than traditional varieties. The average total return for Mexipak was 101 L.L./decare compared to 71 L.L./decare for traditional varieties. Returns from Mexipak were significantly higher than from traditional varieties only in the North and the Beqa'a.

4. Average total costs of production were 66 L.L./decare for Mexipak compared to 59 L.L./decare for traditional varieties. This was a significant difference. However, only in the North was there a significant difference between total costs of production for Mexipak and traditional varieties.

Major items of cost that were higher for Mexipak than for traditional varieties were, in the Beqa'a: irrigation, drainage, pesticides, sacks and threads, transportation; in the North: transporting and spreading fertilizer and seeds, harvesting, filling sacks, collecting straw, pesticides, fertilizer, sacks and threads and transporting grains and commission; in the South: weeding, harvesting, collecting and threshing, filling sacks, sacks and threads, collecting straw, pesticides, fertilizers, and transporting the grain.

Major items of cost that were lower for Mexipak than for traditional varieties were, in the Beqa'a: cost of seeds (Mexipak was purchased mainly from the Cereals and Sugarbeet Office at a lower price than for traditional varieties); collecting, threshing and filling sacks, and commission; in the North: ploughing, seeds, weeding, collecting the crop, and threshing; in the South: seeds.

5. Thirteen percent of the Mexipak fields were irrigated and eight percent of the traditional fields were irrigated.

6. Farmers in the Beqa'a and the South used approximately as much fertilizer on Mexipak as on traditional varieties. Average costs for fertilizer on Mexipak were 11, 15,

and 8 L.L./decare compared to 6, 14, 7 L.L./decare for traditional varieties in the North, Beqa'a and South, respectively.

7. Rates of fertilizer were 55, 82, and 37 kg/decare on Mexipak compared with 33, 69, 38 on traditional varieties in the North, Beqa'a and South, respectively. A significant difference existed only in the North. On the average, there was no significant difference for rates of fertilization between Mexipak and traditional varieties.

8. If the farmer got one L.L./decare net return from traditional varieties, then he obtained L.L. 4,50, 2.50 and 3.30/decare in the North, Beqa'a and South, respectively.

9. For every one L.L./decare that the farmer spent in production, he obtained on the average, for all regions, a net return of 1.50 L.L./decare from Mexipak compared to 1.20 L.L./decare from traditional varieties.

10. Farmers sampled in the North, Beqa'a and South grew Mexipak on 46, 30, and 31% of their total wheat area, respectively.

11. A fairly realistic potential exists for increasing local wheat production from 43,000 metric tons in 1970 to about 146,000 metric tons; this increase would cover about 30% of total present requirements, without considering wheat quality.

11. Of the 52 farmers who grew Mexipak, 67% had not tried to consume it as bread, 16% had tried it and liked it while 17% had tried it and disliked it. No farmers had tried mixing Mexipak flour with traditional flour.

13. Seeding dates for Mexipak and traditional varieties followed the same pattern for each area.

F. CONCLUSIONS

The main conclusions from this section are:

1. Mexipak wheat varieties gave significantly higher yields than traditional varieties in all regions.

2. Higher yields for Mexipak more than offset higher costs of production, thus resulting in higher net returns for Mexipak than from traditional varieties for all regions.

3. The majority of wheat farmers sampled grew Mexipak on less than 35% of their wheat area. Adoption of Mexipak is therefore not complete.

4. The majority of wheat farmers sampled ploughed and harvested their wheat land with machines. Therefore, wheat farming is essentially a mechanized enterprise in Lebanon.

5. The 1970-71 cropping year was much better in terms of rainfall than the preceeding year.

6. About 50% of the Mexipak growers who had tried it had unfavorable attitudes towards consuming Mexipak flour. At the same time, the majority (90%) were going to continue to plant Mexipak.

The pattern will probably be more decares planted to Mexipak in the North and South while always planting sufficient traditional varieties for home consumption. In the Beqa'a, Mexipak will probably replace traditional varieties almost completely wherever rainfall and/or irrigation are adequate.

7. Total local production of soft wheat can be increased through greater adoption of Mexipak wheat varieties.

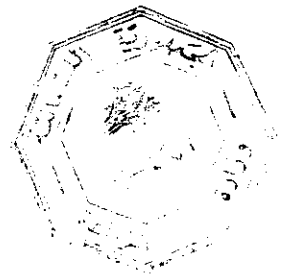
8. The majority of farmers sampled expressed unfavorable opinions toward the red Mexipak varieties. Unfortunately, the area planted to white and red varieties was not obtained.

9. Mexipak varieties were planted at the same time as traditional varieties in each region.

10. The Northern region of Lebanon appeared to be further advanced with regard to Mexipak adoption and the adoption of associated practices than other regions. Thus, a larger portion of its wheat area was planted to Mexipak than in any other region. It was the only region where significantly more fertilizer was used on Mexipak than on traditional varieties. While it obtained higher total returns from Mexipak than any other region, it had significantly higher costs of production leading to the lowest average net returns (24% as compared to 93% in the Beqa'a and 36% in the South).

11. The Southern region of Lebanon, more than any other region, appeared to be following almost identical farming practices both for Mexipak and traditional varieties. Thus similar rates of fertilizer were used in both cases. However, net returns from Mexipak were more than three times that obtained from traditional varieties.

12. Management practices for Mexipak were better in the Beqa'a than in the North and South. Irrigation appears to be the limiting factor. However, similar rates of fertilizer were applied to Mexipak and traditional varieties. In addition, only 30% of the wheat area of the sampled farmers was planted to Mexipak. Therefore, in terms of adoption of Mexipak and its associated practices, the Beqa'a was very similar to the South whereas, given its advantages over the South, it should be in a position of leadership with regard to adoption of new practices.



Appendix A

Detailed yields for farmers sampled in three regions of Lebanon, 1970-71 (kg/decare).

No. of farmers	Mexipak			Traditional		
	North	Beqa'a	South	North	Beqa'a	South
1	300	600*	463	75	300	230
2	440	700*	97	70	360	97
3	360	650*	200	60	437*	135
4	400	500	225	75	330	150
5	259	400	200	100	300	135
6	170	450	80	120	300	84
7	105	451	65	200	300	78
8	183	525	260	80	300	150
9	200	250	308	290	140	108
10	90	352	102	140	135	127
11	145	200	282	196	150	130
12	275	600*	375	217	400*	223
13	330	600*	143	180	400*	60
14	250	600	320	240	360*	68
15	360	706*			270	
16	180	250			150	
17	250	300			200	
18	420	366			225	
19		420			300	
20		660*			350	
Total	4,717	9,580	3,120	2,043	5,707	1,775
$\bar{x}$	262.05	479.0	222.9	145.9	285.4	126.8

* Irrigated.

APPENDIX B

Wheat straw returns for different wheat varieties in Lebanon, by region, 1970-71 (P.L./decare).

(Figures Rounded)

Area	Returns (L.L./decare)		Decrease	decrease
	Mexipak	Traditional	(L.L./decare)	%
	(1)	(2)	(3)=(1)—(2)	(4)=(3)/(2)x100
North	933	1,487	— 554	37
Beqa'a	655	720	— 65	9
South	1,521	1,830	— 309	17
Average	1,037	1,346	— 309	23

APPENDIX C

Detailed costs of production for different wheat varieties in Lebanon, by region, 1970-71 (P.L./decare).[1]

Cost Items	Mexipak			Traditional		
	North PL/dec.	Beqa'a PL/dec.	South PL/dec.	North PL/dec.	Beqa'a PL/dec.	South PL/dec.
Land rent	2,111.11	3,050.00	1,485.71	1,678.57	2,850.00	1,457.14
Ploughing	326.11	212.75	611.78	436.42	205.25	597.50
Transp. fertilizer	53.88	43.05	31.92	40.00	40.55	28.78
Spreading fertilizer	70.27	61.05	52.28	54.28	70.90	47.78
Transp. seeds	33.05	24.66	33.35	29.28	33.00	30.21
Spreading seeds	72.22	64.90	51.64	62.85	66.00	48.85
Seeds	407.83	350.30	410.50	534.00	568.15	530.14
Weeding	68.88	21.25	148.57	77.14	15.00	127.50
Spraying	—	111.30	8.57	33.92	91.75	8.57
Irrigation	—	238.00	—	—	81.00	—
Drainage	—	72.50	—	—	16.00	—
Guarding	68.65	19.25	19.64	57.14	20.50	18.64
Harvesting	820.83	512.60	693.92	647.07	521.85	638.92
Collecting the crop	83.72	—	295.35	128.57	12.75	231.07
Threshing	116.66	—	589.71	266.07	17.50	503.92
Filling sacks	16.66	—	8.57	4.28	—	—
Collecting straw	138.88	—	28.57	52.85	—	—
Pesticides	44.44	26.25	40.35	—	—	—
Fertilizers	1,130.94	1,487.50	758.85	615.71	1,414.50	650.14
Sacks and threads	233.83	426.30	168.64	132.00	249.45	111.21
Transporting grains	158.88	221.80	128.21	88.07	157.50	86.57
Commission	256.22	—	—	142.71	10.00	—
Storage	—	8.00	—	—	6.00	—
Interest on cap.	302.48	389.78	289.32	320.11	354.91	255.90
Total costs	6,515.55	7,341.74	5,855.45	5,401.04	6,802.56	5,373.84

(1) P.L. 100 equals L.L. 1.00.

APPENDIX D

Distribution of wheat area by region and size categories in Lebanon, 1970-71.

Categories (decares)	Mexipak wheats (Number) North	Beqa'a	South	Total	%	Traditional wheats (Number) North	Beqa'a	South	Total	%
	(number)					(number)				
Less than 10 dec.	1	0	3	4	7	0	0	0	0	0
10 and less than 50	7	5	4	16	31	6	2	3	11	21
50 and less than 100	7	2	3	12	23	5	1	0	6	12
100 and less than 150	0	3	0	3	6	3	2	1	6	12
150 and less than 200	0	1	0	1	2	1	1	2	4	7
200 and less than 250	1	4	3	8	15	1	4	2	7	13
250 and less than 300	0	1	1	2	4	0	0	1	1	2
300 and above	2	4	0	6	12	2	10	5	17	33
Total	18	20	14	52	100	18	20	14	52	100

APPENDIX E

Agricultural rotations followed by wheat farmers sampled in Lebanon, by region, 1970-71.

Agricultural rotation	Mexipak growers (Number) North	Beqa'a	South	Total	%	Traditional growers (Number) North	Beqa'a	South	Total	%
Fallow-wheat	1	0	5	6	12	0	0	7	7	15
Peanuts-wheat	13	0	0	13	25	6	0	0	6	13
Sugarbeet-wheat	0	2	0	2	4	0	0	0	0	0
Wheat-wheat	0	0	0	0	0	1	0	1	2	4
Vegetables-wheat	2	16	4	22	42	6	20	3	29	60
Legumes-wheat	0	2	4	6	12	0	0	3	3	6
Tobacco-wheat	2	0	1	3	5	1	0	0	1	2
Total	18	20	14	52	100	14	20	14	48	100

APPENDIX F

Distribution of seeding dates for wheat farmers sampled in Lebanon, by region, 1970-71.

Month	Period	Mexipak var.						Traditional var.					
		North		Beqa'a		South		North		Beqa'a		South	
		No.[1]	%	No.	%	No.	%	No.	%	No.	%	No.	%
October	1st half	1	6	1	5	0	0	0	0	1	5	0	0
	2nd half	0	0	0	0	0	0	0	0	0	0	0	0
November	1st half	3	17	4	20	1	7	2	14	4	20	2	14
	2nd half	1	5	4	20	1	7	2	14	5	25	1	7
December	1st half	9	50	9	45	5	36	7	50	9	45	9	65
	2nd half	3	17	2	10	2	14	2	14	0	0	0	0
January	1st half	0	0	0	0	4	29	0	0	1	5	1	7
	2nd half	1	5	0	0	1	7	1	8	0	0	1	7
Total		18	100	20	100	14	100	14	100	20	100	14	100

(1) No. represents number of farmer sampled.

APPENDIX G

Distribution of harvesting dates for wheat farmers sampled in Lebanon, by region, 1970-71

Month	Period	Mexipak var.						Traditional var.					
		North		Beqa'a		South		North		Beqa'a		South	
		No.[1]	%	No.	%	No.	%	No.	%	No.	%	No.	%
May	1st half	3	17	0	0	5	36	0	0	0	0	3	22
	2nd half	4	22	0	0	1	7	2	14	0	0	0	0
June	1st half	9	50	2	10	7	50	11	79	1	5	7	50
	2nd half	2	11	1	5	0	0	1	7	1	5	2	14
July	1st half	0	0	14	70	0	0	0	0	14	70	2	14
	2nd half	0	0	3	15	1	7	0	0	4	20	0	0
Total		18	100	20	100	14	100	14	100	20	100	14	100

(1) No. represents number of farmer sampled.

APPENDIX H

Marketing channel for wheat farmers sampled in Lebanon, by region, 1970-71.

Wheat channel	Mexipak wheat growers					Traditional wheat growers				
	North	Beqa'a	South	Total	%	North	Beqa'a	South	Total	%
Keep it for consumption	2	0	0	2	4	4	0	0	4	8
Sell it to merchants	10	6	0	16	31	9	14	4	27	56
Sell it to the Grains' Office	6	14	14	34	65	1	6	10	17	36
Total	18	20	14	52	100	14	20	14	48	100

APPENDIX I

Sources of information on Mexipak use for wheat farmers sampled in Lebanon, by region, 1970-71.

Source of information on Mexipak	No. of respondents				
	North	Beqa'a	South	Total	%
Extension agent	0	1	1	2	4
CSO[1]	2	6	3	11	21
Friends and neighbors	12	13	10	35	67
Mass media	1	0	0	1	2
Ford Foundation	2	0	0	2	4
Other	1	0	0	1	2
Total	18	20	14	52	100

(1) CSO = Cereals and Sugarbeet Office.

APPENDIX J

Source of seeds for wheat farmers sampled in Lebanon, by region, 1970-71.

Source of seeds	Mexipak wheat growers					Traditional wheat growers				
	North	Beqa'a	South	Total	%	North	Beqa'a	South	Total	%
Stored from last year's crop	1	0	0	1	2	3	0	1	4	8
CSO[1]	14	17	14	45	87	7	14	12	33	69
Merchants	3	3	0	6	11	4	6	1	11	23
Neighbors, relatives and friends	0	0	0	0	0	0	0	0	0	0
Total	18	20	14	52	100	14	20	14	48	100

(1) CSO = Cereals and Sugarbeet Office.

APPENDIX K

Level of education of wheat farmers sampled in Lebanon, by region, 1970-71.

Level of education	North		Beqa'a		South		Total	
	No.	%	No.	%	No.	%	No.	%
Illiterate	1	5	0	0	0	0	1	2
Elementary	10	56	12	60	11	79	33	64
Secondary	3	17	5	25	2	14	10	19
University	4	22	3	15	1	7	8	15
Total	18	100	20	100	14	100	52	100

III. SECTION TWO

MARKETING AND IMPORTATION OF LEBANESE WHEAT[1]

1. The data for this section were taken from the M.S. thesis of Miss Nuha Alami completed in February 1973 under the senior author.

A. LIST OF TABLES

B. INTRODUCTION

The importance of wheat lies not in its contribution to the value of total agricultural production but rather in the fact that it furnishes about 44% of total food calories consumed by the Lebanese population (Aykroyd and Doughty, 1970, pp. 71-76).

The combined effect of: (a) stagnation or decline in the area and production of wheat; (b) increasing population; (c) rising national income; (d) growing urbanization has resulted in wider gaps between demand and production of wheat. Between 1965-1970, over 70% of the Lebanese wheat requirements had to be imported at an average cost of over L.L. 63 million/annum (Le Ministère du Plan, 1970, p. 241).

Chami and Abed (1967, p. 20) forecasted that total wheat demand would reach 430,000 m.t. in 1975 and 563,000 m.t. in 1985. Assuming the 1970 Agricultural Census figures of 43,005 m.t., then a ten-fold increase would be required in local production to cover total demand in 1975.

Lebanon imports most of her wheat from the large exporters such as the U.S.A. The main reason for this is that Syria and Iraq have widely fluctuating export potential and the Middle East, in general, is a grain deficit area.

Many factors play a role in determining Lebanese import requirements. These are: internal taste patterns; availability of foreign exchange earnings; availability of food supplements for cereals and market prices. The latter vary as previously importing countries (India, Pakistan) become self-sufficient while major exporting countries cut acreages planted to wheat to reduce surpluses and maintain prices. With regards to taste patterns, flour from durum and other hard wheats is most suitable for Arabic

(balady) bread (Aykroyd and Doughty, 1970, pp 59-62). Therefore, exporters of these wheats will be favored in the Lebanese market. These are: The U.S.A., Canada. U.S.S.R., Australia and Argentina. Soft wheats are also imported for non-bread purposes e.g. cakes, biscuits. The major source for these is the E.E.C. (U.S.D.A., 1971,pp 12-14).

The Cereals and Sugarbeet Office (CSO) was set up by the Lebanese government. This is an example of many such offices set up in Ethiopia, Jordan, Morocco, the Philippines, Somalia and Urguay (Abbott and Creupelandt, 1969, pp 73-107). Its main purpose is to stabilize local wheat prices and to encourage local production. The former purpose is attempted by means of import regulation, storage policies, fixing bread prices, and local purchasing at support prices[1]. The latter objective is attempted in cooperation with the Ford Foundation and the Ministries of Agriculture and Extension, by the introduction of high-yielding dwarf wheat varieties called Mexipak. As seen in the previous section, it is quite reasonable to forecast greater local production in the future as Mexipak is more completely adopted by Lebanese farmers. The problem is really what proportion of hard and soft wheat will be imported and/or produced locally.

The marketing process is the mechanism by which production and importation are integrated. Within this process, storage, transport and processing are the three physical variables that determine the efficiency of the marketing system. If these are efficient, then quality control is ensured in turn leading to minimization of costs and maximization of consumer satisfactions. The main source of information on the wheat marketing system in Lebanon is by Pelshenke (1964). Results of the 1964 study showed that poor storage conditions in mills and bakeries resulted in poor flour and bread quality (Pelshenke, 1964, pp 36-68).

The key factor in processing appears to be the higher demand

1. Domestic price levels are fixe dhigher than import prices. The CSO then sets a quota of duty free imported wheat for each licensed importer, the remainder to come from domestic production.

for white bread, whether or not it is leavened (Aykroyd and Doughty, 1970, pp. 52-72).

In 1964, there were seven large mills handling 80% of local flour production and around 300 small village stone mills handling the remainder. Differentiation of flour was mainly by sales promotion policies. The resulting performance of the industry was a 17% underutilization of total capacity. Market structure was primarily oligopolistic with performance less than optimal. Market structure of the bakeries was competitive with 918 bakeries in 1964 of which 50% were in Beirut (Pelshenke, 1970, pp. 37-70).

The purpose of this study was as follows:

1. To appraise and comment on the existing wheat import policies;

2. To study the role of the CSO in stabilizing prices, encouraging local production and ensuring low-cost wheat products to consumers;

3. To study the wheat marketing system in order to identify existing inefficiencies. The three most important aspects studied here were the storage, transport and processing functions together with the structure, conduct and performance of processing industries (Moore and Walsh, 1968).

C. METHODOLOGY

The following steps were taken to obtain the data for this report:

(a) Data on marketing — costs, outlets, collection facilities and prices were obtained from the sample of 52 farmers surveyed in section 1 of this report.

(b) The agricultural attachés of several embassies (U.S., U.S.S.R., Canada, Australia, Argentina) were interviewed for import procedures between their countries and Lebanon.

(c) Officials in the CSO were interviewed concerning the operation of this office.

(d) Four out of the nine largest wheat merchants, five out of the ten largest flour importers and 21 of the most important local flour merchants were interviewed. These were distributed as follows: Beirut 8, Tripoli 5, Sidon 3, Sour 2, Zahle 2, Baalbeck 1, Nabatieh 1. Only one merchant in Beirut refused to be interviewed.

(e) Ten millers handling 80% of total Lebanese flour production were interviewed.

(f) A random sample of 45 bakeries (5%) from the estimated total population of bakeries, 918, was taken. The number of bakers interviewed in each electoral district (Mohafaza) was proportional to the resident population of that district. The sample was: Beirut 6, Mount Lebanon 13, North Lebanon 10, South Lebanon 9, Beqa'a 7.

(g) Secondary data was used whenever necessary such as for figures on wheat consumption, production and import.

In order to appraise import policy, the following variables were studied:

1. The quantity and quality of wheat imports required to supplement local production;

2. Sources of supply to meet import specifications of quality and price;

3. The economic implications of the existing import policy;

In order to appraise the role of the Cereals and Sugarbeet Office with regard to wheat, the following variables were studied:

1. The effect on marketing services and costs at the farm level and throughout the marketing system;

2. The effectiveness of price and supply stabilization measures;

3. The effect of the CSO on the farmer's economic situation.

In order to study the marketing system as a whole, the following variables were studied:

A. Storage: location, capacity, costs, and conditions of storage.

B. Transport: availability, cost, delivery, standardization of charges.

C. Processing: The performance of the milling and baking industries was studied by looking at the market structure, conduct and performance of these industries.

D. Pricing: The price structure of the marketing system was analysed.

D. RESULTS AND DISCUSSION

1. Wheat Import and Marketing

The following major items are discussed: wheat export policies of the major Lebanese suppliers; the role of the CSO (or Wheat Office) in flour and wheat importation; and selected economic implications.

A. Wheat Exporters' Policy

The major exporters of wheat to Lebanon have been the U.S.A., Australia, Canada, Argentina, the U.S.S.R. and the E.E.C.

Hard winter wheat (No. 2), sold commercially or concessionally through the Title I P.L. 480 program is obtained from the U.S.A. In the latter case, long term low interest credit is available. A semi-soft wheat known as 'Fair Average Quality' (F.A.Q.) is obtained from Australia with a discount for amounts over 25,000 m.t. An agent of the Australian wheat Board handles the commercial transaction. Manitoba Northern (Nos. 3 and 4) wheat, now known as Canadian Western Red Spring (Nos. 2 and 3) is purchased through a representative of the agent of the Canadian Wheat Board. A concessional element sets a maximum price to future wheat sales thus protecting Lebanon from rising world market prices. A durum wheat, Taganrog, is obtained from Argentina by private commercial sale with no concessions. The same is true for Type 441 winter wheat from the U.S.S.R. which is obtained through large international firms who, in turn, deal through a U.S.S.R. government agency called 'Export Chlib'. A new baking wheat, SKs-14 is now becoming available. Soft wheats are purchased commercially from the E.E.C., mainly France (Table 1).

Table 1. Export practices of Lebanon's major wheat suppliers, 1970[1].

Country	*Principal government agency*	*Execution of transaction*	*Type of sale*	*Concessional element*	*Types of wheat of interest to Lebanon*	*1970 export prices (F.O.B.) $/m.t.*[1]
U.S.A.	U.S. Dept. of Agriculture	1. Private trade 2. P.L. 480 Sales: U.S.A. negotiates agreement & private offer tenders	Commercial and concessional sale	Long term credit at a low rate of interest	No. 2 Hard winter 12%	58.4
Australia	Australian Wheat Board	Agent, appointed by the Board	Commercial	Discount for quantity purchased above 25,000 m.t.	Fair average quality (F.A.Q.)	56.4
Canada	Canadian Wheat Board	Representative of agent of the Board	Maximum price sale	Ceiling price	No. 3 Manitoba Northern	63.5
Argentina	National Grain Board	Private trade	Commercial sale	None	Taganrog	59.8
U.S.S.R.	Export Chlib	International firms	Commercial sale	None	Type 441	70.91 [2]
E.E.C.	—	Private trade	Commercial sale	None	Durum (soft)[3]	(C.I.F. Rotterdam)

Source: 1. Survey of agricultural attachées in Lebanon and interviews of wheat office oficials; Review of the World Wheat Situation, 1970/71, pp. 72-76.
(1) F.O.B. = free on board; $m.t. = dollars per metric ton.
(2) C.I.F. = cost including freight.
(3) Grants are often of soft wheat. But Lebanon is interested in buying the durum, when available.

B. Role of Cereals and Sugarbeet Office

The CSO previously issued licenses to private importers to regulate import trade. During 1970-72, however, the CSO has assumed monopolistic control over import transaction. Import transactions fall under flour imports and wheat imports.

1. Flour Imports

The following tariff and non-tariff restrictions have been placed on flour importation. The total annual quota is 30,000 m.t. and the monthly quota is 3,000 m.t. Qualitative standards are high and these are specified. Import tax is L.L. 10/m.t. and fixed municipality fees by volume of wheat imported are required.

The main purpose of these restrictions was to protect the Lebanese Flour Milling Industry from foreign competition. Thus, imports of flour have declined between 1960-1970 from 57.4 thousand m.t. to 23.3 thousand m.t. At the same time, import prices have risen over the same period from P.L. 16/kg to P.L. 26/kg (Table 2). Between 1968 and 1970, local flour production averaged 173,000 m.t. (Republic of Lebanon, 1970, p. 138), flour imports were around 20,000 m.t. or 15% of local production and 66.7% of the total import quota (30,000 m.t.) allowed.

Table 2. Lebanese flour imports: Quantity, values, prices, 1960-1970.

Year	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Total quantity (thousand m.t.)	57.4	57.1	35.5	30	27	19.6	21.6	34.7	15.9	20.9	23.3
Value (ooo L.L./m.t.)	9	9	6.4	6.4	5.2	5.5	5.7	9.2	4.3	5.3	6
Price/unit (P.L./kg)	16	16	18	18	19	28	26	27	27	25	26

Abbreviations: m.t. = metric tons ; L.L. = Lebanese pounds ; P.L. = Lebanese piasters.

Source: Republic of Lebanon, Statistiques du Commerce Extérieur, 1960-1970.

Because of these import restrictions, however, the number of flour importers declined leaving only four to five major importers today. In addition, the import price of P.L. 26/kg rose to P.L. 36/kg in the wholesale market and P.L. 37/kg in the retail market. The highest proportion of imported flour is used by bakeries in Beirut, the majority using imported flour for less than five percent of their flour consumption (Table3). With these high prices the major flour importers reported average net margins of L.L. 5-40/m.t.

2. Wheat Imports

The executive of the CSO revises import policy every six months on the basis of total consumption requirements less local production and a buffer storage stock. Imports have varied considerably (Table 4). Government to government agreements such as those existing between the U.S.A., Australia, Canada and Lebanon are given priority. Final prices for the remainder through

Table 3. Consumption of imported flour in a sample of Lebanese bakeries, 1971.

Region	Bakeries interviewed (No.)[1]	% imported flour out of total flour (%)	Bakeries using imported flour (No.)	Bakeries baking European bread in summer only (No.)
Mount Lebanon	13	2.0	3	3
North Lebanon	10	4.5	6	2
South Lebanon	9	4.6	3	1
Beqa'a	7	9.0	5	1
Beirut	6	28.0	4	—
Total	45	7.0	21	7

(1) No. refer to number in all columns.
Source: Survey of bakers.

Table 4. Exports of wheat to Lebanon 1960/61 - 1969/70.*

Exporting countries	60/61	61/62	62/63	63/64	64/65	65/66	66/67	67/68	68/69	69/70
					(Thousand m.t.)					(preliminary)
A. *Wheat & flour in wheat equivalent*										
Argentina	46	—	—	—	10	—	—	—	—	3
Australia	43	110	85	144	74	32	140	95	86	72
Canada	36	16	10	1	7	11	5	6	12	9
E.E.C.	92	38	51	13	48	32	19	79	82	48
U.S.A.	45	41	18	34	47	249	73	128	84	146
U.S.S.R.	4	21	—	3	—	—	—	5	4	49
Others	—	35	—	12	89	1	21	71	93	49
Total	226	261	164	207	275	325	258	384	359	376
										(provisional)
B. *Wheat flour*										
Canada	36	16	10	1	7	11	5	5	12	15
E.E.C.	87	36	15	12	37	30	20	26	51	22
U.S.A.	25	38	38	33	31	34	41	66	46	18
Others	3	7	—	—	—	—	—	—	—	—
Total	151	87	63	46	75	75	66	97	109	55

Source: Obtained by mail from International Wheat Council based on figures extracted from: «World Wheat Statistics» and FAO's «World Grain Trade Statistics.»
\+ Years are July/June years.
— None or negligible.

regular tenders are settled in the presence of the millers. In 1971, four classes were designated ranging from P.L. 20.5/kg for soft wheat from Western Europe to P.L. 23.5/kg for Taganrog, and Extra Hard Wheats. Imported wheat is then sold by the CSO to the millers at prices based on milling costs and on volume determined by past sale to millers. The CSO and the millers then sell wheat to local village stone millers and merchants. For example, Australian wheat is often bought to make bulgar wheat. Some profit is made in these transactions.

3. Selected Economic Implications

Stable imports have led to price stability. The resulting prices, however, could possibly be lower if the CSO had to compete with rather than regulate private trade.

The CSO is exempted from municipality fees while private traders are not. Thus, the government is losing revenue while expenditures through the CSO continue.

The presence of one larger importer, the CSO, probably has allowed Lebanon to buy wheat on concessional terms. Thus, import prices may in fact be lower than if private traders had been left to handle imports on their own. Long term credit sales under Title 1 P.L. 480 allow the government to use funds for other areas of need.

2. The Role of the Wheat Office

The CSO appears to have been successful in three directions: strengthening the farmers' position, improving marketing services and reducing marketing costs and stabilizing supplies and prices.

A. The Farmers' Position

This can be improved through higher prices at the farm gate and/or lower production and marketing costs.

In an attempt to ensure the first objective, the CSO paid a premium price for higher quality wheat. In 1971, prices ranged from P.L. 31 to P.L. 34/kg for Hourani and Senator Capelli hard winter wheats (Traditonal varieties) to P.L. 27 to 30/kg for soft wheats like Florence Aurore, Salamooni (Traditional varieties) and Mexipak. Three CSO collection points are available with a total capacity of 22,000 m.t. Cost of transport to these centers and bagging costs are covered by the farmers. On the average, in 1971, the farmers could obtain P.L. 1.20-2.20/kg more through the CSO center than from private merchants (Table 5). The widest price differential existed for Mexipak indicating that these varieties are less preferred commercially.

Seventeen out of 48 farmers who grew traditional wheat varieties, or 35%, sold these wheats to the CSO centers compared to 33 out of 52 farmers who grew Mexipak who sold to the CSO centers (Table 6). Choice of marketing outlet (the CSO center, a merchant, or in the village) depended on many factors. One was transportation costs to the centers. Another was financial or other obligation outstanding to private merchants. Major complaints expressed by farmers towards the CSO collecting center were their long distance away and their poor management, i.e. the centers opened late in the season for only a few days and they were crowded and disorganized.

B. Marketing Services and Costs

At the primary market at farm level, the following benefits have resulted from CSO purchasing at subsidized prices:

1. Merchants need to provide transport, credit, or other extra services in order to compete with the CSO.
2. A secure market outlet at support price levels has been established.
3. More accurate and stable price levels are quoted to the farmers.
4. The farmers are relieved of storage costs. The net effect has been to decrease the number of uncertainties facing the wheat farmer.

Table 5. Wheat purchasing prices to farmers in Lebanon by buyer, quality and region, 1971.

Region	Quality	Purchasing prices		
		Wheat Office (1)	Merchants PL/kg (2)	(3)=(2)/(1)x100[1] (%)
Akkar	Hard wheat	—	30	—
	Soft wheat	27.70	26.50	95.6
	Traditional	24	26.80	111.8
	Mexipak	28.30	26.40	93.3
North	Hard wheat	—	30	—
South	Hard wheat	33	31.5	95.4
	Soft wheat	29.20	27	92.5
	Traditional	32	29	90.7
	Mexipak	29	25	86.2
Beqa'a	Hard wheat	33	31.85	96.5
	Soft wheat	28.70	28.50	99.3
	Traditional	30	29.30	97.6
	Mexipak	28.60	27.15	94.9
Lebanon (average)				
	Hard wheat	33	31.20	94.5
	Soft wheat	28.70	27.50	95.8
	Traditional	28.65	28.45	99.4
	Mexipak	28.70	26.60	92.60

Source: Survey of 52 farmers growing Mexipak and Traditional wheat varieties.

1. 100% represents the Wheat Office price.

Table 6. Distribution of sampled wheat farmers in Lebanon by market outlet and region, 1971.

Region	Quality	Total no. of farmers sampled	Market outlet of farmers: Wheat office	Merchants	Village
Akkar	Hard wheat	4		2	2
	Soft wheat				
	Traditional	6	1	5	—
	Mexipak	18	6	10	2
	Total	28	7	17	4
North	Hard wheat	4	—	2	2
	Total	4		2	2
South	Hard wheat	12	9	2	1
	Soft wheat				
	Traditional	2	1	1	—
	Mexipak	14	13	1	—
	Total	28	23	4	1
Beqa'a	Hard wheat	12	5	7	—
	Soft wheat				
	Traditional	8	1	7	—
	Mexipak	20	14	6	—
	Total	40	20	20	—
Lebanon	Hard wheat	32)	14)	13)	5
		) 48	) 17	) 26	
	Soft wheat	)	)	)	—
	Traditional	16)	3)	13)	
	Mexipak	52	33	17	2
	Overall total	100	50	43	7

Source: Survey of farmers.

In the import market, the fact that the CSO controls purchase and distribution has meant:

1. That marketing functions have had to be studied in detail.
2. Quality regulations have been developed.
3. Mills are assured of a certain supply thus diminishing their need to hold buffer stocks themselves.
4. Large storage silos have been built in Beirut with a present capacity of 105,000 m.t., and future capacity of 120,000 m.t. This decreased unloading time, storage losses and allowed for bulk handling from port to mills.

C. Stabilization of Supplies and Prices

An attempt to stabilize supplies of wheat was made by means of storage of a buffer stock and centralization of sales by means of import controls. Stabilization of prices was attempted by supporting prices of wheat sold and purchased from farmers, by fixing the distribution price to millers, by putting ceiling prices on flour sold to bakeries and by fixing bread prices for consumers.

Under the price support program, the CSO buys hard wheat at P.L. 32.5/kg and soft wheat at P.L. 28.5/kg calculated on the basis of «fair average quality» wheat. The CSO then resells this to merchants and millers at P.L. 4-6/kg less than the purchase price.

The free wholesale market for wheat is supplied by the CSO and millers. It is in this market that sellers attempt to make a profit. Thus, the CSO sells wheat in this market through wholesalers at P.L. 1-2/kg higher than their selling price to millers.[1]

(1) Selling price to millers ranged from P.L. 23.5/kg for hard wheat to P.L. 20.5/kg for very soft wheat. The latter is not presently being purchased.

In turn, millers sell at P.L. 1-2/kg higher than their purchase price from the CSO. Merchants who bought directly from farmers at a price P.L. 1.20-2.20/kg below the purchasing price paid by the CSO now try to sell the wheat at a higher price in this market (Table 7). The end result is that the burden of higher prices falls on the rural consumers since most of the wheat from the wholesale market is used in these areas. It is also the rural consumer who has the highest income elasticity of demand for wheat.

Table 7. Buying and selling prices of wheat for wholesalers in the Beirut wholesale market, 1971.

Source of wheat	Imported wheat				Local wheat			
	Australian		Russian		Hard		Soft	
	Purchase price	Selling[1] price	Purchase price	Selling price	Purchase price	Selling price	Purchase price	Selling price
	(PL/kg)							
Wheat office	24.80	25.70	23.60	24.60	—	—	—	—
Millers	25.05	25.70	23.60	24.60	—	—	—	—
Farmers	—	—	—	—	30.5	33.0	28.50	31.0

1. For the most part, wheat from the wholesale market was sold to non-wheat growing rural areas.

Source: Survey of wheat merchants.

3. The Marketing System

Transportation, storage and processing are the three marketing functions that move wheat from supplier to consumer. These are discussed, in turn, followed by a summary of the supply and distribution system.

A. Transportation

An adequate supply of trucks appeared to ensure prompt delivery throughout the year with uniform charges as follows: in L.L./m.t., within Beirut, 2; Beirut to Tripoli, 6; Beirut to Sidon, 5; and Beirut to Zahle, 7. Transport charges were normally paid by the buyer except for the farmer who had to pay his own marketing costs. Losses in transit were negligible.

B. Storage

Grain storage capacity in the major grain storage facilities in 1971 was estimated at 226,000 m.t. of which the government held the largest capacity of 105,000 m.t. in the Beirut Port silos followed by the millers with 60,000 m.t. capacity (Table 8). Ninety percent of total storage capacity was in Beirut and its suburbs.

Grain storage conditions in all silos were good. Beirut Port silos charged P.L. 3 for the first eight days, P.L. 5/m.t. for the next ten days, P.L. 6/m.t. for the next ten days and P.L. 6.5/m.t. thereafter. Storage costs in all other facilities were estimated at L.L. 1/m.t./month. Warehouse storage, however, suffered from lack of insect and rodent control, and maintenance conditions were poor i.e. sacks stacked directly on the floor.

Flour storage in mills was negligible. Merchants stored around 15% of their total volume of sale and this was stored, on the average, for ten days. Merchants tried to deliver directly so as to reduce handling costs and capital invested in inventories. Bakeries stored their flour, on the average, for 2 weeks. High temperatures aged the flour rapidly but this was preferred by bakers. High temperatures and humidity may lead to rancidity especially in high extraction flour (wholemeal) due to its high fat content.

C. Processing

The processing function is the most important function in the wheat marketing system as it renders wheat consumable. At least half of the value of Arabic bread, or about P.L. 22.5/kg out of a total price of P.L. 45/kg was contributed by the distribution services (transport and storage) and by processing (Appendix A). The two major elements of the processing function are the milling industry and the baking industry.

Table 8. Major grain storage facilities in Lebanon, 1971.

Location	Government	Wheat office	Millers	Grain dealers	Total
		(thousand m.t.)			
Beirut	105	—	—	—	105
Beirut & suburbs	—	—	60	Shiah 12 Hazmieh 12 Bab Mechiel 10 Mourakaba Co. 5	99
Tel Amara	—	Warehouse 15	—	—	15
Tripoli	—	Silos 5	—	—	5
Sidon	—	Depot 2	—	—	2
Total present capacity	105	22	60	39	226
Total future capacity	120		60	39	241

1. The Milling Industry

Ten industrial mills handle the bulk of wheat or roughly 68-70% of the wheat used in the food industry in Lebanon (Table 9). Oligopolistic conditions exist. However, strong competition exists between these mills. This takes the form of selling flour at P.L. 0.5-1.0/kg below the ceiling price, of sales promotion practice i.e. providing transport; of secret price cutting to favored merchants or in the extension of credit. Five out of ten of these mills are near the optimal size of 39,000 m.t. as determined by the CSO. High initial entry costs and existing excess capacity of roughly 35% or a total of 485 m.t./day (Appendix B) have resulted in a highly competitive industry. Unfortunately, the end result has been poor flour quality since 34 out of 45 bakers interviewed indicated dissatisfaction with the flour obtained from the mills.

2. The Flour Wholesalers

These merchants service the baking industry. They are concentrated in Beirut and other cities and buy from mills and other importers on a weekly credit basis. They handle over 80% of the flour output of the industrial mills (Appendix C). They provide transport and credit facilities to the bakeries but are themselves frequently caught in a credit squeeze i.e. required to pay cash to the millers while extending credit to the bakers.

Practices by these wholesalers vary by area. For example, most of their flour sale is zero flour to Beirut and other urban areas. In addition, home baking has disappeared in Beirut and has almost disappeared in other cities (Appendix D) as shown by the high % of total sales in urban areas.

An estimate of wholesalers net margins gave a figure of P.L. 0.26/kg of flour sold or a return of only one percent (Appendix E).

Table 9. Wheat[1] utilized in the food industry of Lebanon, 1968-72.[2]

Utilization in Food industry	Average quantity of wheat utilized in 1968-70	
	m.t.	%
By industrial mills	237.3	68.7
By village mills and for bulgur	80.5	23.4
As imported flour	27.5	7.9
Total	345.3	100

1. In wheat equivalent, at a conversion rate of 1 m.t. flour = 1.376 m.t. of wheat.
2. An average of the last three years of available data was used to arrive at quantities handled by parties involved.

Source: Based on figures extracted from Recueil de Statistiques Libanaises, 1970, p. 38 and Statistiques du Commerce Extérieur, 1968-1970.

3. The Baking Industry

There are about 1,000 bakeries in Lebanon (Pelshenke, 1964, p. 7). Low initial capital costs and an absence of legal restrictions makes entry into this industry relatively easy.

Non-price competitive practices were observed such as: service differentiation of the product by distribution by car, selling by consignment and credit; product differentiation by stressing fresh loaves or using plastic bags. Neither of the above was associated with bread quality.

Many bakeries did not handle 900 kg of flour per day, the amount estimated by the bakers syndicate as being required for optimal scale of operations. Other problems faced by the bakers were: poor flour quality (as mentioned); unstable labor force (primarily Syrian); rising costs of inputs but fixed bread prices; and social security payments (23% of total wages) for laborers. As a result, the bakers syndicate has been pushing for a P.L. 5/kg rise in bread prices. Estimates of component costs of production for the bakeries showed that bakers were undergoing additional costs in adjusting dough quality.[1] The average selling cost per kg of Arabic bread should be P.L. 43.75/kg using good flour and P.L. 46.05/kg using good flour plus paying social security. This compared with P.L. 48.42/kg using bad flour and P.L. 50.94/kg using bad flour plus pay in social security (Appendix F). The better the flour quality, the lower the cost of production of bread to the bakers.

4. Aggregate Supply and Distribution

Total production ranged between 40 in 1960 and 72.5 in 1962 to 50 thousand m.t. in 1970.[2] For the same period, imports ranged from a low of 135 thousand m.t. in 1964 to a high of 398.6 thousand m.t. in 1970. The large majority of this wheat supply

(1) Adjustments included adding sugar to give the crust better color, using imported flour to strengthen the flour and adding salt.

(2) Results of the 1970 Agricultural Census in Lebanon estimate production at 43,005 m.t.

around 85%, was consumed as food. A small percentage was used as seed, feed and for re-exporting (Appendix G).

The distribution of flour sales was as follows:

a. Wheat merchants sold 80,500 m.t. of local and imported wheat to retailers and village millers for bulgur and tannour bread (See Table 9).

b. Industrial mills sold most of their flour, an average of 173,000 m.t. in 1968-70 (Republic of Lebanon, 1970, pp. 38), to flour merchants and bakers.

c. Flour merchants sold an average of 20,000 m.t. of imported and 138,400 m.t. of local flour to bakers for bread and to pastry and industrial users for cakes and biscuits.

E. SUMMARY

The purpose of this section of the report was to study the marketing and import of wheat in Lebanon. The existing import policies, the role of the CSO in importation and marketing and the entire wheat marketing system was studied. It was thought that by these means information could be assembled that would be useful in defining an import policy; developing a long-run price policy and increasing the efficiency of wheat marketing.

Import policy at present involves importing hard wheats from the U.S.A., U.S.S.R., Canada and Argentina, soft wheats from the E.E.C. and a mixture from Australia. Grants are not included. The CSO controls import transactions of both flour and wheat grain. Restrictions on imports of flour are aimed at protecting the large Lebanese millers who number ten. The total import quota allowed was: 30,000 m.t. per annum as compared to an average local flour production of 173,000 m.t. for 1968-1970. With respect to wheat grain import, large imports are required to make up the deficit between local production and local requirements. Commercial or concessional imports are controlled by the CSO.

Prices are fixed to the millers by the CSO based on four classes ranging from P.L. 20.5/kg for soft wheats to P.L. 23.5/kg for hard wheats. These wheats are also sold to merchants at a higher price than to the millers.

The CSO plays a key role in encouraging farmers to produce more wheat by introducing high yielding Mexipak wheats and by fixing purchasing prices. Mexipak, being a soft wheat, was purchased at between P.L. 27 to 30/kg depending on quality. This was lower than purchasing prices for local hard wheats. But the CSO price for all wheats was generally P.L. 1.20-2.20/kg higher than merchants' purchasing prices. Marketing services and costs

have been reduced as farmers need not store their grain and merchants need to provide extra services in order to compete with the CSO in purchasing from the farmers. Due to large storage silos, mills also need to hold smaller stocks as well as spend less on handling charges.

Another function of the CSO has been to stabilize prices of wheat throughout the system. Thus, the CSO sold local wheat to millers at P.L. 4-6/kg less than their own purchasing prices. This has subsidized wheat to the millers. The price of imported wheat to the CSO varies with world market prices. Ceiling prices on flour sold to bakeries have also been fixed by the CSO. Bread prices are controlled indirectly by the CSO through wheat and flour prices.

The three major marketing functions discussed were transportation, storage and processing. The transport system appeared to be efficient and had little detrimental effect on wheat quality. Major grain storage capacity was estimated at 226,000 m.t. with 90% of this capacity in Beirut and its suburbs. Storage conditions in 1/3 of this capacity were estimated to be poor.

With regard to processing, the market structure, conduct and performance of the bread making industry (milling industry, flour wholesalers, baking industry) was analysed.

The milling industry consisted essentially of ten large millers who handled about 70% of the total wheat used in the food industry in Lebanon. Severe competition existed often leading to lower flour quality. An average of 35% of total capacity was not being utilized.

Flour wholesalers are concentrated in Beirut and other urban areas and handle over 80% of the flour output of the industrial mills. Most of their sales are to urban areas and most of this is zero flour. Their net margins were estimated to be very low at P.L. 0.26/kg and turnover often rapid due to a credit squeeze between millers and bakers.

The baking industry consisted of a large number of small bakeries operating at below optimum scale and just breaking even. Poor flour quality an unstable labor force, rising costs but fixed bread prices and social security payments have resulted in strong pressures for higher bread prices.

. Throughout the study efforts were made to determine the most important sources of market imperfections. Prices were detailed and the entire price structure was reviewed. There appeared to be a need to revise the following controlled or fixed prices: wheat support price to farmers; wheat distribution prices to millers; flour ceiling prices to merchants and bakers and bread prices to consumers.

F. CONCLUSIONS

1. Future Wheat Supply

Apparently, increasing demand for wheat will have to be met mainly by increasing imports and only partly by increasing local production.

The amount of hard wheat imported is likely to increase. Most of this is likely to come from the U.S.A. and Australia because of quality and price considerations. Australian wheat is the most desirable in terms of flour yield, baking quality and consumer satisfaction. Long term low interest credit from the U.S.A. makes American wheat an attractive source of supply.

Soft wheat requirements may be met by local production, especially if Mexipak varieties continue to be adopted by farmers and continue to give higher production than traditional varieties. It is feasible that a point will be reached, if not already, where weak flour (from soft wheats like Mexipak) will be mixed with strong flour (from traditional and imported hard and durum wheats) to provide a very satisfactory **balady** bread acceptable to local consumers.

Strong variations in world supplies of wheat will increase import prices and require the CSO to subject the whole price structure to revision.

2. Effectiveness of the CSO

The following direct benefits have resulted from the activities of the Cereals and Sugarbeet Office: farmers can sell to CSO collection centers at higher prices than to merchants; millers can buy at lower prices and appear to be making adequate profits and consumers have a steady supply of bread at stable prices.

These benefits, however, are not equitably distributed between the various groups. Around 20% of the total consumable wheat supply is sold in the open wholesale market primarily for the non-wheat growing rural areas. Channels are long and prices higher than at other points in the marketing system.

The milling industry is a protected oligopsony and as such obtains most of the benefits. However, severe competition in this industry has diminished the potential benefits. The baking industry is restricted to obtaining low net profits due to a squeeze between higher production costs, and fixed bread prices. However, low income urban consumers have benefited from stable bread prices resulting from subsidization of imported wheat prices to the millers.

3. The Marketing System

Present inefficiencies may lead to greater future inefficiencies. Problems found included:

a. Confusion at the CSO collection centers with regard to organization and administration;

b. Leakage of wheat from the mills. This results in unearned profits to the millers and shifts the burden of the price support program on to the consumer.

c. Poor storage conditions in about 1/3 of the total storage capacity.

d. Overly long distribution channels to rural areas. The elimination of at least one middleman seems feasible.

e. Inefficient firms in the milling industry are shielded by the oligopolistic structure of this industry. Inefficient marketing practices that affect wheat flour quality appear to exist.

f. Net margins for bakeries appeared to be low. Instability in the baking industry is one result of this situation.

These market situations give rise to costs that were not justifiable from the standpoint of public welfare. The fact that net margins as a percent of sales were found to be small does not mean that margins cannot be reduced, but merely shows that most charges intervening between the producer, importer (Wheat Office) and consumer are not profits but costs. Therefore, rectifying structural deficiencies noted in the study and reorganization of the procurement and distribution system might allow reduction in margins and an increase in profit that eventually will be translated into reductions in prices to consumers.

Furthermore, there were several observed pricing inefficiencies, such as:

1. Support prices: Though occasionally a number of factors were listed that should enter into determining the level of support, there were no official indications that important variables were really taken into account.

2. The Wheat Office selling price of imported wheat to millers: These were based primarily on milling costs. In the absence of cost analysis of other variables, no firm figure can be given for the price at which wheat can be supplied to Beirut mills.

3. Flour prices: There seems to be little purpose in maintaining the present level of official ceiling at which many bakers cannot operate without loss and which are not observed anyway, in practice.

4. Bread prices: Lebanese bakery crises together with the fact that prices have been fixed since 1956 indicate that prices may be divorced from realistic costs.

G. APPENDICES

Appendix A

Estimated contribution of distribution services and processing to value of Lebanese Arabic bread, 1971.

Distribution service & processing	Value	
	P.L./kg	Percent
1. Price of Arabic (balady) bread	45	100.0
2. Price of local white flour	30	66.7
3. Balance attributed to distribution services and baking process (row 1-2)	15	33.3
4. Price of local white flour	30	66.7
5. Average price of important wheat	22.5	50.0
6. Balance attributed to distribution services and milling process (row 5-4)	7.5	16.7
7. Total value attributed to distribution services and processing (row 3 + 6)	22.5	50

Appendix B

Volume*, scale and capacity of the ten major industrial mills in Lebanon, 1971.

Number of mills studied	Local wheat (thousand m.t.)	Imported wheat (thousand m.t.)	Yearly total volume (thousand m.t.)	Available capacity (m.t./day)	Utilizable capacity (m.t./day)	Excess capacity (m.t./day)
1	2,000	48,000	50,000	150	139	11
2	3,000	45,000	48,000	250	133.3	116.7
3	1,500	45,000	46,500	150	129.1	20.9
4	1,000	38,000	39,000	150	108	42
5	500	35,000	35,500	165	98.5	66.6
6	800	30,000	30,800	160	86	74
7	700	25,000	25,700	100	71	29
8	500	20,000	20,500	120	57	63
9	3,000	15,000	18,000	100	50	50
10	400	15,000	15,400	55	43	12
Total for ten mills	13,400	316,000	329,400	1,400	914.9	485

Source: Survey of millers.
* Assuming all wheat bought is milled.

Appendix C

Distribution of flour by ten major industrial mills in Lebanon, 1971.

No. of mills studied	Volume of flour sale (m.t.)	Share of flour market (%)	Outlet			Area of sale		Provision of transport
			Merchants	Bakers	Homes	Beirut	Outside Beirut	
				(%)		(%)		
1	35,000	20.20	90	10	—	50	50	Buyer (in most cases)
2	29,000	16.5	100	—	—	60	40	Often himself
3	34,000	19.4	80	20	—	50	50	Often himself
4	24,000	13.7	100	—	—	75	25	Buyer (in most cases)
5	19,000	10.8	100	—	—	40	60	Buyer (in most cases)
6	12,500	7.1	80	20	—	20	80	Buyer (in most cases)
7	10,200	5.8	100	—	—	80	20	Buyer
8	7,000	4.0	80	20	—	65	35	Buyer
9	3,000	1.7	100	—	—	80	20	Often himself
10	1,500	0.8	75	20	5	80	20	Often himself
Total	175,200	100	Average of total 90.5	9	5	60	40	

Source: Survey of millers.

Appendix D

Selling practices of Lebanese flour wholesalers, 1971.

(Figures founded)

Area	Proportion of kinds of flour				Imported as proportion of total	Area of sale	Outlet					
	Local					Within the city	Bakers	Pastry shops	Groceries	Retailers in villages	Home	Total
	Zero	Balady	Others	Total								
							(%)					
Beirut	86	11.5	2.0	100	13	84	90	5	2	2	1	100
Tripoli	56	43.5	0.5	100	2	75	58.5	1	4	23.5	13	100
South: Sidon & other cities	55	41.5	4.0	100	12	50	45	4	4	26	20	100
Beqa'a: Zahle & Baalbeck	73	22.5	4.0	100	10	83	82.5	5	2.5	4	6	100
Average for Lebanon	68	29	2.5	100	9.5	70	68.5	3.5	3	14.0	11.0	100

Source: Survey of local flour merchants.

Appendix E

Calculation of net margin for Lebanese wholesale flour merchants, 1971.

Kind of flour	(1) Government ceiling prices	(2) Millers' selling prices	(3) Merchants' purchase prices	(4) Merchants' selling prices	(5) Bakers' purchase prices	(6) Bakers' purchase prices less marketing charges[1]	(7) (6)-(3) Net margin	(8) Net margin
				(P.L./kg)				(%)
Zero	30.5	29.85	29.85	30.30	30.40	30.00	0.15	0.5
Balady: First choice	28	28	27.80	28.40	28.50	28.10	0.30	1.07
Balady: Ordinary	26	26	25.50	28.20	26.26	25.86	0.36	1.3
Merchants' average net margin							0.26	

Source: Survey of millers, flour merchants and bakers.

1. Transport charge (L.L. 3/m.t.) + handling (L.L. 1/m.t.) give a marketing charge of P.L. 40/kg.

Appendix F

Details of conversion of one bag of flour into Arabic bread, 1971.

	Assuming good flour quality	Assuming bad flour quality	Assuming good flour and social security	Assuming bad flour quality and social security
			(P.L./100 kg)	
Material inputs	3290.0	3365.0	3290.0	3365.0
Utilities	176.0	176.0	176.0	176.0
Labour wages	1175.0	1175.0	1445.0	1445.0
Miscellaneous expenses	79.0	79.0	79.0	79.0
Equipment depreciation	78.0	78.0	78.0	78.0
Interest administrative expenses	174.0	174.0	174.0	174.0
Average cost production per kg of bread	$\frac{4972}{117} = 42.50$	$\frac{5047}{107} = 47.17$	$\frac{5242}{117} = 44.80$	$\frac{5317}{107} = 49.69$
Add:	1.25	1.25	1.25	1.25
Average selling cost kg of bread	43.75	48.42	46.05	50.94

Source: Baker's Syndicate.

Appendix G

Supply and distribution of wheat in Lebanon, 1960-70.*

Total Supply of Wheat

Year	Production	Stocks at beginning**	Imports	Total supply
		(Thousand m.t.)		
1960	40	20	253.3	313.3
1961	68.5	27.50	207	303.0
1962	72.5	27.50	226	326.0
1963	60	31.25	219	310.5
1964	59.5	32	135	226.5
1965	55	38.75	367	460.7
1966	70	42.50	257.7	370.2
1967	67.7	46.25	259	373.0
1968	47.7	50	268	365.7
1969	33	53.75	229	315.8
1970	50	57.50	398.6	506.1

Total Distribution of Wheat

Year	Exports	Seed & feed	Stocks at end*	Consumed as food	Total distribution
			(Thousand m.t.)		
1960	6.4	10.0	21.5	257.4	295.3
1961	4.5	12.0	22.6	260	299.1
1962	1.5	12.3	23.7	288.4	325.9
1963	0.8	12.5	24.8	262.4	300.5
1964	0.7	12.7	25.9	190.3	229.6
1965	0.7	13.1*	27	430	470.8
1966	1.0	13.5	28.1	327.6	370.2
1967	4.0	13.9	29.2	325.8	373.0
1968	0.4	14.3	30.3	320.6	365.6
1969	4.0	14.6	31.4	265.8	315.8
1970	8.0	15.0	32.5	450.2	506.0

Source: Based on figures extracted from:
(1) Statistique du Commerce Extérieur, 1960-1970.
(2) Ministry of Agriculture, 1967, B.P.G. No. 2.

** Including wheat flour in wheat equivalent (1 m.t. flour = 1.37 m.t. wheat).

* Estimated value based on linear projection of stocks.

IV. RECOMMENDATIONS

Section One: Production

1. Farmers sampled, especially in the North, used different units for area and volume measurements. The decare, for example, had several interpretations in the Beqa'a. Therefore, standardization of units of measurement would be helpful.

2. Farmers sampled had very little contact with extension agents, especially those in the South of Lebanon.
In addition, many farmers were unaware of appropriate inputs to use to obtain optimum results from Mexipak varieties. In some cases, excess fertilization had led to rust infestation. Therefore, an aggressive extension policy should be developed to assist in spreading the new technology required for Mexipak cultivation.

3. Only a few farmers kept written records of inputs and outputs, even though the majority had a fair level of education. Orientation toward keeping of records could be stressed by all those coming into contact with farmers.

4. Loss of wheat may have occurred in the South due to a shortage in harvesting and threshing machines or because of other factors delaying their movement to the South. This problem should be resolved and more agricultural facilities should be made available in the South.

5. Mexipak growers did not like the red Mexipak variety because it was even softer than the white variety and because it appeared to be more susceptible to rust infestation. These differences should be studied in detail. If findings support the farmers' viewpoint, then greater quantities of white Mexipak should be distributed by the Cereals and Sugarbeet Office.

6. The majority of wheat farmers sampled grew Mexipak on less than 35% of their total wheat area. Efforts should be made to encourage further adoption of Mexipak and necessary additional cultural practices so as to obtain the maximum yields.

   Possible methods for doing this include: reorganization of CSO collection centers so as to increase contact with farmers; village centers of distribution; irrigation development policies; village fertilizer distribution centers; refresher training courses for extension agents and merchants handling agricultural inputs; more extension agents.

7. Further studies on wheat production should be carried out in the near future since the 1970-71 season was good in terms of rainfall. More manpower could be assigned for collecting economic production data in each region every year so as to clarify present and future trends.

8. Accuracy in economic data could be improved by using aerial photography to study regional resources.

9. Research should be done to determine the optimum solutions for Mexipak with respect to the following in each region: date of seeding; rate and time of fertilization; time of irrigation; depth of planting seed; spacing and other agronomic cultural practices and problems.

10. Since Mexipak varieties are soft wheats, and local taste prefers hard wheat for local bread, further studies should be made to determine the optimum mix for rural and urban bread consumption. However, imports of soft wheat for other purposes could be replaced by increased local production.

11. Further research on other varieties of wheat must be implemented to find out if better and higher producing varieties could be found. In this way, a high yielding hard wheat

variety adapted to local conditions might be more suitable in terms of increasing local production than the Mexipak soft wheat varieties.

Section Two: Marketing and Importation

Supply Policy

There is a need to determine accurately the cost of altering the share of local production vis-à-vis imports. The question here is if additional money spent on imports were instead directed to encourage local improvements in wheat production and technology, how much would this benefit the economy. For accurate measurement of either import substitution or foreign exchange savings, an input-output analysis would be needed.

In the future, imports should take into consideration price-quantity relationships, the quality of wheat grown locally, as well as consumer preferences. To arrive at this, there is a need for continuous preparation and testing of wheat blends to arrive at a flour of maximum quality and economy out of locally supplied and imported wheat.

Projections on crop and consumption data, with a continuous review of the world market situation, would determine the importation schedule. The volume to be imported at any one period of time could be estimated since usage is linear to a certain extent. The optimum level of stocks at hand should strike a balance between securing a steady supply and a buffer stock and, at the same time, minimizing storage costs.

Wheat Office Stabilization Policy

Annual scrutiny of Wheat Office operations and policies should be a continuing duty of the Ministry of National Economy. In this scrutiny, particular attention is required to ensure that subsidies are having the desired effect. Besides, attention should be paid to the effect of controlled prices on the profitability of each industry. Only then, can it be determined how to

distribute the benefits and costs of the Wheat Office among the various groups.

The above should not be taken to imply that full control and rationing is necessary. In fact, control should not become rigid over time. Instead, what is visualized is the type of intervention and control that would be as flexible as possible and indirect in character designed to adapt to changing situations.

A position and income statement for each financial year must be audited and published. The Ministry of National Economy responsible for the Wheat Office, wheat producers, industrial users, consumers, and its own executives will all secure more efficient operations if such accounts were at their disposal.

Bread Baking Industry

A comparison of the existing industry with an optimum market reorganization obtained by rectifying structural deficiencies would suggest the direction of possible adjustment. From this, it will be also possible to determine the potential reduction in production cost that could be realized.

Milling Industry

A decision has to be made as to whether the milling industry is to remain as it is, or whether it is going to be helped to where it could be if the economy were to make full use of its resources and capacity. To arrive at this decision, a study should be made of costs of protecting an inefficient industry over a number of years, until a gradual increase in sales occurs mainly as a result of population growth to absorb the excess capacity. Meanwhile, flour export outlets should be sought. These costs should be compared with the costs arising from forcing out inefficient mills leaving the market to be serviced by fewer efficient mills of an optimum scale and working at an optimum capacity.

Baking Industry

In the future, the baking industry should be one of fewer

bakeries and increasing bakery size and concentration. Merging of bakeries is recommended. In merging, a balance must be struct between optimum size and maintaining competition. However, prior to merging, the following should be determined:

- Cost of unemployment caused by merging.
- A realistic schedule of present baking and distribution costs, with future expected costs after merging.
- Per capita consumption and population density of the areas in which mergers are to occur.

Pricing Structure

Controlled and fixed price programs need to be reviewed.

Support Prices

It has been recommended at FAO prices policy and marketing meetings in Asia and Latin America that a number of indicators should be taken into account when arriving at price-support levels. These include changes in costs of important factors of production, changes in prices of competing crops, recent trends in general wholesale prices and in the general cost of living, and specific indications of demand (Abbot and Creupelandt, 1969, pp.94).

Distribution Prices of Imported Wheat

This is a process which should reflect:

- Trading policies and arrangement of major suppliers.
- The influence of basic price-making forces in Lebanon and the world.
- Local competitive conditions and practices.
- Detailed analysis of the cost of supplying wheat at Beirut mills.

By postulating these prices and working forward through cost schedules it becomes possible to arrive at appropriate flour and bread prices in proper relationship to each other and with wheat.

LITERATURE CITED

A. Section One:

Abdus Sattar. 1966. Survey of Wheat, Barley, Lentils and Chickpeas. F.A.O., AEC No. 3. Ministry of Agriculture. Republic of Leabnon.

Alami, N. 1972. Importation and marketing of wheat in Lebanon. M.S. thesis. Faculty of Agricultural Sciences. American University of Beirut, Beirut, Lebanon. 110 numbered leaves.

Borlaug, N. 1968. «Wheat breeding and its impact on world food.» Proc. 3rd International Wheat Genetics Symposium. Australian Academic Science, Canberra.

Borlaug, N.E., I. Narvaez, O. Aresvik and R.G. Anderson. 1969. *A Green Revolution Yields a Golden Harvest.* J. of World Business, Columbia University, N.Y. October.

Clawson, M., H.H. Landsberg, and L.T. Alexander. 1971. *The Agricultural Potential of the Middle East.* Am. Elsevier Publ. Inc. New York.

F.A.O. 1966. Indicative World Plan for Agricultural Development, 1965-85. Near East. Subregional Study No. 1, Vol. 1, F.A.O., Rome, Italy.

Farhat, H. 1972. Feed-Lixestock Economy in Lebanon. M.S. Thesis. Faculty of Agricultural Sciences. American University of Beirut, Beirut, Lebanon. 158 numbered leaves.

Issi, M. 1972. Costs and Returns for Mexipak and other Traditional Wheat Varieties in Lebanon. M.S. Thesis. Faculty of Agricultural Sciences. American University of Beirut, Beirut, Lebanon. 95 numbered leaves.

Ministry of Agriculture. 1970. Report. Agricultural Statistics. A. Ec. No. 17. Statistics Section, Agricultural Economics Service, Department of Joint Technical Services. Republic of Lebanon. Beirut, Lebanon.

Ministry of Planning. 1969. *Recueil des Statistiques Libanaises,* Direction Centrale de la Statistique, Beyrouth, Liban.

Ministry of Planning. 1972. *Recueil des Statistiques Libanaises,* Direction Centrale de la Statistique, Beyrouth, Liban.

Munshi, Z.A., M.A. Aziz, S. Khan, S.A. Qureshi, and I. Narvaez. 1968. Accelerated Wheat Improvement Program, West Pakistan, Annual Technical Report. Government of West Pakistan, Lahore.

Paarlberg, D. 1970. Norman Borlaug—Hunger Fighter. Foreign Econ. Dev. Service, U.S.D.A. and U.S.A.I.D., U.S. Govt. Printing Office, Washington D.C., U.S.A.

Siegel, S. 1969. *Non-Parametric Statistics for the Behavioral Sciences.* McGraw-Hill Book Company, Inc. New York.

Stickley, T. and H. Kizirian. 1970. Determining Maximum Profit Farm Plans in the Central Beqa'a, Lebanon. Mimeo Pamphlet No. AES 7. Faculty of Agricultural Sciences, American University of Beirut, Lebanon.

U.S.D.A. 1965. The Agricultural Economy of Lebanon. ERS-Foreign 138, U.S. Govt. Printing Office, Washington, D.C., U.S.A.

U.S.D.A. 1970. World Demand Prospects for Wheat in 1980: E.R.S. Foreign 62. U.S. Govt. Printing Office, Washington, D.C., U.S.A.

U.S.D.A. 1971. High Yielding Varieties of Wheat in Developing Countries. E.R.S. — Foreign 322. U.S. Govt. Printing Office, Washington, D.C., U.S.A.

U.S.D.A. 1971. Imports and Plantings of High-Yielding Varieties of Wheat and Rice in Less Developed Nations. Foreign Econ. Dev. Services, No. 8, U.S.D.A. and U.S.A.I.D. U.S. Govt. Printing Office, Washington, D.C., U.S.A.

B. Section Two:

Abbott, J.C. 1967. «Marketing boards in developing countries.» J. of Farm Econ. 49:705-722.

Abbott, J.C. and H.C. Creupelandt. 1969. *Agricultural Marketing Boards. Their Establishment and Operation.* FAQ Marketing Guide, No. 5 Food and Agricultural Organization of the United Nations. Rome.

Abed, K.M. and A. Sattar. 1967. *Production and Supplies of Agricultural Products in Lebanon.* Ministry of Agriculture, B.P.C. No. 2. Republic of Lebanon. Beirut, Lebanon.

Aykroyd, W.R. and J. Doughty. 1970. *Wheat in Human Nutrition.* F.A.O. Nutritional Studies, No. 23. Food and Agricultural Organization of the United Nations. Rome.

Chami, J.K. and K.M. Abed. 1968. *Prospective Demand for Food and Agriculture Products in Lebanon 1975 and 1985.* Ministry of Agriculture, B.P.C. No. 4. Republic of Lebanon. Beirut, Lebanon.

Conseil Supérieur des Douanes. 1960-1970. *Statistiques du Commerce Extérieur.* Direction Générale des Douanes. République Libanaise Beyrouth, Liban.

Issi, M. 1972. The cost of production of local varieties vs. Mexipak. M.S. Thesis. Faculty of Agricultural Sciences. American University of Beirut. Beirut, Lebanon. 95 numbered leaves.

Ministry of Planning. 1970. *Recueil de Statistiques Libanaises.* Direction Centrale de la Statistique. République Libanaise. Beyrouth, Liban.

Moore, J.R. and R.G. Walsch (Editors). 1966. *Market Structure of the Agricultural Industries.* Iowa State Univ. Press ,Iowa, U.S.A.

Pelshenke, P. 1964. *Report to the Government of Lebanon on the Bread Situation.* F.A.O./EPTA, Report No. 1819. Food and Agricultural Organization of the United Nations. Rome.

Starkey, W.N. (Chairman). 1971. *Review of the World Wheat Situation.* International Wheat Council, 28 Haymarket, London.

Quisenberry, K.S. and L.P. Reitz (Editors). 1967. *Wheat and Wheat Improvement.* Agronomy Series, No. 13. Am. Soc. of Agron., Inc., Wisconsin, U.S.A.

U.S. Dept. of Agriculture. 1971. *World Demand Prospects for Wheat.* E.R.S.—Foreign 62. U.S. Govt. Printing Office, Washington, D.C., U.S.A.

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