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UTILIZATION OF MAIZE IN EGYPT

Report No. 72

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Acronyms

AERI	Agricultural Economic Research Institute
ARC	Agricultural Research Center, Ministry of Agriculture
Ardeb	Unit of measurement (shelled maize grain = 140 KG) (MT = 7.14 ardeb)
APCP	Agricultural Production and Credit Project (USAID)
APRP	Agricultural Policy Reform Program (USAID)
ALCOTEXA	Alexandria Cotton Exporters Association
CAPMAS	Central Agency for Public Mobilization and Statistics
CAAES	Central Administration for Agricultural Economics and Statistics
CAPQ	Central Administration for Plant Quarantine (MALR)
CASC	Central Administration for Seed Certification and Testing
CASP	Central Administration for Seed Production
Fd.	Feddan (equal to 0.42 hectares or 1.037 acres, 4200 sg. meters)
FY	Fiscal Year
GOE	Government of Egypt
GTZ	German Technical Assistance Program (Deutsche Gesellschaft Fur Technische Zusammenarbeit)
Kg.	Kilogram
Lb.	pound (unit of weight, equal to 0.45359 Kg.)
LE	Egyptian Pound (monetary unit)
MT	Metric Ton.
MMT	Million Metric Ton
MALR	Ministry for Agriculture and Land Reclamation
MPE	Ministry of Public Enterprise
MTS	Ministry of Trade and Supply
MVE	Monitoring, Verification and Evaluation Unit of APRP
PBDAC	Principal Bank for Development and Agricultural Credit
RDI	Reform Design and Implementation Unit of APRP
US$	United States dollar
USDA	United States Department of Agriculture
USAID	United States Agency for International Development

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Executive Summary

- Maize is a major field crop of Egypt, and **the major** summer field crop in many governorates.

- Green fodder is extremely scarce in Egypt during the summer season and the major source of green fodder is maize harvested before it is permitted to mature. This use of maize in Egypt is called 'drawa'.

- About 97 percent of the maize produced in Egypt is white maize although the yields of white and yellow maize are very similar.

- About two thirds of the maize producers in all study areas reported selling some maize.

- 56 percent of the maize produced on the sample farms was sold. This percentage varied from 44 to 77 percent between study areas.

- Private traders in all study areas purchased most of the maize that was sold.

- A small percent (3-4 %) of the sample farms that produced maize did not produce sufficient quantities for their own needs.

- No yellow maize was used for human consumption. Farms that produced only yellow maize purchased white maize for food.

- The Egyptian farm with no animals or poultry is quite rare. Most farms have a donkey, some chickens or ducks and 1-2 buffalo or 1-2 cattle.

- Maize producers feed 14 percent of their maize output to animals.

- Maize producers feed almost 8 percent of their maize output to chickens or ducks.

- Maize was a much more important item in the human diet in Egypt prior to the initiation of the wheat bread subsidization program.

- Almost all farms that produced maize (93 %) reported the use of maize for human food.

- Maize producers reported using 22 percent of their output for human food.

CHAPTER I: INTRODUCTION

Maize (*Zea Mays*) is the 3rd major field crop grown in the world after rice and wheat. In Egypt, maize, wheat and rice are also the three major grain crops with very similar annual tonnage and similar total values depending upon prices. The total value of the Egyptian wheat and maize crops are similar most years with the value of the rice crop being more variable. On the other hand a considerable area of planted maize is used for forage as "drawa". In the case of wheat, straw is a valuable by-product. Hence, on balance, the total annual quantity of output and total annual value of output is similar for these three crops.

1.1.Purpose of this study

However, a major question exists in regard to maize; "What happens to the maize?" The MALR provides estimates on the annual area, yield, and production of maize but our knowledge is rather incomplete regarding the utilization of the maize grown in Egypt. The major purpose of this study is to specifically answer that question. Policy makers need information on the current use of maize. Planning for expanded growth in the agricultural sector is hampered by a lack of information on maize utilization. Expansion in livestock production is dependent upon expanded maize production.

All of the maize that is planted in Egypt is intended to ultimately provide food for the human population but the route from the field to the human stomach is somewhat varied. Some of the maize grain produced in Egypt is consumed directly by humans, a large share is fed to animals and a small share is fed to poultry. The purpose of this study is to refine these estimates.

1.2. Previous estimates of maize use

Previous estimates of maize utilization have varied widely. Estimates by CAPMAS based on total domestic production plus imported maize are shown in Table 1.1.

Table 1.1 Estimates of utilization of domestically produced and imported maize,1995-96.

Category of use	Percent
Human consumption	65.2
Animal and poultry feed	29.3
Seed	1.0
Industrial uses	2.0
Losses	2.5

Source: Calculated from El-Guendy, Siddik and Edgar, (2.P.15).

These estimates were based on domestic maize production plus imports. The quantity estimated to be used for human consumption was 5.4 MMT and domestic production was estimated at 5.8 MMT. This implies that only 0.4 MMT of the white maize produced in the country was fed to poultry or animals. These estimates do not appear realistic.

In a study reported in 1994, Soltan and Emara estimated that maize producers used 56 percent of the maize they produced and sold the remaining 44 percent (7). Of the maize used by the producers, 66 percent was used for human consumption, 22 percent for animal feed and 12 percent for poultry feed. This study also reported per capita annual consumption by humans has 0.78 ardeb, or 109 KG. This study estimated that 37 percent of the total maize production was consumed as human food by the maize producers and their family, 12.3 percent was consumed by their own animals and 6.7 percent by their own poultry. The final disposition of the quantities sold by the producers is not known but a large share was probably purchased by other farmers and used also for animal and poultry feed and for human consumption.

In 1995 the American Embassy in Cairo estimated that 78 percent of domestic production plus imports was utilized for feed and the balance for other uses.[1] Estimates by Harrison in 1996 placed human consumption of domestic maize production at only 20 percent.[2] Analysis by El-Guendy, Siddik and Edgar of Family Budget Survey data compiled by CAPMAS in 1995-96 indicated that total direct consumption of maize by all households was only 473,299 MT or 5.5 percent of the total supply (domestic production plus imports) or 8.1 percent of domestic production.[3]

The objective of this study is to arrive at more precise estimates of these shares and to see how these shares vary the in various areas of the country and to identify the types of animals that utilize this maize.

1.3 .Method of study

The approach of this study is to estimate the use of maize by maize producers. As pointed out by Harrison (3, page 241) the bulk of the maize produced in Egypt is consumed within the same village where it is produced. Very little maize goes through any complex marketing channels and the bulk of it is used by the producer or other village residents primarily for livestock and poultry feed and for food for the farm households. The share sold to the government is small and so are the industrial uses of maize. This study will concentrate on examining the disposition of the maize by the original maize producers.

Estimates will be made of the total quantities of maize purchased by the government and used for commercial livestock feed and the balance will be assumed to be consumed according to the pattern of usage indicated by the maize producers. This means that we are using the assumption that maize purchased by non-maize producers in the rural areas will be utilized in the same manner as the maize consumed by the maize producers.

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[1] American Embassy, Grain and Feed Annual Report, Cairo, March 1995, pp. 26-36..

[2] Harrison, K. (3, page 241)

[3] El-Guendy , *Siddik and Edgar*, (2, page 15)

CHAPTER II: SURVEY

2.1 Questionnaire

The major source of data for this study was a special survey conducted by the CAAES of the MALR during April-May of 1999. The questionnaire used in this study is included in ANNEX I. It included questions on the following topics:

1. Land area operated in 1998,
2. Number of adults and children in the family,
3. Cropping program during the winter of 1997-98 and summer of 1998, including crop yields,
4. Farmers source of maize seed,
5. Purchases of maize,
6. Disposition of maize by category including type of buyer maize was sold to and type of animals and poultry fed,
7. Livestock inventory including the number of animals fattened,
8. Poultry inventory.

The questions were intended to obtain data on the amounts of maize produced by type (white or yellow) and complete utilization of these quantities and sufficient data on household numbers and livestock to attempt to make estimates of usage of maize by type of animal.

2.2 Sampling plan

Table 2.1 contains the data on area planted and production for 1998. These data indicate that over half of the maize is produced in the Delta. Two governorates were selected to represent the Delta, Sharkia and Menoufia. These two governorates have the largest areas of production in the Delta. Within these two governorates the two districts in each governorate with the largest area planted to maize were selected for study. Within each of these four districts the three largest villages were selected for sampling. This gave a total of 12 villages for study within the Delta.

The sample that was specified for the Delta was as follows:

A. Sharkia governorate: 227,500 feddan, 5.4 million ardeb

Belbeis district:	Villages:	Shoubra El-Nakhla
		Anshas El Raml
		Belbeis
Fakous district:	Villages:	Akyad (Baryah,Kibliah)
		El-Azazy
		Kenteer

B. Menoufia governorate: 183,700 feddan, 4.33 M. ardeb.

Ashmon district:	Villages:	Ashmon
		El-Baranya
		Talya

Menoufia district: Villages: Serce El-Layan
Menouf
Zawyat Razeen

Table 2.1. Maize, area and production, Egypt, 1998.

Type of Maize and Area	Feddan (000)	Ardeb (000)	Percent of Production
White			
Delta	1,044	23,985	54.6
Middle Egypt	618	12,456	28.4
Upper Egypt	270	5,832	13.3
New Lands	41	712	1.6
Desert Governs.	49	940	2.1
Total	2,022	43,924	100.0
Yellow			
Delta	29.9	648.0	48.4
Middle Egypt	6.9	145.7	10.9
Upper Egypt	1.2	25.2	1.8
New Lands	7.0	121.4	9.1
Desert Governs.	20.6	398.6	29.8
Total	65.6	1,338.9	100.0

Source: MALR,

The governorate of Minya was selected to represent Middle and Upper Egypt since this governorate has the largest production of maize in that region. Again, the two major maize producing districts within Minya were selected and the three largest villages within each district were sampled as follows:

Minya governorate:
Minya district: Villages: Toukh El-Gabal
Saft El-Gharbya
Tela
Malawi district: Villages: Bandar Malawi
Kalndohl
Tenda

The Nuberia region in the west dessert was selected to represent the new lands and desert governorates. The Nuberia area was selected because it produces a large share of the yellow maize in Egypt. The three largest communities were selected for sampling.

Communities in Nuberia: Ezab El-Nuberia
Bangar El-Soukar
Ganoub El-Tahrir

Fifty farmers were selected at random in each of the 21 sample areas from a list of all producers who grew all types of maize in 1998. This sampling procedure gave a total sample of 1,050 maize producers.

2.3 Weighting

To arrive at estimates for maize utilization for the entire country the results for the four study areas were aggregated. However, these results were not aggregated on the basis of the sample size in each area because the sample size was not proportional to the production in the area. Instead, the results for each study area were weighted on the basis of maize production in 1998. The weights used to aggregate the study results for white were based on the relative importance of each of the four study areas in the national white maize produced in 1998 (table 2.2).

Table 2.2. Weights for aggregating study area results for white maize.

Study area	Weights
Sharquia	.280
Menoufia	.266
Minya	.417
Nuberia	.037

Source: Calculated from estimates of table 3.1.

In the analysis of the survey data summaries were first made within each of the 4 study areas described above. Each sample farm in a study area was given equal weight in arriving at these estimates for the individual study areas. The results for the 4 study areas were then weighted by these weights to arrive at estimates for the entire country. Estimates at the national level were made for only selected items

The sample of farms drawn included no farms producing yellow maize in Minya or Sharquia and only about 10 feddans of yellow maize were produced on the sample farms in Menoufia. Thus, no estimates could be determined for the country in respect to the use for yellow maize. Estimates on the use of yellow maize will be presented only for Menoufia and Nuberia.

2.4 .Description of maize sample farms

Table 2.3 presents data on the sample farms on the average area of land holding and the average family size. The average size of land holding is significantly larger in Nuberia since this is a desert lands area and the settlers there were given 5 to 6 feddans when they settled there. Some of this new land is still not well developed and is idle.

Table 2.3. Number, average land holding, and average family size of maize sample farms.

Study Area	Sample Size	Average land Holding (Fds)	Average No. of adults per farm	Average No. of children per farm
Sharquia	300	3.41	4.24	3.21
Menoufia	300	2.45	4.15	4.14
Minya	300	2.54	4.54	3.50
Nuberia	150	5.42	3.66	2.43

The cropping patterns presented in Tables 2.4-2.7 ***are not representative*** of the average farms in these governorates since all farms selected for this study were maize producers. These farms produce less of other crops than do the average farms in these areas. Sharquia is the only study area in which rice is produced. Rice is the major alternative to maize and hence the farms in Sharquia produce less maize per farm than do the farms in Menoufia or Minya. Actually, rice is the major crop on the sample farms in Sharquia.

Table 2.4. Average cropping program of maize sample farms, Sharquia.

Season	Crop	Percent of farms	Feddans Per farm	Percent of land	Average Yield
Summer	White maize	100.0	1.01	29.8	15.78 Ar.
	Drawa	4.7	.02	0.5	---
	Rice	81.0	1.72	50.7	2.67MT
	Cotton	33.7	.56	16.4	5.16 K.
	Vegetables	3.3	.01	0.4	---
Winter	Wheat	90.3	1.61	47.3	12.5 Ar.
	Short Berseem	28.7	.46	13.6	---
	Long Berseem	87.7	.90	26.4	---
	Fava Beans	25.7	.31	9.1	8.8 Ar.
	Vegetables	6.0	.05	1.5	---
	Other	1.7	.007	0.2	---
Nile crops	Vegetables	0.3	.004	0.1	---
Full year	Fruit	1.7	.07	1.9	---

Ar. = ardeb.

Table 2.5. Average cropping program of maize sample farms, Menoufia.

Season	Crop	Percent of farms	Feddans Per farm	Percent of land	Average Yield
Summer	White maize	99.7	1.98	80.8	15.15 Ar.
	Yellow maize	2.3	.03	1.3	13.90 Ar.
	Drawa	9.3	.08	3.1	---
	Cotton	5.0	.08	2.7	5.85 Kt.
	Vegetables	12.7	.10	4.2	---
	Sunflower	0.4	.03	0.7	.45 MT
	Other	0.1	.007	0.3	---
Winter	Wheat	78.0	.81	33.2	13.42 Ar.
	Long Berseem	80.3	1.17	47.7	---
	Short Berseem	14.3	.16	6.7	---
	Vegetables	8.7	.07	2.7	---
	Other	1.0	.007	.1	---
Nili	Vegetables	9.3	.08	3.1	---
Full year	Fruit	3.3	.20	8.2	---

Table 2.6. Average cropping program of maize sample farms, Minya.

Season	Crop	Percent of farms	Feddans Per farm	Percent of land	Average Yield
Summer	White maize	98.0	1.27	50.1	13.63 Ar.
	Drawa	0.7	.005	0.1	---
	Cotton	15.7	.37	14.6	5.44 K.
	Soyabeans	17.7	.30	11.8	---
	Vegetables	6.0	.10	3.8	---
	Sorghum	0.3	.003	0.1	---
	Peanuts	1.0	.03	1.0	4.0 Ar.
	Other	1.0	.03	1.0	---
Winter	Wheat	75.7	1.10	43.4	17.8 Ar.
	Long Berseem	40.3	.37	14.4	---
	Short Berseem	9.7	.10	3.8	---
	Fava Beans	11.7	.25	9.7	6.5 Ar.
	Vegetables	4.7	.10	4.1	---
	Other	13.0	.26	10.0	---
Nili	Maize	2.0	.01	0.5	14.83 Ar.
	Vegetables	1.3	.01	0.5	---
Full year	Fruit	0.3	.006	0.3	---
	Sugarcane	17.6	.27	10.5	40.76MT

Farms in Nuberia do not grow cotton so these farms do not grow short season berseem. This area is a major area for the production of yellow maize. Actually no yellow maize was produced in 1998 on any of the sample farms in Minya or Sharquia.

Table 2.7. Average cropping program of maize sample farms, Nuberia.

Season	Crop	Percent Of farms	Feddans per farm	Percent of land	Average Yield
Summer	White maize	75.3	1.53	29.7	15.43 Ar.
	Yellow maize	38.7	.63	10.0	18.43 Ar.
	Drawa	9.3	.24	4.4	---
	Peanuts	59.3	1.38	25.5	13.61 Ar.
	Vegetables	33.3	.54	17.4	---
	Soyabeans	4.7	.04	0.8	525 KG
	Other	3.3	.04	0.8	---
	Sesame	14.0	.16	2.9	17.77 Ar.
Winter	Wheat	94.0	2.75	50.7	12.59 Ar.
	Long Berseem	47.4	.89	16.5	---
	Fava Beans	36.7	.72	13.3	6.81 Ar.
	Vegetables	35.3	.65	12.1	---
Full year	Fruit	14.7	.33	6.2	---

As shown in these tables, the summer cropping programs differ considerably among the sample areas. Peanuts and vegetables are major crops in Nuberia. A large variety of crops are grown in Minya including sugarcane, which is not grown in any of the other study areas. Wheat and berseem are major winter crops in all study areas (See Figures 1 and 2).

Figure 1. Summer Cropping Patterns in Study Areas

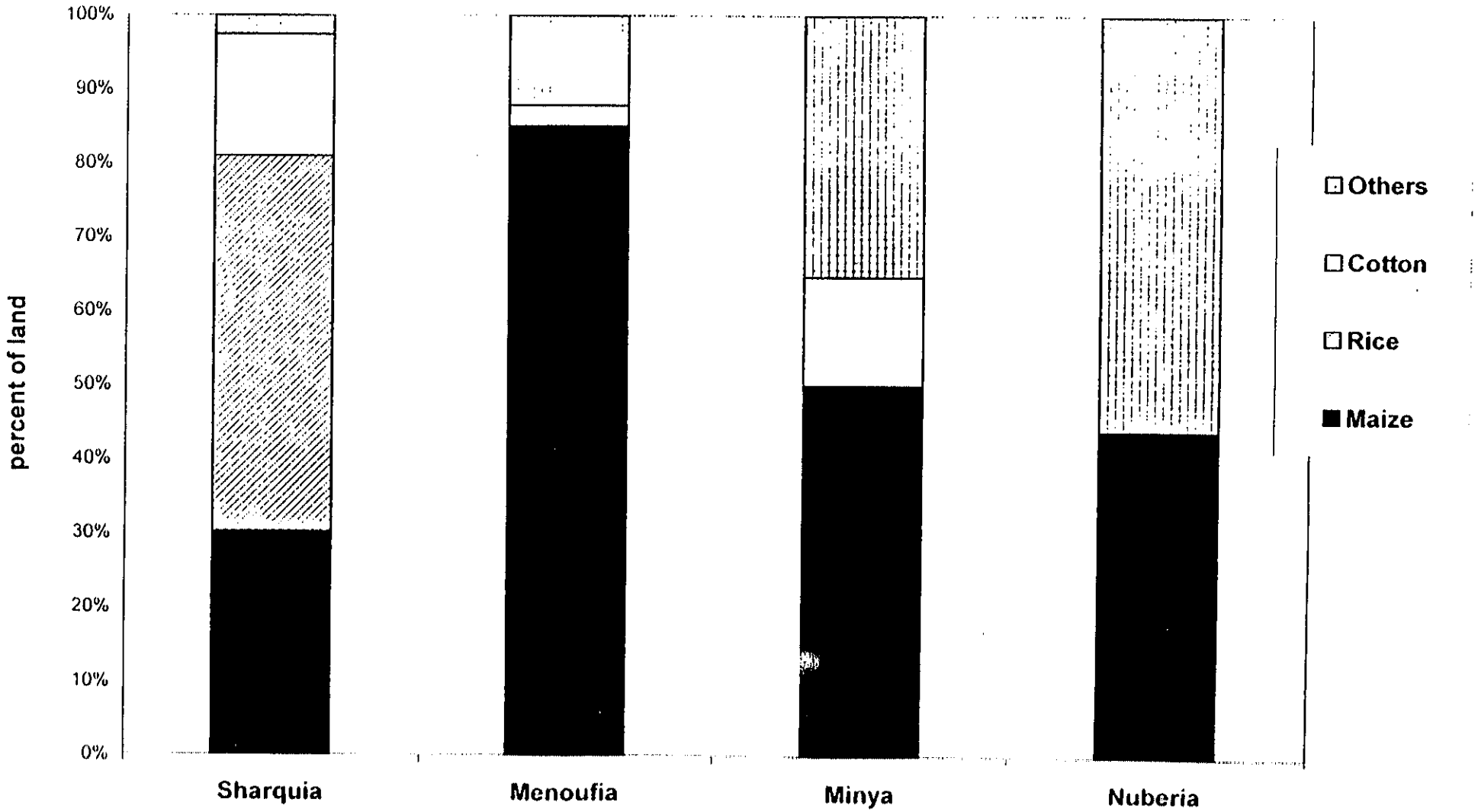
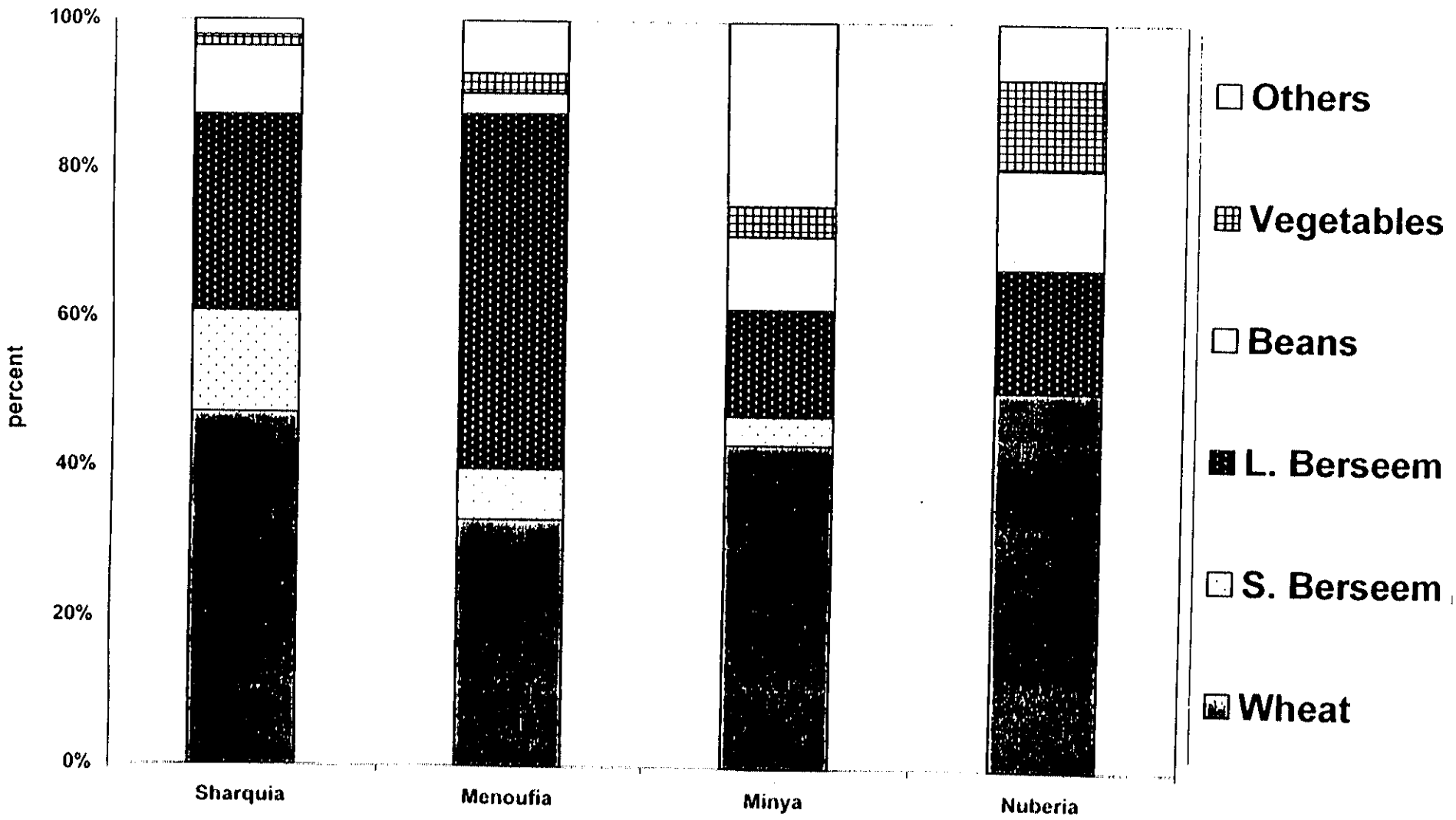


Figure 2. Winter Cropping Patterns



The cropping intensities of the sample farms were as follows:[4]

Sharquia: 1.97
Menoufia: 1.96
Minya : 1.80
Nuberia: 1.83.

The cropping intensities were lower in Minya and Nuberia because sugarcane and fruit crops are year-round crops grown in those areas.

[4] The cropping intensity ratios were determined by summing the areas of all crops produced, as listed in Tables 2.4-2.7, and dividing by the average area of land holding as given in Table 2.3.

CHAPTER III: MAIZE PRODUCTION

3.1 Maize production in Egypt

As stated in Chapter I, maize is a major field crop and a major food crop in Egypt with total production and value on a par with wheat and rice. The data on maize area planted and production indicate that maize production has increased by nearly 100 percent in Egypt between 1980 and 1998 as a result primarily of an upward trend in yields (Table 3.1 and Figs. 3 and 4). Yields have increased by about 75 percent, from about 1.7 MT/FD in 1980 to about 3 MT/FD in 1998. The area planted has also increased during this period but only by about 10 percent. The dip in area planted in 1986 was due to an announcement that the GOE was planning to purchase all of the maize that season. This policy was never enforced. The dip in yields in 1995 was due to a shortage in fertilizer that season.

The data in Table 3.1 and 3.2 and Figure 1 show that maize is grown throughout Egypt. White maize is by far the major type. In 1998, 97 percent of the area and production was white maize and 3 percent was yellow. Egypt introduced yellow maize in 1992. Nuberia is a major production area for yellow maize. As we will see later, white maize is far preferred to yellow maize for human consumption. In terms of yields, the two types are almost identical (Fig. 2).

Of the white maize, 84 percent of area was summer maize and 16 percent was Nili.[5] Of the yellow maize, 88 percent was summer and 12 percent was Nili. Nili maize is often planted because vegetables of various types are planted in early summer.

The data in Table 3.3 and Figure 3 show a wide range in the share of cropland utilized for maize. For all of Egypt the share of the cropland used for maize during the summer season is shown as 29 percent. But this share varies from 27 percent in the Delta to 48 percent in Middle Egypt, 29 percent in Upper Egypt, and 17 percent in the new lands. This share depends largely on the availability of other crops. For example, in the Delta, farmers in Menoufia governorate are discouraged from producing rice and thus maize is grown on 69 percent of the land in the summer. In Upper Egypt the major cropping alternatives includes sugar cane and sorghum. Cotton is a cropping alternative to maize throughout most of Egypt but the area of cotton recently has been 700-800,000 feddans compared to about 2- 2.1 million feddans of maize.

In retrospect, we see that the governorates selected for study were not representative in terms of the share of land used for maize. In Egypt as a whole the maize area represented 29 percent of the cropland in 1997. In Menoufia 69 percent of the cropland was planted to maize in 1997 and in Minya it was 54 percent and 37 percent in Sharquia. The high intensity of maize production in the study areas indicates that these areas are maize surplus areas and thus will tend to give estimates of utilization that are higher than average.

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[5] Nili crops are those planted late in the summer after the time of the Nile flood (late summer). Since the Aswan high dam was completed in 1966 there no longer is a flood season but crops planted at that time of the year are still called Nili crops.

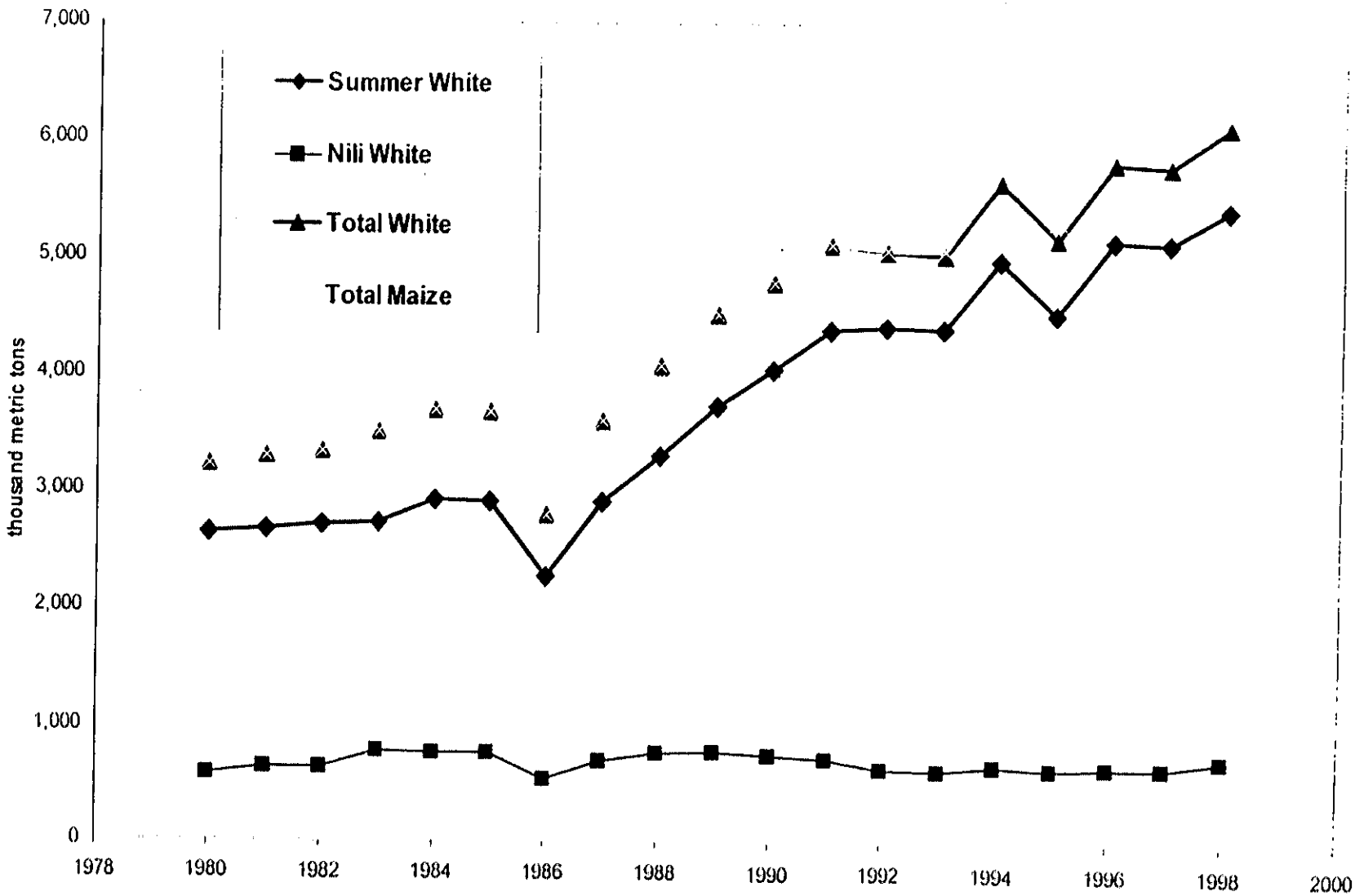
Table3.1:Domestic Production of Maize, by Season and Type : 1980-1998.

Year	White Maize									Yellow Maize									All Maize		
	Summer			Nili			Total			Summer			Nili			Total					
	area 1000F	yield Ton	prod 1000T	area 1000F	yield Ton	prod 1000T	area 1000F	yield Ton	prod 1000T	area 1000F	yield Ton	prod 1000T	area 1000F	yield Ton	prod 1000T	area 1000F	yield Ton	prod 1000T	area 1000F	yield Ton	prod 1000T
1980	1,433	1.844	2,642	473.1	1.247	589.9	1,906	1.696	3,232										1,906	1.696	3,232
81	1,434	1.863	2,672	489.5	1.296	634.4	1,924	1.719	3,307										1,924	1.719	3,307
82	1,452	1.868	2,712	483.5	1.316	636.2	1,935	1.730	3,348	0.36	0.172	0.06				0.36	0.172	0.06	1,936	1.730	3,348
83	1,397	1.957	2,733	555.5	1.397	776.0	1,952	1.798	3,509										1,952	1.798	3,509
84	1,449	2.024	2,933	525.9	1.455	765.2	1,975	1.872	3,698	3.18	0.144	0.46				3.18	0.144	0.46	1,978	1.870	3,699
85	1,396	2.089	2,917	518.3	1.487	770.7	1,914	1.926	3,687										1,914	1.926	3,687
86	1,122	2.024	2,271	361.1	1.485	536.2	1,483	1.893	2,807										1,483	1.893	2,807
87	1,353	2.156	2,916	457.5	1.536	702.8	1,810	1.999	3,619										1,810	1.999	3,619
88	1,480	2.240	3,315	479.9	1.609	772.2	1,960	2.085	4,087										1,960	2.085	4,087
89	1,534	2.443	3,747	470.2	1.662	781.4	2,004	2.260	4,529										2,004	2.260	4,529
90	1,547	2.617	4,050	428.4	1.749	749.3	1,976	2.429	4,799										1,976	2.429	4,799
91	1,676	2.625	4,400	384.7	1.876	721.6	2,061	2.485	5,122										2,061	2.485	5,122
92	1,649	2.688	4,431	317.1	2.013	638.4	1,966	2.579	5,070	0.86	2.747	2.36				0.86	2.747	2.36	1,967	2.579	5,072
93	1,661	2.659	4,417	312.0	1.996	622.7	1,973	2.554	5,040	16.86	2.110	35.57				16.86	2.110	35.57	1,990	2.550	5,075
94	1,740	2.870	4,992	317.4	2.100	666.6	2,057	2.751	5,659	45.98	2.965	136.33	5.58	2.14	11.9	51.56	2.875	148.24	2,108	2.754	5,807
95	1,751	2.590	4,536	328.1	1.960	643.1	2,079	2.491	5,179	58.47	2.657	155.35	8.39	2.36	19.8	66.86	2.620	175.17	2,146	2.495	5,354
96	1,768	2.922	5,167	317.8	2.075	659.4	2,086	2.793	5,826	93.16	2.810	261.78	14.55	2.2	32	107.7	2.728	293.82	2,194	2.790	6,120
97	1,636	3.146	5,147	302.1	2.180	658.6	1,938	2.995	5,805	76.35	3.174	242.33	14.33	1.88	26.9	90.68	2.969	269.23	2,029	2.994	6,075
1998	1,698	3.199	5,432	324.1	2.220	719.5	2,022	3.042	6,151	57.67	3.027	174.57	7.90	1.63	12.9	65.57	2.859	187.46	2,088	3.036	6,339

Source:MALR, Central Administration for Agricultural Economics and Statistics, as reported in

El-Guendy, Magdy, Siddik, Ibrahim and Edgar, Anza Nimo, Policy Issues and Options in Poultry Feed Market in Egypt, APRP, ARD, MALR & USAID, Cairo, 1999

Figure 3. Trends in Maize Production, 1980-1998



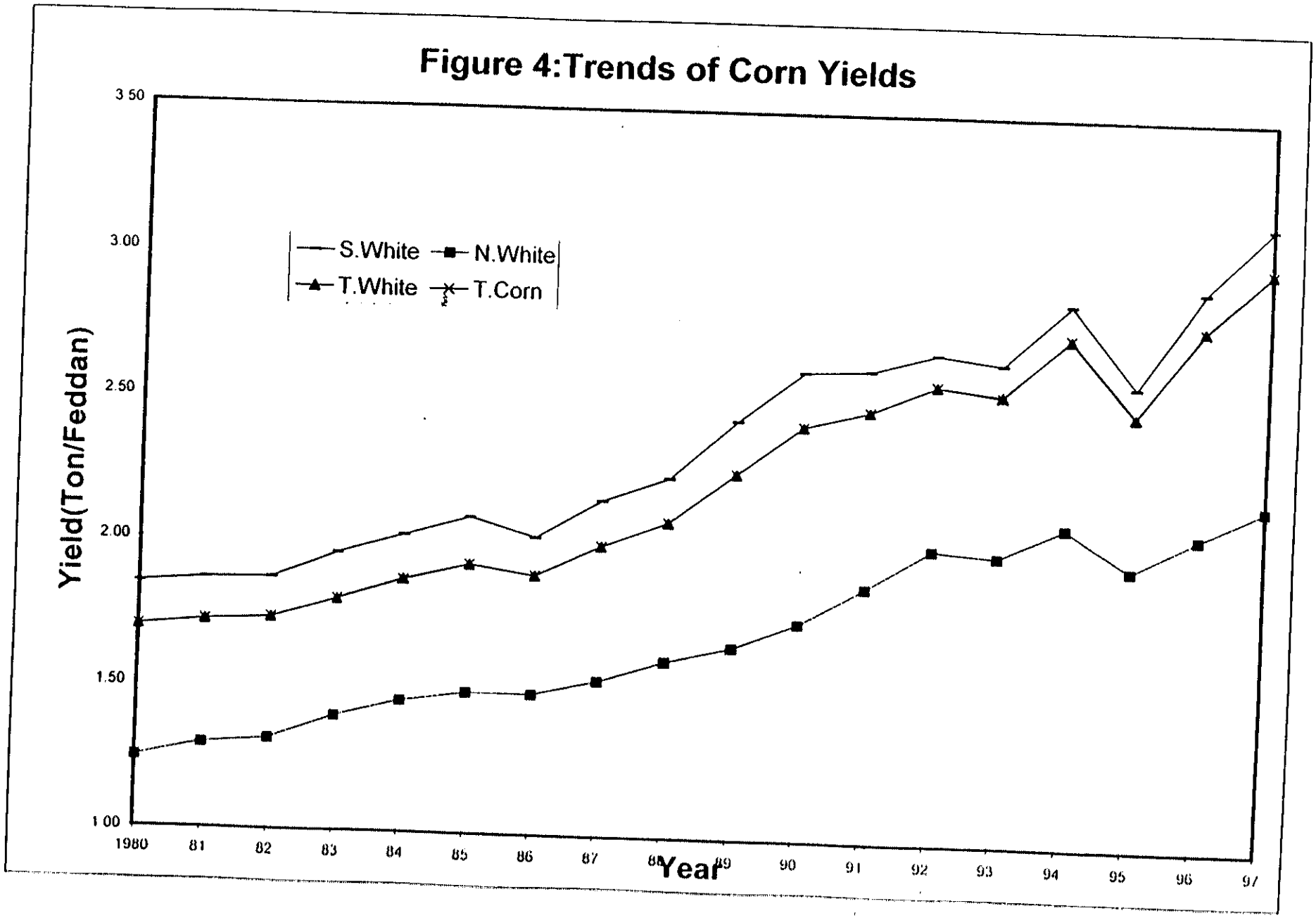


Figure 4:Trends of Corn Yields
3.50
3.00
2.50
2.00
1.50
1.00
Yield(Ton/Feddan)
S.White
N.White
T.White
T.Corn
1980
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
Year

Table 3.2. Area of maize by type, season and governorate, 1998.

	White maize		Yellow maize			All
Governorate	Summer	Nili	Summer	Nili	Drawa	Maize
Alexandria	1639	744	73	726	3647	6829
Behira	124832	15220	5792	3289	13479	162612
Gharbiya	88121	36027	1203	92	6889	132332
Kafr El-Sheikh	47218	5125	517	0	10789	63649
Daqahliya	67153	30121	1952	25	4797	104048
Damietta	3634	1474	61	380	518	6067
Sharquia	218994	43504	3723	0	10457	276678
Ismailia	32691	4818	1559	0	10652	49720
Port Said	650	0	0	0	3812	4462
Suez	2870	1323	0	0	114	4307
Menoufia	217581	0	8801	0	10921	237303
Qalubiya	98372	0	2071	0	11610	112053
Cairo	1348	0	0	0	986	2334
Lower Egypt	**905103**	**138356**	**25752**	**4170**	**88671**	**1162052**
Giza	67331	43343	0	0	12940	123614
Beni Suef	98508	71303	21	32	356	170220
Fayoum	49432	38669	0	0	17341	105442
Minya	249290	0	6880	0	2524	258694
Middle Egypt	**464561**	**153315**	**6901**	**32**	**33161**	**657970**
Assuit	70583	1193	410	0	14995	87181
Sohag	115022	4168	214	0	4650	124054
Qena	36239	13385	536	0	4797	54957
Aswan	8958	8802	0	0	5516	23276
Luxor	8099	3871	0	0	0	11970
Upper Egypt	**238901**	**31419**	**1160**	**0**	**29958**	**301438**
Nile Valley	**1608565**	**323090**	**33813**	**4202**	**151790**	**2121460**
Wadi El Gidida	1232	737	0	1232	2826	6027
N.Sinai	0	0	0	0	193	193
Matrouch	5564	0	0	0	0	5564
Nuberia	41591	0	19349	0	0	60940
Desert Lands	40577	0	0	0	0	40577
New Lands	40577	301	4510	2467	2810	50665
Total Egypt	**1697529**	**324128**	**57672**	**7901**	**157619**	**2244849**

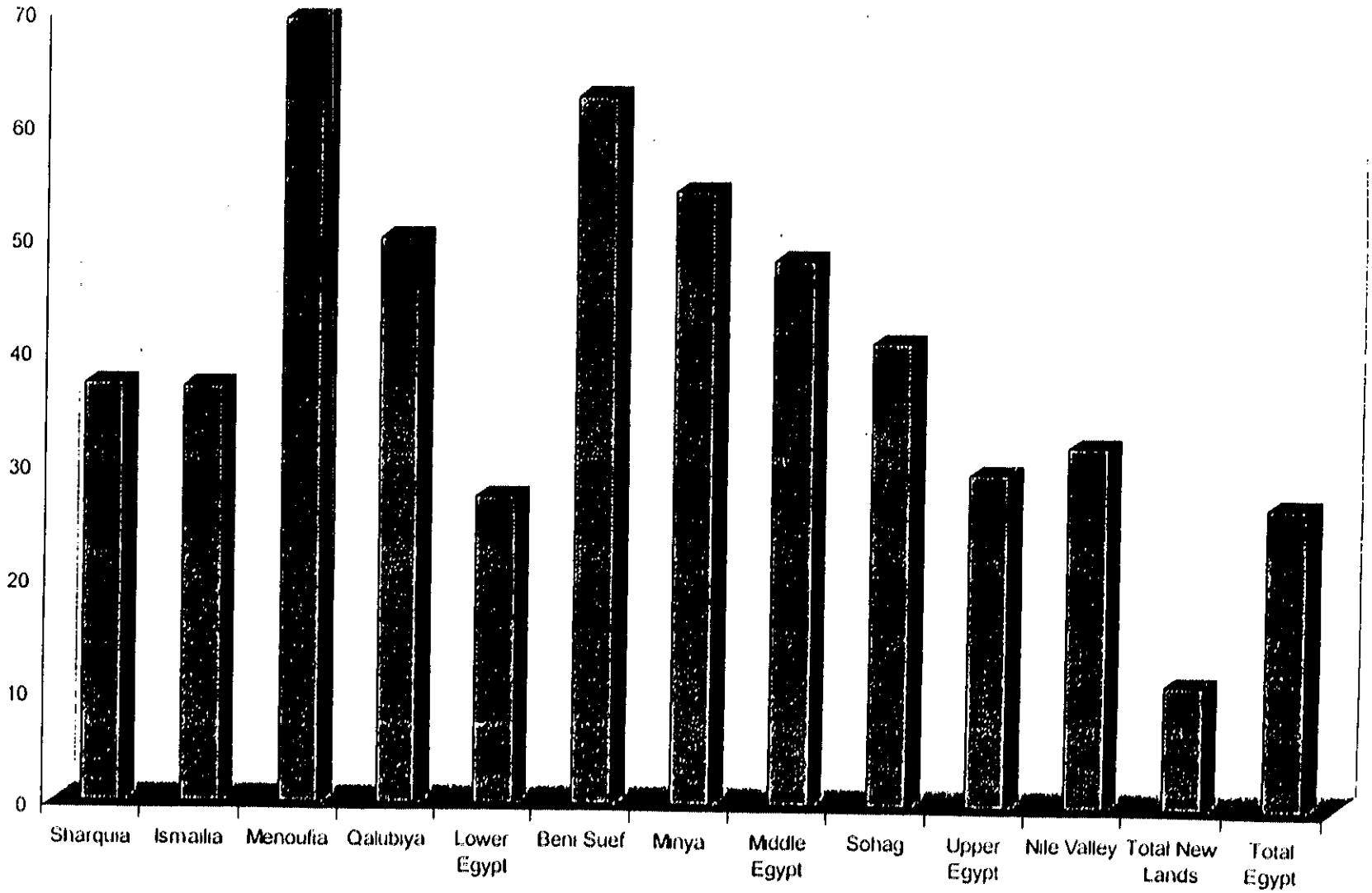
Table 3.3 Percent of agricultural land in maize.

Governorate	Area Cultivated	White maize Summer	White maize Nili	Yellow maize Summer	Yellow maize Nili	Yellow maize Drawa	All Maize
Alexandria	58998	5.47	17.75	0.24	---	5.11	28.57
Behira	755590	11.44	2.74	0.47	0.05	1.49	16.19
Gharbiya	377648	21.62	8.41	0.27	0.05	1.63	31.98
Kafr El-Sheikh	570849	12.16	0.62	0.04	---	0.95	13.78
Daqahliya	628301	8.50	3.31	0.53	0.26	0.15	12.75
Damietta	106436	2.45	2.04	0.15	---	0.49	5.13
Sharquia	724832	31.39	3.25	1.31	---	0.97	36.92
Ismailia	139261	23.20	3.67	1.03	3.67	5.14	36.72
Port Said	5701	14.75	23.05	---	---	2.74	40.54
Suez	12715	24.12	---	---	---	0.87	24.99
Menoufia	302921	60.66	---	5.17	---	3.43	69.25
Qalubiya	189228	43.02	---	0.82	---	6.11	49.94
Cairo	7734	19.87	0.79	---	---	12.75	33.41
Lower Egypt	3880214	21.32	3.08	0.94	0.19	1.67	27.20
Giza	186257	37.39	20.92	0.23	---	6.93	65.47
Beni Suef	263317	38.30	23.82	0.03	0.24	0.14	62.53
Fayoum	390310	10.36	8.15	0.06	---	4.44	23.01
Minya	447844	53.81	---	0.01	---	0.38	54.20
Middle Egypt	1287728	35.09	10.37	0.06	0.05	2.51	48.08
Assuit	329586	22.65	0.31	0.91	---	4.42	28.28
Sohag	294503	37.11	1.55	0.63	---	1.57	40.85
Qena	279853	14.24	5.38	0.05	0.08	1.71	21.46
Aswan	128385	5.64	7.13	0.31	---	4.02	17.11
Luxor	27615	37.73	20.43	---	---	---	58.16
Upper Egypt	1059942	22.78	3.34	0.51	0.02	2.75	29.40
Nile Valley	6227884	24.41	4.63	0.69	0.13	2.03	31.89
Wadi El Gidida	63774	2.29	1.57	---	---	2.06	5.91
N.Sinai	117592	---	---	---	---	0.16	0.16
Matrouch	189388	3.44	0.12	---	---	---	3.56
Total New Lands	960032	0.83	0.13	0.00	0.00	0.26	1.22
Total Egypt	7494896	20.39	3.86	0.57	0.11	1.72	26.66

3.2 Maize breeding and seed production

Prior to the 1950's there was little concern within the GOE or MALR to the production of maize. It was considered to be sufficient to meet the local demand. This was the farmers' crop. Also, resources for research and extension were limited and the seed industry was not well established. However, the need for more maize became evident in the 1950's and a project involving maize breeding and seed production was undertaken in the Ministry of Agriculture.

Figure 5. Percent of Land Planted to Maize



Although several high yielding hybrid varieties were developed, their impact on maize production was not obvious due to two main constraints. These constraints were 1) the susceptibility of those hybrids to late wilt disease, caused by *Cephalosporium maydis* ; and 2) late planting of maize which prevailed before the completion of the high dam. After completion of the high dam in 1966 it became possible to plant maize much earlier in the season which brought about an increase in yields of about 30 percent. from about 6 ardebs/ feddan to 8 ardebs/ feddan by the end of the 1960's.

A remarkable improvement in maize research came as a result of the collaboration between the MALR and the International Maize and Wheat Improvement Center (CIMMYT) which started in 1966. This collaboration provided the Maize Research Center in ARC with a large number of accessions from various countries. Several exotic populations were resistant to the late wilt disease, were reasonable high yielding, and were well adapted to the local environment. These populations were used to develop some high yielding varieties. Two variety crosses, VC-69 and VC-80, and two composites, Shedwan-3 and Composite-108 were released in 1972. Although high yielding they did not attract the attention of the Egyptian farmers because of their plant height, high ear placement, late maturity, and high fertilizer requirements.

The real breakthrough in Egyptian maize improvement began early in the 1980's. This breakthrough was the result of several factors: 1) privatization of the maize seed industry, 2) the initiation of a massive extension campaign (the National Campaign for Maize Improvement), 3) the release of high-yielding varieties and hybrids with desirable agronomic characteristics, 4) the development of a package of agronomic practices to maximize yields, and 5) the availability of production inputs including fertilizer, pesticides, machinery and credit.

Privatization of maize seed production began in 1980 with the establishment of three private seed companies. These were MISR-Pioneer, the Egyptian Agricultural Seed Company (EGA Seed) and the National Seed Company. Two more companies, MISR-Dalton, and Nile Seed companies were established in the late 1980's. Since then more seed production companies have been formed so that currently there are 35 private companies producing maize seed.

The research efforts of the Maize Research Program in ARC yielded the release of the open-pollinated variety Giza -2 in 1980 followed by the double cross hybrids Giza-202 in 1981, and Giza 204 and 215 in 1984. These were followed by the releases of 3-way crosses Giza 310 and 320 in 1988 and 1989 respectively and three single cross hybrids Giza -9, 10 and 103 in 1989.

Seventeen new maize hybrids were registered and released for commercial production during the period from 1993-97. These hybrids comprise 11 single cross hybrids of which 4 are of white endosperm (Giza-122, 123, 124 and 129) and 7 are of yellow endosperm.(Giza -151, 152, 153, 154, 155, 156 and 161). Also six 3-way cross hybrids have been released of which 4 are of white endosperm (Giza-321, 322, 323, and 324) and 2 are of yellow endosperm (Giza 351 and 352). Additional hybrids are being evaluated for future registration and release for commercial production.

In addition, private seed companies are also developing hybrid varieties. Four private companies, MISR-Pioneer, Hytech, EGA Seed Company and National Seed Company have breeding programs and have varieties on the market. Three other private companies, Fine Seeds, Nile Seeds and Delta Seeds have breeding programs but have not as yet released any varieties. An additional company, Nile Storage and Seed Processing, is an affiliate of DeKalb International and has imported some foreign developed varieties for local production.[6]

3.3 Maize production on the maize sample farms

Data were gathered from the sample farmers not only on maize production but also on the entire cropping program for the winter 1997-98 season and the 1998 summer season. Table 3.4 summarizes maize production on the sample farms. Yellow maize was not found on any sample farms in Sharquia or Minya and on only 4 out of 300 sample farms in Menoufia. In Nuberia, 56 of the 150 farms planted yellow maize and 115 of the 150 farms planted white maize. This means that 21 farms planted both white and yellow maize. Only 7 of the 1,050 sample farms, one in Menoufia and 6 in Minya planted Nili maize.

Table 3.4. Maize production on the maize sample farms.

Study Area	Type of maize	Feddans Per farm	Yield (ardeb/FD)	Production/farm (Total ardeb)
Sharquia	White Maize	1.02	15.78	15.99
	Drawa	.02	---	---
Menoufia	White Maize	1.98	15.13	29.95
	Yellow Maize	.03	14.71	.45
	Drawa	.08	---	---
Minya	White Maize	1.28	13.63	17.44
	Drawa	.005	---	---
Nuberia	White Maize	1.53	15.43	23.61
	Yellow Maize	.62	17.90	11.43
	Drawa	.24	---	---

Drawa was harvested by 14 sample farms in Sharquia (4.7%), 28 farms in Menoufia (9.3 %), two farms in Minya (0.7 %) and 14 farms in Nuberia (9.3%). However the area harvested for drawa was very small on these farms, except in Nuberia.

Maize was by far the major crop on the sample farms in Menoufia. As was shown in Table 3.3, maize represented 69 percent of land use in the summer of 1977, and ***maize was the only summer crop on 68 percent of the sample farms in Menoufia.*** Maize was also the major summer crop in Minya and the only crop on 51 percent of the sample farms in that governorate. In contrast, maize was the only crop on only 13 percent of the farms in Sharquia and 11 percent of the farms in Nuberia. Rice was the major crop in Sharquia.

[6] See (1) for more details on the maize seed industry.

CHAPTER IV: SALES AND PURCHASES OF MAIZE ON SAMPLE FARMS

4.1 Sales of Maize

Farmers dispose of maize that they grow, but do not utilize themselves, through three primary outlets: 1) local traders, 2) their neighbors, or 3) the government. Sales to the government are usually to a village branch of PBDAC. Purchases of maize by the GOE are by the MOTS to grind and blend with wheat flour in producing 82 percent extraction rate wheat flour for the production of baladi bread. The MOTS has reported that it purchased 189,000 MT of maize in 1997 and 338,000 MT in 1998.[7] These purchases are made for the MOTS by PBDAC. PBDAC purchases maize directly from farmers or from traders.

Due to the small land holdings of some farmers and due to rotational restrictions, many small farmers do not plant maize each year and thus must purchase maize for their own needs.[8] These farmers obtain the maize they want from neighbors or they buy from local traders. Exchange of maize between neighbors may be via barter, trade or through sales.

Private traders sell maize to other farmers in the same villages, to PBDAC, to industrial users, or to commercial feed manufacturers. The authors have had numerous experiences in the last decade with surveys of private traders at the village level.[9] Obtaining reliable information from these traders has proven to be quite difficult. These traders generally fear taxation by government officials and thus generally are afraid to fully disclose data on the size of their operations. However, they could be relied upon to provide accurate data on the share of their trade going to various categories of their customers.

4.2. Sales of white maize on maize sample farms

In the course of itemizing the utilization or disposal of the maize on the sample farms the amounts of maize sold to these three categories of buyers were determined. Since the survey was taken during the period of utilization, some of the 'sales' reported here are actually intended sales. Of the total sales reported below, 75 percent were reported during the period between harvest and the date of the survey (April-May 1999) and 25 percent are intended sales after that date.

Table 4.1 indicates the percent of the maize sample farms selling white maize to these categories of buyers. Traders were the major buyers of white maize in all study areas. The government was the major buyer in only Minya. Some farmers sold to more than

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[7] Private communication with Dr. Ali Abdel Rahman Ali, Advisor to the Minister of Trade and Supply.

[8] Due to the need for determination of the cropping rotation at the village level some farmers, particularly the smallest farmers, are not able to grow maize each year. All of the land of a small farmer may be located in a block of land that the village decides to use for cotton or rice.

[9] See the Agricultural Policy Reform Program tranche reports IV through VII of the APCP, USAID Cairo, particularly the sections reporting privatization of rice, cotton and fertilizer marketing.

one type of buyer (See Figure 6). The quantity of sales of white maize, measured as a percentage of maize production, is given in Table 4.2. Again, private traders are the major buyers in all study areas. The 'Average' estimate was obtained by use of the weights given in Table 2.2.

Table 4.1. Percent of maize sample farmers who sold white maize.

Study area	To Government	To Traders	To Neighbors
Sharquia	1	44	20
Menoufia	1	67	13
Minya	20	56	15
Nuberia	5	54	5

Table 4.2. Sales of white maize on maize sample farms, (Percent of Production).

Type of Buyer	Sharquia	Menoufia	Minya	Nuberia	Average
Traders	55.7	59.2	22.2	63.3	45.5
Neighbors	8.9	1.0	2.8	0.8	3.3
Government	1.8	0.2	18.2	11.4	7.5
Total sales	66.4	60.4	43.1	75.5	56.3

4.3 Sales of yellow maize on maize sample farms

In Menoufia only one farmer sold yellow maize. In Nuberia, 19 percent of the sample farmers sold yellow maize to traders and 5 percent sold to neighbors. In terms of quantity, 64.2 percent of the production of yellow maize was sold to traders and 16.2 percent was sold to neighbors for a total of 80.4 percent.

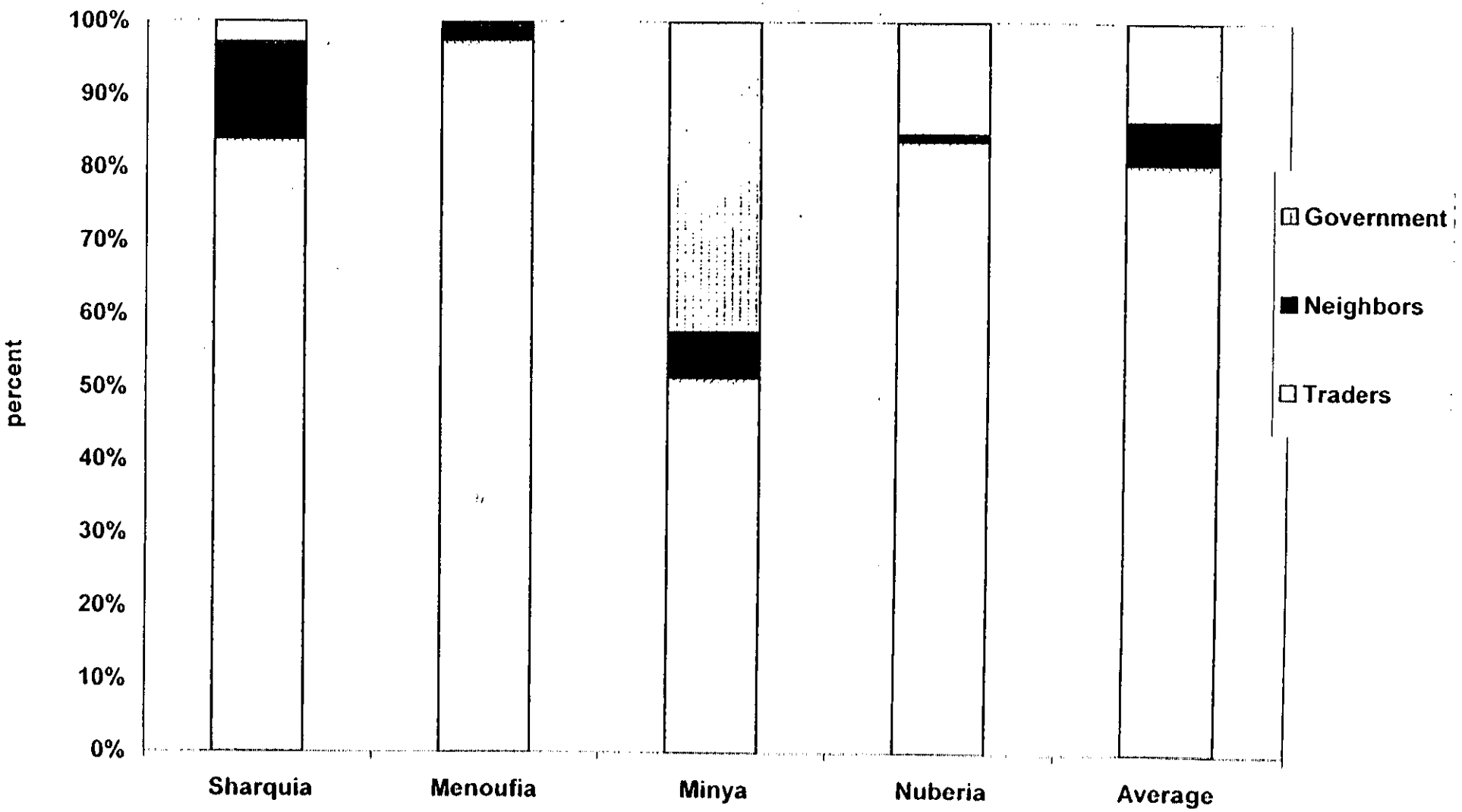
Table 4.3 presents the average prices received for maize sold by the sample farmers in 1998-99. (Based of course only on the sales prior to the survey.) Most prices reflect the price of LE 90/ ardeb paid by the government for purchases of the MOTS. Prices of yellow maize tend to be lower than that of white maize. The lower prices for yellow maize reflect the prices of imported yellow maize, which is considerably below the domestic prices.[10] Prices of maize were lower at harvest time and have risen to LE 110-120 at this date. The dates of sales or purchases of the maize were not obtained but are reflected in the range in maize prices.

Table 4.3. Average prices received for maize, classified by buyer, (LE/Ardeb).

Study Area	Sales to Govern.	Sales to Traders	Sales to Neighbors
White maize			
Sharquia	91.88	91.13	90.01
Menoufia	----	70.72	77.06
Minya	90.70	96.58	91.79
Nuberia	74.83	72.47	---
Yellow maize			
Nuberia	---	72.81	73.97

[10] The recent price of imported yellow maize from the USA is reported at $106-110/MT CIF Alexandria. With the payment of import duties, taxes, port charges, transport costs, etc. the price becomes about $126-130 which is equivalent to LE 61-63/ardeb.

Figure 6. Sales of White Maize



4.4 Purchases of maize on maize sample farms

Some of the sample farms purchased maize. Details on the purchases of white maize are presented in Table 4.4 and for yellow maize in Table 4.5. These sample farms purchased white maize because they were small farms producing less than their needs or, in the case of most of the 18 farms from Nuberia, because they produced only yellow maize and small quantities of white maize were purchased for human consumption. There were some farms in the sample that produced as little as 3-5 ardeb of maize and most sample farmers used more than this amount for their own use and for feed. There were a few cases in the sample of farmers who both bought and sold maize. The reasons for this were not explored. In general, the larger farms were the biggest sellers and the buyers were the smallest farms.

Table 4.4. Purchases of white maize by maize sample farms.

Study Area	No. of farms Purchasing	Percent of farms who purchased	Total ardeb Purchased (total sample)	Ave. price Paid LE/Ardeb
Sharquia	10	3.0	146.5	92.90
Menoufia	7	2.3	6.0	77.70
Minya	12	4.0	149.25	90.00
Nuberia	18	8.7	47.0	82.00

Data on purchases of maize by these sample farms tells us very little about maize purchases by farmers that did not grow maize. These purchases were recorded and included in the analysis to get a complete picture of maize consumption by the sample farmers.

Table 4.5. Purchases of yellow maize by maize sample farms.

Study area	No. of farms Purchasing Maize	Percent of farms who purchased	Total ardeb Purchased (total sample)	Ave. price Paid LE/Ardeb
Sharquia	8	2.7	40.00	93.00
Menoufia	3	1.0	30.75	84.36
Minya	2	0.7	38.00	70.00
Nuberia	5	3.3	10.50	66.20

CHAPTER V: MAIZE UTILIZATION AS FEED

5.1 For Animals

Animals are well fed in the winter season in Egypt but the summer is a difficult feeding season for animals on farms in Egypt. During the winter season, from October through April, approximately 40 percent of the cropland in the Nile Valley is used for berseem production. This large area of about 2.4 million feddans of berseem provides a bountiful supply of green forage for all large animals during this portion of the year. However, in the summer season, from at least June through September, there is very little land used for the production of animal feed and hence very little green forage for animal feed. Milk production in particular diminishes drastically during this portion of the year. Maize is the major crop that produces any green fodder for livestock during the summer and maize grain, produced the previous summer, can also be used for feeding animals.

Throughout Egypt some land is used to grow green fodder crops for livestock feed in the summer. In 1998, a total of 157,619 feddans of such crops were grown. Of this total, 130,046 feddans (83%) was 'drawa'. Drawa is a special use of maize. Regular maize seed is planted, usually in a broadcast manner (not in rows or hills), and the crop is cut for feeding to livestock as green fodder before the grain is mature. This maize is fed mainly to cattle or buffalo that are producing milk. In the Nile Valley, 126,189 feddans of drawa were grown in 1998, which represented about 2 % of the cultivated land. Drawa is grown on 1.7 % of the cultivated land in the Delta, 2.5 % in Middle Egypt and 2.75 % in Upper Egypt. Planting of maize for harvest as drawa can be done throughout the summer season, thus providing green fodder for many months.

Also, many farmers strip the leaves from the maize stalk to provide green fodder for their animals. The farmer starts to strip off the leaves beginning at the bottom of the plant and gradually works his way up the stalk as more fodder is needed. Some farmers also cut off the top of the maize plant, just above the maize ear of grain, and use this stalk for fodder. Both of these practices reduce the grain yield. The extent of the reduction in yield depends upon the timing of the removal of the leaves or plant top. But obviously the leaves also have a high value as green fodder for the animals. Data are not available on the extent of these practices, or hence on the aggregate impact of these practices on maize production.

A small amount of maize is also cut for silage before it reaches full maturity. Because of the large capital investments needed in silage making and storage equipment this practice is used mainly on large dairy farms. But in Menoufia some co-operatives also own equipment that can be rented by the small farmers for silage making. This activity holds promise for future expansion.

5.2 Feed subsidy reforms

During the period from 1959 to 1992 the GOE regulated the production and distribution of livestock and poultry feeds with substantial subsidies of feed costs. The subsidies on commercial feed were gradually removed beginning in 1986. The year 1992 witnessed the full liberalization of these feed programs. As a result of the elimination of these

feed subsidies the quantities of commercially produced both animal and poultry feed has declined drastically (Table 5.1).

On the other hand, animal numbers have not declined in Egypt, nor has animal feeding. The number of adult buffalo plus cattle in Egypt was reported as 5,284,768 in 1982, 5,515,302 in 1990, and was 6,213,416 in 1997.[11] The fattening of animals has not declined during this period either. The decline in the subsidized commercial feed has been taken up an expansion in grinding and mixing on farms. There are reportedly many farms that have small feed lots and fatten small numbers of animals, ten head or more, that have obtained their own equipment for grinding and mixing feed.

Poultry feeding and the manufacture of poultry feed by commercial companies did decline as a result of this policy reform (2). As a result of the elimination of the subsidization of feeds many poultry and animal producers have shifted to buying grain and doing their own grinding and mixing.

Table 5.1. Commercial animal and poultry feed production,1982-1997 (MT).

Year	Poultry Feed		Animal Feed		Total
	Quantity	Percent	Quantity	Percent	
1982	542,000	27.8	1,406,000	72.2	1948000
1983	931,000	38.3	1,500,000	61.7	2431000
1984	1,247,000	45.0	1,524,000	55.0	2771000
1985	1,558,000	49.1	1,613,000	50.9	3171000
1986	1,800,000	52.2	1,650,000	47.8	3450000
1987	1,900,000	51.5	1,786,000	48.5	3686000
1988	1,900,000	48.5	2,015,000	51.5	3915000
1989	1,630,000	40.7	2,372,000	59.3	4002000
1990	1,105,000	30.7	2,500,000	69.3	3605000
1991	680,000	23.6	2,200,000	76.4	2880000
1992	654,000	30.4	1,500,000	69.6	2154000
1993	631,970	26.9	1,715,000	73.1	2346970
1994	649,374	26.0	1,848,665	74.0	2498039
1995	662,888	26.9	1,801,083	73.1	2463971
1996	652,921	28.4	1,642,836	71.6	2295757
1997	616,143	31.9	1,314,391	68.1	1930534

Sorce: El-Guendy, M., Siddik, I., and Edgar, A.N., 1999(2, table 2.1).

5.3 Livestock inventory on maize sample farms

Tables 5.2 and 5.2 and Figure 7 describe the livestock and poultry inventories on the sample farms. The data indicate that the farm with no animals or poultry is rare in all parts of Egypt. Almost every farm has either chickens or ducks and some large animals such as buffalo or cattle and some goats or sheep and one donkey.

[11] The estimate for 1982 was taken from the Agricultural Census. The estimates for 1990 and 1997 were made by the Central Administration for Animal Products in the MALR.

But the average number of animals on any farm is rather small. For instance, buffalo are most common in Menoufia but those farms that had buffalo averaged only 1.48 head /farm. Similarly, in Menoufia the 91 percent of the farms had chickens but the average size of flock was only 33 adult chickens. The farms in Nuberia had the least concentration of livestock of any study area but 88 percent of the farms in that area had some animals or poultry (Figures 8 and 9).

Sample farms were also asked to report the number of buffalo, cattle or sheep that they fattened during the previous year. The survey results indicate (Table 5.4) that fattening of animals on farms varies considerably between governorates. Many more farms in Menoufia reported fattening buffalo and cattle than in Sharquia while the opposite was true for fattening of sheep. Fattening of animals would be expected in Menoufia because of the large amount of maize available, however, it should not be concluded that maize was used to fatten all of these animals.

Table 5.2. Percent of maize sample farms having each type of adult animal.

Type of Animal	Sharquia	Menoufia	Minya	Nuberia
Buffalo	63	83	77	44
Cattle	47	60	45	62
Sheep	55	29	31	45
Goats	27	60	48	32
Donkeys	65	86	75	55
Horses	<1	1	8	0
Camels	1	8	2	0
Any animals	90	95	89	86
Chickens	83	91	83	63
Ducks	81	80	52	56
Turkeys	0	1	<1	0
Geese	0	<1	0	0
Any poultry	86	92	84	64
Any animals Or Poultry	99.7	98	96.0	88.0

Table 5.3.Average number of adult animals on the maize sample farms.

Type of Animal	Sharquia	Menoufia	Minya	Nuberia
Buffalo	.84	1.48	1.07	.94
Cattle	.65	1.02	.81	.59
Sheep	.98	1.02	1.47	.39
Goats	.60	2.40	1.45	.30
Donkeys	.89	1.00	.95	.30

Table 5.4. Percent of maize sample farms that fattened animals.

Study area	Buffalo	Cattle	Sheep
Sharquia	6.0	12.7	26.0
Menoufia	43.0	38.0	11.0
Minya	17.7	31.3	15.7
Nuberia	17.3	33.3	34.0

Figure 7. Average Number of Adult Animals per Farm

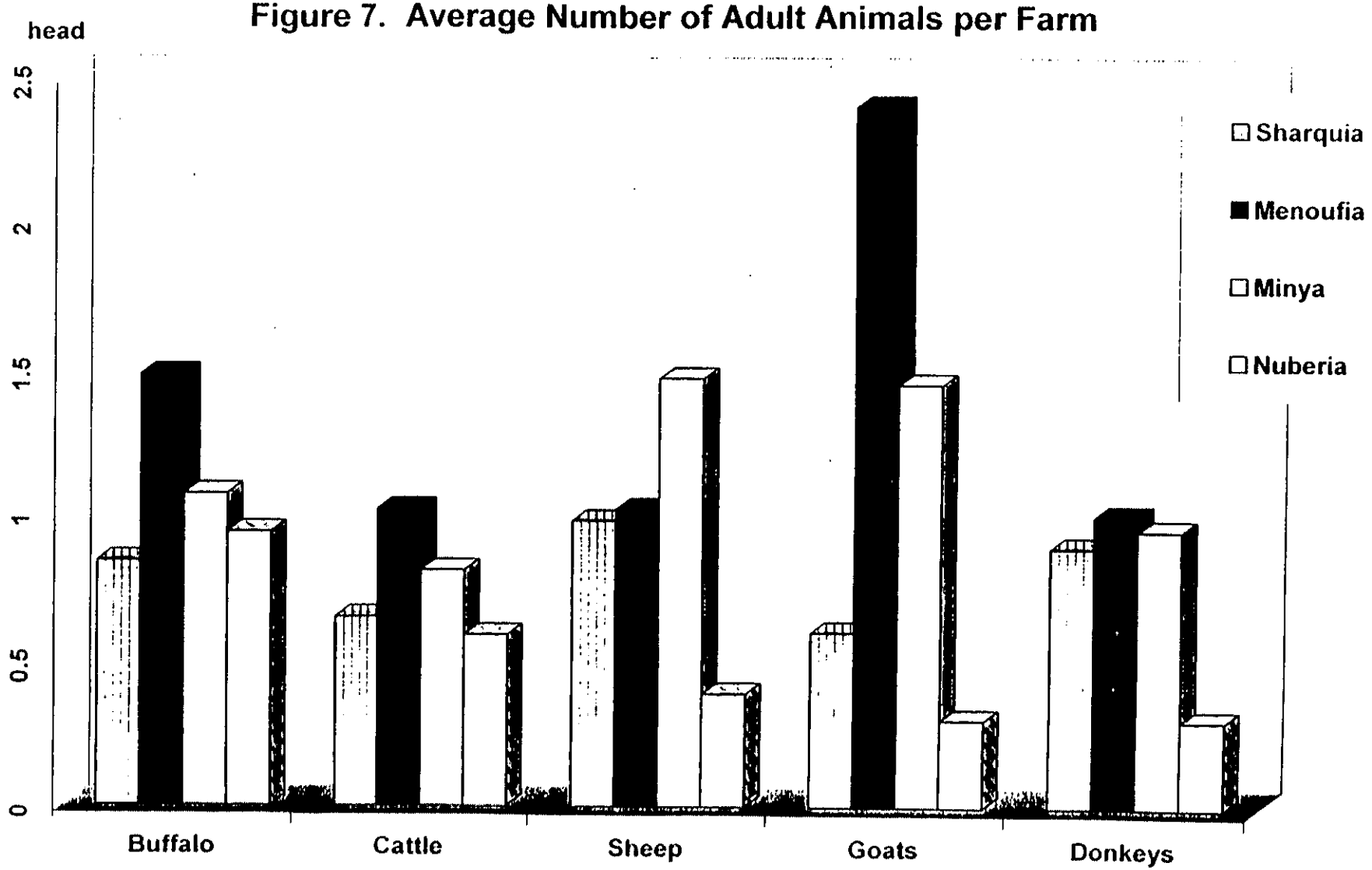


Figure 8. Percent of Farms that have Animals

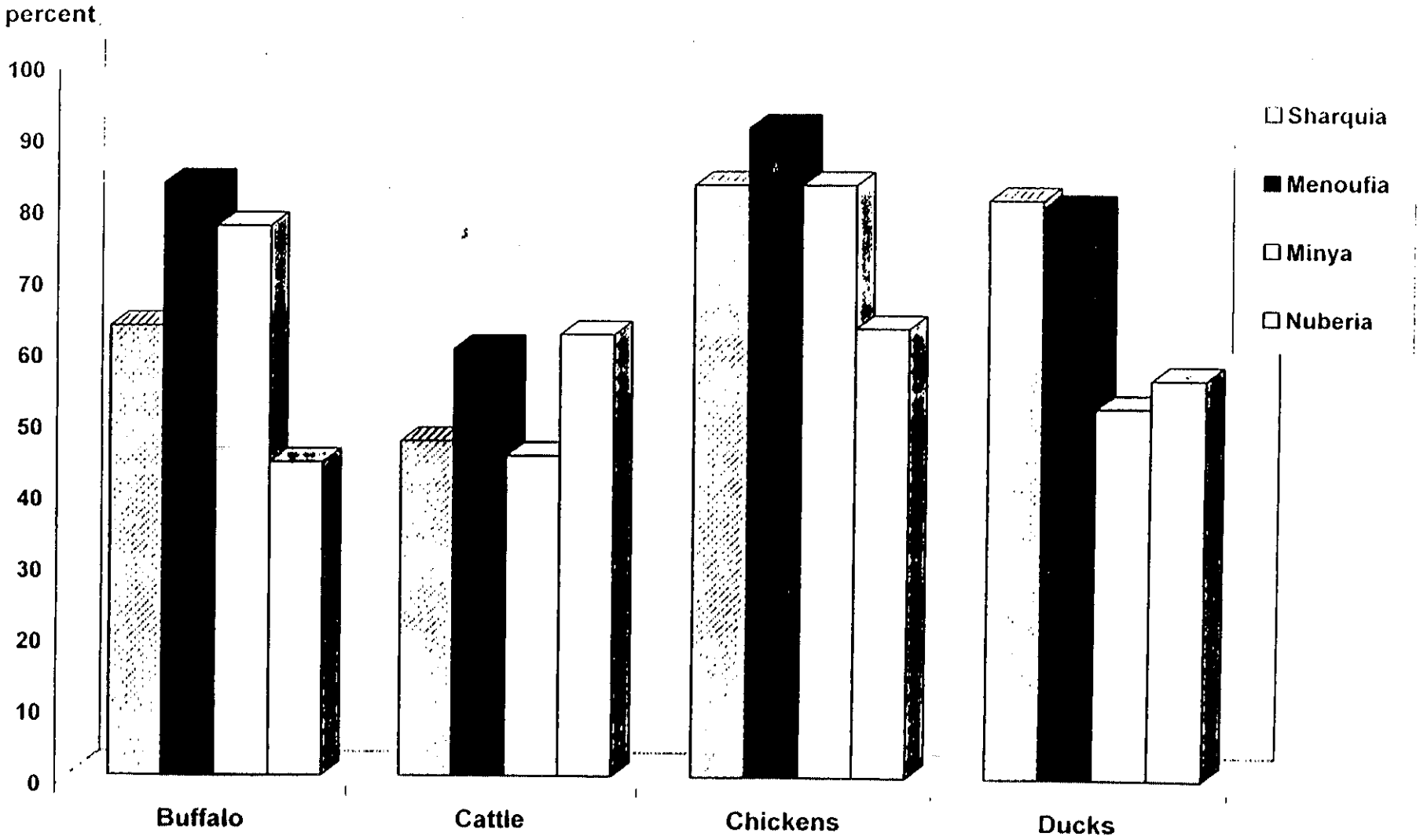
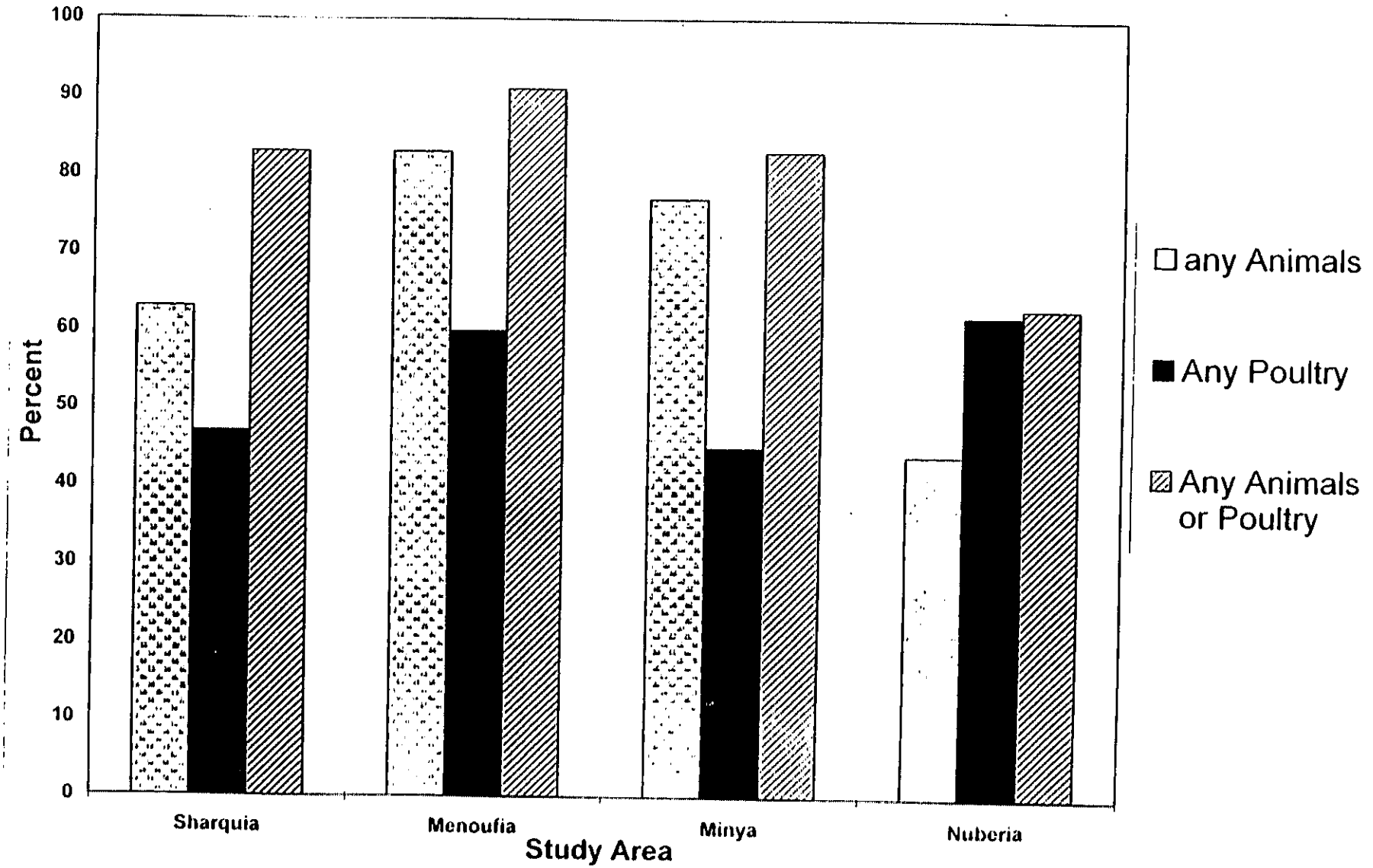


Figure 9:Percent of Farmers that have any Animals or Poultry



The number of animals fattened per farm was small in all governorates (Tables 5.5-5.6). Surprisingly, the farms in the Nuberia area reported the highest average number of animals fattened per farm.

Table. 5.5. Number of animals fattened.
(On farms that fattened animals)

	No. of animals per sample farm:		
Study area	Buffalo	Cattle	Sheep
Sharquia	1.50	1.71	1.50
Menoufia	1.18	1.30	1.45
Minya	1.09	1.67	2.93
Nuberia	2.88	1.64	3.20

Table. 5.6. Number of animals fattened.
(On all maize sample farms)

	No. of animals per sample farm:		
Study area	Buffalo	Cattle	Sheep
Sharquia	.09	.22	.39
Menoufia	.51	.49	.16
Minya	.19	.52	.46
Nuberia	.50	.55	1.09

Use of maize for feeding animals on sample farms is summarized in Table 5.7. Here we see that the highest average quantity (ardeb) fed per farm was in Nuberia, which reflects the use in that area of maize for fattening animals. On average, 14.1 percent of maize production was reported being fed to animals.

Table 5.7. Feeding of maize to animals on maize sample farms.

Item	Sharquia	Menoufia	Minya	Nuberia
White Maize fed/farm (Ardeb)	1.27	4.97	3.08	1.96
Percent of white maize production	7.7	16.6	17.2	8.2
Yellow Maize Fed farm (Ardeb)	.09	.36	---	1.94
Percent of yellow maize production	(from purchases)	79.3	---	17.0
Total fed/farm (Ardeb)	1.36	5.33	3.08	3.90

5.4 Poultry feeding

There is a substantial commercial poultry industry in Egypt that utilizes primarily imported yellow maize as feed stock. About 2.5 MMT of yellow maize is imported annually of which all but 100,000 MT (used for starch production) is used for the production of processed poultry feed that is used by commercial poultry producers (2).

In addition to the commercial poultry producers most Egyptian farmers keep a small poultry flock. The survey data indicate (Tables 5.2 and 5.3) that the most common type

of poultry kept are chickens and ducks. These birds primarily fend for themselves but they are fed a small amount of maize grain on some farms. Maize is ground if it is fed to chickens but it probably is not ground if it is fed to other types of poultry. Small stone mills are owned by some farmers, which are used to perform crude grinding of maize for chickens. Maize ground at the village flourmills would be too fine for feeding of chickens. The grinding required is mainly only cracking the maize.

Egyptian farmers have a special type of feeding of ducks, geese and turkeys called 'zaghate' which is forced feeding. These birds are fed in this manner for special feasts such as Eid.

Table 5.8 presents inventory numbers of poultry on the sample farms and estimates of the extent of use of maize for poultry feeding on the sample farms. On average, 7.8 percent of the white maize production was fed to poultry.

Table 5.8. Poultry numbers and maize feeding on maize sample farms.

Item	Sharquia	Menoufia	Minya	Nuberia
Number on farms				
Chickens	24.3	33.0	30.8	4.4
Ducks	16.0	10.0	4.4	1.5
Turkeys	---	---	.67	---
Maize fed to poultry				
White Maize fed/farm (Ardeb)	1.24	2.19	1.50	0.79
Percent of white maize production	7.5	7.3	8.4	3.3
Yellow Maize Fed/farm (Ardeb)	---	.13	---	.32
Percent of yellow maize production	---	29.2	---	2.8

CHAPTER VI: MAIZE UTILIZATION AS HUMAN FOOD

6.1 Baladi Breads

Many people within the MALR have stated that the consumption of maize as food was much greater before the initiation of the program of subsidization of baladi bread made with wheat. The GOE program of subsidization of wheat flour and bread was initiated in the 1950's so this change was made over 40 years ago. However, there are still many rural people who make their own bread and some use maize in the production of these baladi breads.

There are several types of baladi breads that are produced in Egypt which utilize maize flour. Village residents in Middle and Upper Egypt, particularly in Beni Suef, consume bread called 'battau'. This type of bread is made with a blend of 50 percent wheat and 50 percent maize flour with a small amount of fenugreek added for flavor. The bread dough is rolled flat and baked making crisp, flat, cracker-type bread. Battau can also be made with wheat and sorghum flour instead of maize.

In Middle and Upper Egypt a pan bread called 'shamsi' is made. This bread is particularly popular in Sohag and Qena. The flour used is also a blend of wheat and maize or wheat and sorghum. The bread dough is put into pans and set in the sun to encourage fermentation and raising of the bread before baking.

In the Delta, the baladi bread is called 'merahrah" of which there are two types, 'roahaa' which is 100% wheat and 'fallahi' which is made with mixed grain, mostly wheat and maize. This type of bread is thin and flat but becomes soft if water is added before eating.

6.2 Grilled maize

"Dura mashwi" (grilled fresh maize on the cob) is another use of maize for human consumption that is found mostly in the bigger cities. Street vendors charge LE 0.25 to 0.50 per ear of maize which they grill on the spot for passing customers, but this use of maize is rare in the rural areas.[12]

6.3 Grinding of maize

Maize must be ground for use in making baladi breads. It is ground in the village mills with the same stone mills that are used to grind wheat. Maize flour does not store as well as wheat flour since the fat content (lipids) of maize is usually in the range from 4 to 4.5 percent compared to about 1 percent for wheat. This fat becomes rancid if stored for too long a period. Thus, rural users of maize for bread making must grind maize rather frequently.

The requirement for frequent grinding is not a problem for most rural people since many village mills are available. The MOTS listed 5,259 licensed village mills in

[12] The MALR reports that in 1997, 193 feddans of maize, producing 627 MT were harvested in Cairo governorate for dura mashi and in 1998 the area was 299 feddans producing 972 MT.

1995-96 (5. p.19). In 1996 CAPMAS estimated 7,432 grain mills in the seven rice governorates (6. p.13). In a study of wheat milling, the number of unlicensed mills was estimated at 8,700 and the total number of village mills that can mill maize at about 14,000 (5. p. 23). This gives about 2 mills per village in the entire country.

6.4 Nutritional aspects

Yellow maize is more nutritious than white maize since yellow maize has practically the same nutritional content as white maize, plus it contains beta carotene, a precursor of vitamin A. Researchers at the Food Technology Research Institute of ARC report that the Egyptian diet is deficient in vitamin A and thus the production of yellow maize should be encouraged in Egypt not only for poultry production but also for consumption by humans.

6.5 Blending maize with 82 % extraction rate wheat flour

In 1996 the MOTS began to blend maize flour with wheat flour for baking of the subsidized baladi bread. The blend uses 20 percent maize and 80 percent wheat flour. The purpose of this program is to substitute locally produced maize for imported wheat to conserve on foreign currency. This program was expanded in 1997 to a level of 189,000 MT of maize and in 1998 to 338,000 MT. For the 1998-99 crop year beginning in October 1998 the MOTS purchased 360,000 MT of maize for this purpose. The goal for 1999-2000 is 600,000 MT with a long-term goal of one million MT. Before this maize-wheat blending program was started about 6 MMT of wheat was used for this program, so at an extraction rate of 95-96 % for maize, about one million MT of maize would be needed to have blended flour for all of the baladi bread (5, pp. 29-34). Food nutritionists report that maize flour contains a slightly higher fat content than wheat flour, so the blended flour is slightly more nutritious than pure wheat flour.

6.6Family use of maize on maize sample farms

The majority of the maize sample farms indicated that they used white maize for human food. The percentage of farms using white maize was only 70 percent in Nuberia but was 94 to 99.7 percent in the other study areas. Nuberia is an area of new desert lands settled in the 1960's. Some of the settlers were students. Some of the farm operators in the area work in Alexandria so this area is slightly atypical in terms of rural customs.

Table 6.1. Use of white maize for family use on sample maize farms.

Item	Sharquia	Menoufia	Minya	Nuberia	Total
Percent of farms using maize for food	99.7	94.3	97.3	70	93.2
Ardeb/farm					
At time of survey	2.17	1.41	3.83	1.38	2.60
Intended use	.86	3.30	1.79	.18	1.90
Total	3.03	4.70	5.62	1.56	4.50
Percent of production	18.4	15.7	31.3	13.0	21.8

The data on family consumption were tabulated in two sets, the consumption reported up to the time of the survey, and the intended consumption for the remainder of the

production cycle. However, no pattern was detected from the summary data in terms of the period of use. The households in Minya reported the greatest total use of maize per household for the entire year with the lowest use reported in Nuberia.

The weighted average consumption reported (actual use plus intentions) was 4.5 ardeb, or 630 KG per household. The consumption of maize per family member varied as follows:

Study Area	KG/person/year	Grams/person/month
Sharquia	56.9	4,742
Menoufia	79.5	6,625
Minya	97.9	8,158
Nuberia	35.9	2,992
Wt. Average	76.0	6,333

These estimates of maize consumption are much higher than estimates obtained in a recent household survey.[13] IFPRI estimates of consumption of maize flour are 1,186 grams per capita per month for all Egypt, 2,018 for Lower rural Egypt and 2,237 grams in Upper rural Egypt. The results of this farmer survey are 2-3 times higher than the IFPRI estimates. The farmer survey results are consistent with the IFPRI results in the sense that both estimates indicate greater per capita consumption in Upper Egypt than in Lower Egypt.

The results of this farmer survey would be expected to result in consumption estimates greater than the IFPRI results. The sample for this survey included only farms that were producing maize, and in addition, the study areas selected produced more maize than average. Thus, these are the households in Egypt that have a bountiful supply of maize and no doubt consume much more than the average household in rural Egypt. Unfortunately, the extent of the bias cannot be measured and hence accurate estimates of average maize consumption in Egypt, or even an average of the rural areas cannot be made from the results of this study.

Similar results have been obtained in surveys or rice producers. In a 1991 survey, rice farmers reported that they kept an average of 1.3 MT of rice for family consumption.[14] This amount of rice is about 275 percent of the average consumption of rice by rural households in Lower Egypt as reported in the IFPRI household study.

In the above comparison it was assumed that the estimates obtained regarding the intended uses of maize after the date of the survey were during one year. As explained earlier in Chapter III, for reasons of maintaining a crop rotation in the villages, many farmers planted only maize in 1998 while others planted none. Many of the sample farmers who produced maize in 1998 will not plant maize in 1999. Hence, some of the maize produced by the sample farmers in 1998 may be consumed during the 1999-2000 crop year. Perhaps dividing the quantity intended for consumption by 13 or 14 months instead of 12 months would be a more accurate reflection of usage.

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[13] "Patterns of Food Consumption and Nutrition in Egypt", Howard E. Bouis, Akhter U. Ahmed, Akila S. Hamsa. Food Security Research Unit/ APRP, IFPRI, January 1999. Cairo, Egypt. pp. 50-55.

[14] Tranche V Monitoring and Verification Report, APRP, APCP. USAID/Cairo, June 1992, P 30.

CHAPTER VII: SUMMARY OF MAIZE UTILIZATION

7.1 Utilization of white maize on maize sample farms

The previous chapters have presented estimates of maize utilization for the various uses. These estimates were obtained from the survey of maize producers. In this chapter we will summarize these estimates and make some estimates of aggregate use of maize for the country. Table 7.1 presents a summary of the disposition of white maize on the study farms in terms of ardebs per farm.

Table 7.1. Production, purchases, and disposition of white maize on sample farms. (Ardeb per farm)

Use of maize	Sharquia	Menoufia	Minya	Nuberia	Weighted Average*
Production	15.99	29.95	17.44	23.61	20.6
Purchases	.49	.02	.50	.31	.4
At time of survey					
Family use	2.17	1.41	3.83	2.75	2.65
Poultry feed	.99	.72	1.04	.64	.90
Animal feed	.55	1.58	1.75	1.50	1.30
Sold to Traders	6.07	12.68	3.06	14.98	6.80
Sold to neighbors	.72	.25	.38	.19	.43
Sold to GOE	.29	.01	3.25	2.73	1.52
Total sales	7.08	12.94	6.69	17.90	8.75
Intended use					
Family use	.86	3.30	1.79	.36	1.85
Poultry feed	.26	1.47	.46	.14	.70
Animal feed	.72	3.38	1.33	.46	1.60
Sold to Traders	3.11	5.07	.92	.16	2.56
Sold to neighbors	.73	.06	.12	---	.27
to GOE	.01	.04	.01	---	.02
Total sales	3.85	5.17	1.05	.16	2.85
Total					
Family Use	3.03	4.70	5.62	3.11	4.50
Poultry feed	1.24	2.19	1.50	.79	1.60
Animal feed	1.27	4.97	3.08	1.96	2.90
Sold to Traders	9.18	17.75	3.98	15.14	9.37
Sold to neighbors	1.46	.31	.50	.19	.69
Sold to GOE	.30	.05	3.26	2.73	1.54
Total sales	10.94	18.11	7.74	18.06	11.60

*Weights given in Table 2.2.

The farm survey estimates of maize consumption by maize producers can also be summarized on a percentage basis (Table 7.2). These results show a considerable degree of variation between the study areas, which indicates that a broad sample should be used in this type of study (see Figure 10.).

Table 7.2. Disposition of maize, percent of total use.

Item	Sharquia	Menoufia	Minya	Nuberia	Weighted Average*
On Farm Use:					
Family use	18.4	15.7	31.3	13.0	21.8
Poultry feed	7.5	7.3	8.4	3.3	7.8
Animal feed	7.7	16.6	17.2	8.2	14.1
Sales:					
To Traders	55.7	59.2	22.2	63.3	45.5
To neighbors	8.9	1.0	2.8	0.8	3.3
To GOE	1.8	0.2	18.2	11.4	7.5
Total	66.4	60.4	43.1	75.5	56.3

*Weights given in Table 2.2.

7.2 Utilization of yellow maize on maize sample farms

The survey obtained an adequate number of observations on yellow maize consumption only in Nuberia. Only 7 sample farms in Menoufia produced yellow maize. That number is considered to be insufficient to permit any useful projections. This survey was designed primarily to estimate the use of white maize, and useful estimates of the use of yellow maize in all of Egypt were not expected. In Nuberia, the producers sold 80.3 percent of the yellow maize, fed 16.9 percent to animals and 2.8 percent to poultry.

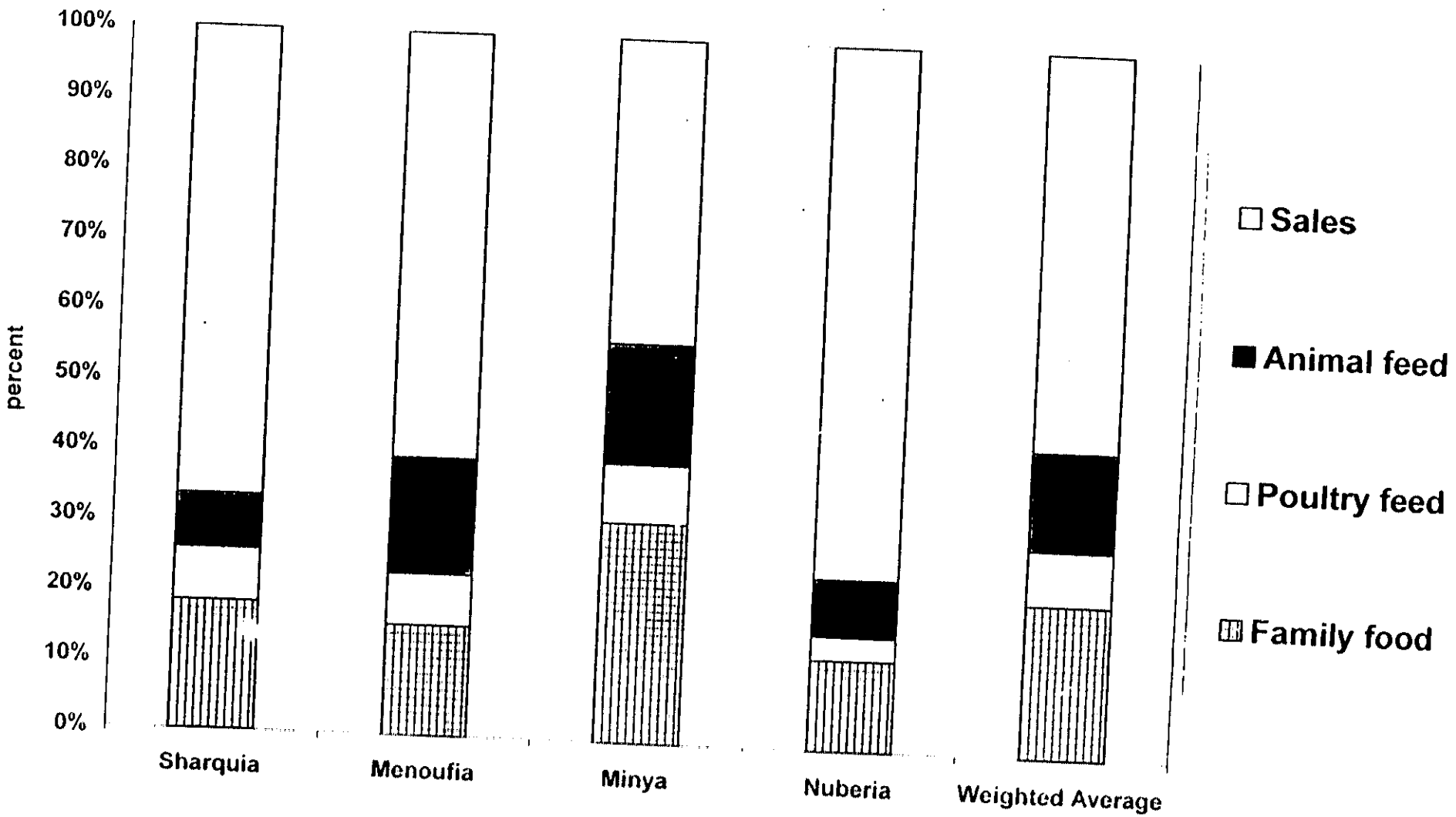
7.3 The Egyptian maize market

The volume of maize traded in the local market is much greater than we anticipated. Unfortunately, the governorates selected for study were those with very high concentrations of maize. Thus, maize producers in the governorates included in this study likely sold a bigger share of the maize produced than the average maize producer in Egypt. Also, we know that the MOTS did not purchase 7.5 percent of the maize crop, they purchased only 6 percent. However, even with some discounting of these estimates we must conclude that there is a lot more maize being sold on the local market than we expected. If the private traders purchase 40 percent of the maize crop they are buying 2.5 MMT of maize with a total gross value of LE 640/MT or LE 1.6 Billion. ***That LE 1.6 Billion represents cash income for farmers.***

We have a poor indication at present as to what happens to that maize. Small amounts are used for seed, poultry feed, industrial uses and commercial processed foods. Large amounts are used for processed animal feed and large amounts are resold to farmers who did not grow maize last year for the same uses described above. It would be useful to quantify these items.

A study of local private maize traders is needed to determine the channels of trade of this maize. It is expected that the bulk of this maize is used as processed on non-processed animal feed. There is very little known about that portion of the agricultural sector.

Figure 10. Maize Dispostion by Maize Growers



CHAPTER VIII: SOURCES OF MAIZE SEED

This study is not intended as a study of maize seed. For more information on maize seed, the reader is referred to a recent study by Fitch and Ismail (1) and references cited by that report.

While gathering data for this study of maize utilization, maize producers were asked to report their source of maize seed. Data were not obtained on either quantities or prices of maize seed. Survey farmers merely reported their source of seed and the area planted. These data were then tabulated on the basis of the area planted.

Very few farmers (only about 2%) reported more than one seed source for maize. Even in cases where farmers planted both yellow and white maize or where they planted maize for fodder (drawa) and for grain, they reported only one source of seed.

Some farmers reported the variety of the maize seed but most did not. Hence the variety data were not tabulated. Fitch and Ismail estimate that 51.5 percent of the area of maize planted in Egypt in 1998 was planted with hybrid seed (1, page 13). This they judge to be a significant achievement in comparison to other African countries, but they also point out that this allows significant room for additional improvement in yields.

A total of 16,000 MT of hybrid maize seed was prepared for the 1999 maize crop. Of this total only 1,600 MT (10 %) was produced by CASP with the balance being produced by various private sector seed companies. These seed companies use a variety of outlets to market their product (4, pp. 19-22). Data were obtained in the survey conducted for this study on farmer's maize seed sources. Hence these data really pertain to the market channel, or retailer, not the original seed producer. The 16,000 MT of hybrid seed available for 1999 is estimated to be sufficient to plant about 55 percent of the expected planted maize area.

The survey data provide no information regarding the extent of the use of hybrid varieties. Obviously, the seed obtained from their own farms or other farms is not hybrid seed (13.4 % in Table 8.1), but seed obtained from private traders or from the co-operatives may or may not be hybrid. Co-operatives and PBDAC sell hybrid seed for private seed companies but village co-operatives may be selling local seed produced by other farmers in the village. In the case of seed sources for yellow maize, only the Nuberia area had sufficient data to tabulate. In that area 67 percent of the maize was seeded with seed obtained from private traders, 18 percent from their own farms, 10 percent from seed companies and 5 percent from other sources.

Table 8.1. Farmers' sources of seed for white maize
(Percent of area planted)

Study Area	Own Farm	Other Farms	Co-op	Ext. Agent	PBDAC	Private Trader	Seed Co.
Sharquia	6.5	0.0	19.7	27.6	14.5	31.7	0.0
Menoufia	2.5	0.0	71.5	21.8	0.0	3.6	0.4
Minya	22.7	2.3	36.1	12.2	8.7	1.2	16.6
Nuberia	13.4	0.0	33.1	1.0	0.0	38.3	14.2
Egypt*	12.5	0.9	40.8	18.7	7.7	11.8	7.6

* Results for study areas weighted by weights given in Table 2.2

CHAPTER IX: CRITIQUE AND RECOMMENDATIONS

In almost every research study, and many other efforts, one learns how to do the task only after it is completed. This was no exception. If we were to do this task again we would do several things differently, namely:

1. Timing:

The field data were gathered in April-May 1999, which was approximately in the middle of the maize utilization cycle for 1998-99. We had to ask farmers what had been their use of maize since harvest up to the date of the interview and also ask for their intended use of the balance of any remaining maize stocks. This was not the best approach. Intentions are seldom realized, but the actual utilization may have varied on either side of the intentions. A better approach would be to gather data on maize utilization at the end of the utilization season.

2. Sampling plan:

A large sample was used in the survey (1,050 farmers) but our conclusion after completion of the study was that this sample was not distributed geographically in an optimal manner. As indicated by the data on cropping patterns, livestock inventories and livestock feeding, and from the estimates obtained on maize utilization, large differences exist between the four study areas. With major geographical differences as here illustrated, the sample should have been distributed more widely, covering perhaps 10 farmers in each of 100 villages, or 5 farmers each in 200 villages, located in those governorates that produced at least 90 percent maize in Egypt. The governorates selected for study exhibit higher than the average concentration of maize. Thus the farms sampled were those who have bountiful supplies of maize available for feeding or human use. We are concerned that the weights used to aggregate these data may not have been proper to arrive at the correct estimates for the country as a whole. They should be viewed with caution.

3. Non-maize producers:

Again, after completion of the study we must conclude that the sample of farmers should have been included all farmers, not just maize producers. By sampling all farmers we would then know the average cropping program and livestock inventories or all farmers, not just the maize growers. We would also have known the maize consumption patterns of those who buy all of the maize they utilize. We cannot assume that those who must purchase maize have the same consumption patterns as those who produce large quantities of maize

These changes in the study procedures may not have produced significantly different results. We have no knowledge at this time which leads us to believe that the results presented above are biased in any particular direction, but these changes would have made the estimates more dependable and would have decreased the uncertainty and concern of the authors regarding their validity.

Recommendations for future study

The results of this study indicated that far more trade of maize exists at the village level than was expected, and the bulk of this trade is with local private traders. The fact that this trade exists is not to be lamented but little is known about the activities of these local traders. Knowledge of their activities would be useful for many purposes.

Since it is expected that a major use of this maize that is traded is used for animal feed, a thorough study of the animal feeding industry would also be very informative and useful.

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ANNEX I

SURVEY QUESTIONNAIRE

Maize Producers Survey Questionnaire

Governorate		District		Village	
Supervisor		Interviewer		Farmer	
				Date	

Total Area Farmed in 1998: _____ feddans _____ kerats

Family Size: _____ adults _____ children

Season Codes:

S Summer
N Nili
W Winter

Area harvested during 1998 (crop year 1997/98)

Season	Crop	Feddans	Kerats	Production	Units

Seed Source Codes

OWN	Own farm
FARM	Other farmers
COOP	Cooperative
EXT	Extension agent
BDAC	PBDAC
SHOP	Private trader shop
COMP	Seed Company
OTH	Other source

Maize Supply: Production and Purchases

Variety of Maize	Seed Source	Feddans	Kerats	Fodder or Grain?	Production Grain (erdab)
White:					
Yellow:					

Maize Grain Purchases

	Erdabs	Price (LE/erdab)
White		
Yellow		

Maize Grain Disposal		White (erdabs)	Yellow (erdabs)
Family food consumption	FAM		
Sold to Government	GOV		
Sold to traders	TRD		
Sold to neighbors	NEIG		
Fed to poultry	POL		
Fed to			
Fed to			
Other uses			
Total Consumption			
Remaining stocks			

Sale Price of Maize (LE/erdab)	
White	Yellow

How many head of fattened cattle, buffalo or sheep did you sell in 1998?

buffalo:	
cattle:	
sheep:	

Livestock on farm		Adults	Young
Buffalo	BUF		
Cattle	COW		
Sheep	SHP		
Goats	GOT		
Chickens	CHK		
Ducks	DUK		
Donkeys	DON		
Horses	HOR		
Camels	CAM		

Interview Notes and Comments

التاريخ:	
القرية	
المزارع	

المركز	
جامع البيانات	

محافظة	
مركز	

فدان	
بالقين	

قيراط	
أطفال	

حسب المساحة المنزرعة عام ١٩٩٨:

عدد أفراد الأسرة:

أكواد المواسم
ص: صيفي
ن: نيلي
ش: شتوي

أكواد مصدر التقاوي	
١-	من المزرعة
٢-	مزارع أخرى
٣-	جمعية
٤-	الارشاد
٥-	البنك
٦-	تاجر
٧-	شركة تقاوي
٨-	أخرى

المساحة المنزرعة ١٩٩٨				
المحصول	فدان	قيراط	الانتاج	الوحدة

عرض الذرة: الانتاج والمشتريات					
صنف الذرة	مصدر التقاوي	فدان	قيراط	علف/ حبوب	انتاج الحبوب (اردب)
بيضي					
أصفر					

مشتريات الذرة		
	اردب	السعر بالجنيه/اردب
أبيض		
أصفر		

التصرف في الذرة		بيضاء (اردب)	صفراء (اردب)	سعر بيع اردب الذرة	
				بيضاء	صفراء
استهلاك عائلي	FAM				
يورد للحكومة	GOV				
حبوب	TRD				
هدايا	NEIG				
علف دواجن	POL				
فاقد					
فاقد					
أخرى					
الاستهلاك الكلي					
المخزون المتبقي					

عدد الرؤوس المسمنة والمباعة سنة ١٩٩٨	
جاموس:	
أبقار:	
أغنام:	

الانتاج الحيواني		كبير	صغير
جاموسي	BUF		
بقر	COW		
غنم	SHP		
ماعز	GOT		
دواجن	CHK		
	DUK		
حمير	DON		
خيل	HOR		
جمال	CAM		

ملاحظات جامع البيانات

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