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DIPLOME D'ETUDES SUPERIEURES SPECIALISEES PRODUCTION ANIMALES EN REGIONS CHAUDES

MEMOIRE DE STAGE

CONTRIBUTION TO THE STUDY OF FARMING SYSTEMS IN THE WEST BANK: THE CASE OF DEIR- ELHATAB VILLAGE IN THE DISTRICT OF NABLUS

par

Jihad ABDALLAH

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RESUME

Contribution à l'étude des Systèmes Agraires en Palestine: Le Cas du Village de Deir-Elhatab dans le District de Naplouse

Par
Jihad ABDALLAH

Une étude a été menée au village de Deir-Elhatab dans le district de Naplouse pour contribuer au diagnostic des systèmes agraires en Palestine. L'objectif était d'identifier les systèmes de production au village, d'évaluer leur productivité et d'identifier les contraintes majeures. Un questionnaire a été élaboré pour procéder à des enquêtes. Le questionnaire comprenait principalement des questions ouvertes. Les aspects zootechniques et socio-économiques des exploitations ont été étudiés. L'étude a révélé l'importance de la production agricole pour la consommation familiale dans les petites exploitations et comme source de revenus dans les grandes exploitations. Cinq types d'exploitations agricoles ont été identifiés à partir de 47 exploitations. Parmi les bovins, 60 % étaient des Bandouk (Baladi x Holstein) et 40 % des Holstein. La production de lait était en moyenne de 2 850 l (Bandouk) et 4 208 l (Holstein) en 9 à 11 mois. Sur les 1 350 moutons, 97 % étaient de race Awassi. Sur les 150 chèvres du village, 96 % étaient de race Bandouk et 4 % Shami. La production laitière était 57 l/an (Awassi), 137 l/an (chèvres Bandouk) et 503 l/an (Shami). Parmi les contraintes majeures on a trouvé l'augmentation rapide des coûts d'alimentation des animaux, les problèmes sanitaires, la productivité faible et l'accès limité aux pâturages naturels et aux plantations d'oliviers à cause de la présence d'une colonie israélienne à côté du village. L'amélioration des pratiques de gestion peut résoudre une partie des problèmes. Cependant, il est essentiel de faire des études approfondies au niveau des exploitations agricoles pour identifier les causes de la faible productivité.

Mots-clés : bovin Bandouk, chèvre Bandouk, contrainte, Deir-Elhatab, district de Naplouse, économie de l'élevage, enquête en milieu paysan, mouton Awassi, Palestine, sociologie rurale, systèmes agraires, typologie, zootechni.

ABSTRACT

Contribution to the Study of Farming Systems in Palestine : The Case of Deir-Elhatab Village in the District of Nablus

By
Jihad ABDALLAH

A study was made in the village of Deir-Elhatab as a contribution to the diagnosis of farming systems in Palestine. The aim of the study was to identify the main production systems in the village, evaluate their productivity and identify the major constraints. A sample of 47 farms was chosen and inquired. A questionnaire was designed to elaborate the inquiries. The questionnaire included mostly open questions and covered the socio-economic and technical aspects of the farms. The study showed the importance of the agricultural production for the family consumption in small farms and as a source of income in larger farms. Five different farm types were identified in the village. Of the dairy cattle in the village, 60 % were Bandouk (Baladi x Holstein) and 40 % were of Holstein breed. Milk production averaged 2,850 l (Bandouk) and 4,208 l (Holstein) in 9 to 11 months. Out of 1,350 sheep, 97 % were of Awassi breed. Of 150 goats in the village, 96 % were of Bandouk breed and 4 % Shami. Milk production was 57 l/year (Awassi sheep), 137 l/year (Bandouk goats) and 503 l/year for the Shami goats. High feed costs, animal health problems, low productivity and lack of access to some natural pastures and olive plantations due to the presence of an Israeli settlement were the major identified problems. Some of the problems could be solved by improving management practices. More research work is needed on the farm level to identify the causes of low productivity.

Key Words : Awassi sheep, Bandouk cow, Bandouk goat, constraint, Deir-Elhatab, diagnosis, district of Nablus, farming systems, Palestine, rural society, technical aspects.

CONTENTS

Resume	
Abstract	
Acknowledgments	
Introduction	1
Part One : Historical review and presentation of the study region	
I- A Historical review.....	3
II- Presentation of the study region.....	5
1- The West Bank.	5
1-1- Physical and climatic factors.....	5
1-2- Population.....	7
1-3- Land ownership and patterns of land tenure ...	8
2- The district of Nablus.	9
3- The village of Deir-Elhatab.	10
4-	
Part Two : Methodology	
I- The choice of the study village.....	14
II- The pre-inquiry phase	14
III- The study sample and questionnaire.....	15
IV- Analysis of the questionnaire	16
Part Three : Results and discussion	
I- Crop production systems	20
1- Fruit trees	20
1-1- Olive production	20
1-2- Other fruit trees	23
2- Annual crops.....	24
2-1- Wheat	24
2-2- Broom sorghum	26
2-3- Vetch and ervil.....	27
2-4- Barley	28
2-5- Lentil, pulses and other crops	28
II- Livestock farming systems..	29
1- Dairy cattle.....	29
2- Sheep and goats	30
2-1- Farming systems	31
2-1-1- Transhumance system ...	32

2-1-2- Sedentary range land farming system	32
2-1-3- Confined system..	33
2-2- Housing	33
2-3- Feeding management	33
2-4- Reproduction management	34
2-5- Milk and wool production	36
2-6- Health management	37
3- Poultry production	38
III- Marketing agricultural and animal products	38
IV- The family concept and distribution of work...	39
V- Farm types	39
Conclusions and recommendations	42
References..	43

Introduction :

Agriculture comprises a main sector in the economy of the Palestinian people. This is reflected by its high share in Gross Domestic Production (GDP) (more than 20 %) and labor force (about 24 % in 1990) and its contribution to export trade. It also has a significant role in the struggle of Palestinians for survival on their land and attaining food security. About 40 % of households in the West Bank practice farming as a main or secondary income so that the development of this sector would have a positive impact on a large proportion of the Palestinian society [19].

Since the Israeli occupation of the Palestinian Territories in 1967, the agricultural sector has been subjected to a destructive policy. This policy was manifested through the land confiscation, controlling of water resources and imposing restrictions on the Palestinian agricultural products. This forced a part of the rural society to move toward other productive sectors, [14]. The peace agreement signed in 1994 by the P.L.O (Palestinian Liberation Organization) and Israel put the Palestinians into a new era and gave them the opportunity to plan for the future. A priority will be given by the Palestinian Authority and the international organizations for the development of the agricultural sector. This raises the need for comprehensive information about farming and the Palestinian rural society to make priorities between development requirements. Responding to this need, the present work which was proposed by V.S.F (*Vétérinaires Sans Frontières*), comes as a contribution to the study of agrarian systems in Palestine. The aim of the study was to analyze production systems on a village level, evaluate their performance and to identify the major constraints.

**Part One : Historical Review and Presentation of the
Study Region**

I- A Historical Review

The first culture existed in Palestine (and Syria) was the Natoufian culture between 10,000 BC and 8,000 BC [10]. They practiced hunting and fishing and lived in concentrations in certain areas as the oasis like Jericho, which implied a relative stability. The harvest of *Graminae* was the first step towards cultivation. This was followed by the Pre-Pottery Neolithic A and B eras which extended up to 7,000 BC. In these eras, the first cereals were cultivated as barley of type *Hordium distichum* and wheat of type *Triticum dicoccum* in the Pre-Pottery Neolithic A and *Triticum monococum* and some legumes as lentils and fava in the Pre-Pottery Neolithic B. The Arab geographers described many crops in Palestine, especially citrus fruits which according to Al-Mas'audi, came from India via Oman and were adapted to the area in the Abbassid period. Cotton was also mentioned in literature since the fourteenth century as an example of the economical changes in the country. This crop had an interest from the European countries in the beginning of the eighteenth century, especially France which represented an importing pole of this crop until the revolution of Ahmad Algazzar where the production of cereals was encouraged over cotton whose cultivation was transferred into Egypt [10].

One of the ancient data available about agriculture in Palestine goes back to 1895 in the District of Jerusalem which comprised 81 % of the total area of Palestine in that time and 10 % of it was cultivated. Cereals, legumes, vegetables, citrus and fruit trees were cultivated in that time with a total area of 2,200,000 dunums. In 1909, there were in Jerusalem, Nablus and Akka about 17,000 families working in agriculture and owned 7,850,000 dunums with an average of 46 dunums per family, and 67 % of the families in Jerusalem and 63 % in Nablus possessed less than 50 dunums per family [3].

The ownership system goes back to the Ottoman domination period. The land was

classified into 5 categories according to the Ottoman law dictated in 1858 [17]:

1. the *wakf* lands : which makes part of the religious benefits and cannot be transferred to the name of any one.
2. The *mulk* lands : which are owned by people and its ownership is recognized as valid by the law.
3. The *miri* lands : these were owned by the Sultan following his victories. These were cultivated by the peasants with the permission of the Sultan.
4. The *matrouk* lands : These were the lands used in common by the public as pastures. These were also owned by the Sultan.
5. The *mawat* land (or dead) : These were the lands located far away from cities and villages as mountains and pastures and were not owned by people.

Another category was added to these in 1921 during the British Mandate on Palestine. This was the public lands which were under the control of the government. During the Jordanian period, no changes were made on the Ottoman law but the Jordanian law in 1953 permitted the conversion of the *miri* lands into *mulk* lands by cultivating them.

The most obvious impact on the Palestinian agricultural sector was caused by the Israeli occupation. The total cultivated area in the West Bank dropped by an average of 14 % compared to the pre-occupation (average for 1963-1966) which was largely caused by the closure of large areas of land by the Israeli Authorities for security reasons [19] and confiscation of land for the building of settlements. Another factor was the shift towards the work in the Israeli enterprises which provided more income for the Palestinian workers than cultivating the land.

Field crops and olives were the most influenced crops. By 1978, the area under field crops decreased by 33 % in the West Bank. This may also be attributed to the increased interest in higher value crops and olives. On the other hand, increased

productivity was attained through the increased use of fertilizers, the introduction of machinery in the agricultural operations and transfer of technology facilitated by the contact with the Israeli agents [20].

Livestock production had developed during the last few years before the occupation. This development continued after the occupation, especially poultry production. Despite a slight decrease in the late 1970s, the share of livestock production in the agricultural output rose sharply during the 1980s, especially after the Uprising where it reached 49 % in 1989 and 1990.

II- Presentation of the Study Region

1- The West Bank

1- 1- Physical and Climatic Factors

The West Bank has a kidney shape with a surface area of about 5650 km². It is bordered by Jordan and the Dead Sea from the east and by Israel from the north, west and south (Map 3). Most of the West Bank is covered by mountains and hills with steep slopes and highly rocky. But it has a high diversity in topography, soil structure and climatic conditions which gives the opportunity for agricultural variation and regional specialization [5, 13]. Based on topography and climatic variations, the West Bank is divided into four distinct regions (Map1), [5].

1- The Jordan Valley

The Jordan Valley extends along the western bank of the Jordan River with about 70 km long and a total area of about 400 km². The elevation ranges from 200 to 300 meters below the sea level. It has a semi-tropical climate with a hot summer and warm winter. Annual rainfall ranges from 200 mm to 100 mm from north to south.

2- The Eastern Slopes

As the name implies, they extend along the eastern part of the West Bank, from Jenin in the north to the eastern hills of Hebron in the south with a total area of 1500

km². The elevation ranges from 150 m below sea level to 800 meters above the sea level. The climate is semi-dry with a low rainfall (200 to 400 mm).

3- The Central Highlands

Constitute the largest part of the West Bank with about 3500 km². It includes the mountainous areas that extend from Jenin in the north to Hebron in the south with 120 km long. The elevation exceeds 1000 meters above the sea level in some areas. This area has a good average rainfall from 400 mm in the southern foot to about 700 mm in the mountainous areas.

4- The Semi-Costal Region

It constitutes an extension of the Mediterranean Coastal Region. This region is limited to the north western part of the West Bank and includes parts of Jenin and Tulkarm districts. The area of this region is about 400 km² with 3 to 12 km width and 60 km long. The elevation varies from 100 to 300 meters above sea level. It has a high average rainfall (about 600 mm).

Mean annual rainfall in the West Bank fluctuates from 200 to 600 mm according to the topography of the area (Map 2). Sharp fluctuations in rainfall tend to occur within the year as well as between years. Winter begins in October. The highest rainfall occurs in January and February with about 50 % of the total rainfall. About 80 % of the total rainfall occurs in four months from December to March. About 75 % of the annual rainfall is lost through evapo-transpiration. Rainfall usually stops in May.

Loamy-clay soils dominate in Nablus, Jenin and Tulkarm districts. These soils have formed by the deposition of materials eroded from the mountains of Nablus. Ferralitic soils are found in the borders and sides of valleys in Jerusalem and Ramallah, while in the Jordan Valley and the surrounding areas, the soil is loamy, thin and superficial. The land in the West Bank was classified into six classes according to its convenience for cultivation (Table 1). The data show that a large proportion of the land

in the West Bank is unsuitable for cultivation and its reclamation is not feasible. 24 % is under rain-fed farming and about 27 % need irrigation to be cultivated.

Table-1: Classification of the land in the West Bank according to its convenience for cultivation.

Class	Description	Surface Area (in dunums)	%
I	Convenient for irrigated crops without limitations	172,292	2.9
II	Convenient for irrigated crops with some limitations	439,774	7.5
III	Convenient for rain-fed farming	1,431,058	24.3
IV	Cultivation is not feasible	2,262,717	38.5
V	Not convenient for cultivation but can be grazed	591,388	10.1
VI	Can be grazed with some limitations	980,734	16.7
Total		5,877,963	100

source: [2]

1-2 Population

The total Palestinian population in the West Bank reached 1,571,575 habitants in April 1996 [15]. More than 70 % of the population in the West Bank live in rural areas. Palestinian villages and cities are concentrated in the middle western parts of the West Bank where rainfall is high and land is more fertile. About 400 villages are concentrated in the middle area of the West Bank around the districts of Ramallah and Nablus [5].

The rural population is relatively non developed. The status of water, electricity, schools, roads and markets is often poor. In 1990, there were 24 %, 16.5 %, 11 %, and 48 % of the Palestinian population in the agricultural, industrial, construction and services sectors, respectively [9]. A large proportion of the Palestinian labor force depends on working in Israel. According to the Israeli statistics, in 1991 there were about 100,000 Palestinians working in Israel of which 75 % from the West Bank [8]. This number has declined since then because of the restrictions on work in Israel imposed on the Palestinians by the Israeli authorities for what they call as security reasons. Many Palestinian workers were replaced by imported workers.

1- 3 : Land Ownership and Patterns of Land Tenure

Most of the rural population in the West Bank are small holding peasants with very few big land-holdings concentrated in the Jordan Valley. Most of the holdings are less than 50 dunums (84 % of all landholders and covers 34 % of all possessed land). Less than 1 % of holders possess 38 % of the land with holdings in excess of 100 dunums each [11]. Excessive fragmentation of large holdings into smaller holdings is characteristic of land ownership in the West Bank. This process is due mainly to land division among heirs according to the Islamic laws. Another factor which is less important in relation to cultivated land is the occasional parceling of larger holdings for purposes of land speculation [19]. This pronounced feature was highest in the 1950's and 1960's. The percentage of holdings of less than 10 dunums increased from 27 % to 50 % during 1953 -1965. This excessive fragmentation of holdings and the dispersion of plots in the same holding poses some constraints on the development of agriculture. Small holdings do not provide sufficient income for the farm family, render it difficult to use machinery in farm operations, increases production costs, reinforce the lack of interest among owners in attempting commercial farming patterns and increase the

number of persons to deal with by the extension services. Three patterns of land tenancy dominate in the West Bank :

1- Cash Rent : In this form, the tenant pays a certain amount of rent per dunum. The owner does not provide any of production inputs. This pattern is widely spread in vegetable farming in Tulkarm and Jenin districts.

2- Share Cropping : This pattern has two forms: A form in which the landlord provides a share in production inputs and rented services. In the second form, the landlord provides nothing. Share cropping is mainly conducted in the Jordan Valley.

3- A third pattern is spread in olive producing areas. In this pattern, the owner delegates the picking of the crop to tenants against one-third of the yield.

Disputes between tenants and landlords are rare. Leases are often renewed automatically. It is argued that land tenancy in the Occupied Palestinian Territories helped improve productivity in areas of intensive productivity by the fact that the land is given to professional farmers who have the expertise and the family labor force needed for competitive farming [19].

2- The District of Nablus

The district of Nablus lies in the northern part of the West Bank. It is bordered by the Jordan Valley in the east, the Tulkarm district in the west, the Jenin district in the north and Ramallah district in the south (Map 4). The city of Nablus lies at longitude 35:16' east and 32:12' latitude north. It is about 42 kms away from the Mediterranean sea and about 624 m above sea level [4]. The district of Nablus forms a part of the Central Highlands, with the eastern part of the district extending along the Eastern Slopes. The climate in the district is semi-arid mediterranean. The annual average rainfall is about 605 mm. The rainfall varies between years. The highest rainfall was 896 mm in 1978/79 and the lowest rainfall was 349 mm in 1979/80. The number of

rainy days ranges from 50 to 80 days during the season. The average of the high temperatures is 21.6°C and that of lower temperatures is 13.6°C (Weather Station of Jericho).

The population in the district of Nablus was 217,935 habitants in April 1996 [15]. Four refugee camps surround the city of Nablus and about 70 villages are scattered in the plane, hilly and mountainous areas of the district.

3- The village of Deir-Elhatab

This village lies about 6 km to the east of Nablus city (Map 5). It is located on a hill about 550 meters above the sea level, on the western face of a mountain called Aljabal-Elkebir. The highest summit of this mountain is 767 meters above the sea level. The eastern slope of the mountain descends down to the Jordan Valley. Deir-Elhatab counted 1541 habitants in April 1996 [15] and about 250 houses. Approximately 140 families have agricultural activities. The land of Deir-Elhatab extends over relatively large space; about 24,000 dunums, (the Village Committee). It covers a part of a plain south of the village and continues up the mountain and then goes down the eastern slope of the mountain to join the plane areas in the Jordan Valley. This part of the Jordan Valley is called the *Ghor*. In this area some farmers of Deir-Elhatab grow annual crops (mainly wheat) when the amount of rainfall is sufficient. A water stream passes through the *Ghor*. Some people from Deir-Elhatab own plots on the side of this stream and most of them rent their plots to farmers living in the area who grow it with vegetables.

The plain south of Deir-Elhatab is about 7000 dunums of which the people of Deir-Elhatab exploit 1400 dunums. The rest is shared by other nearby villages. Within the mountainous areas to the east of the village, there are terraces and a small plain used for growing annual crops. Most of the hilly and mountainous areas are cultivated with olives and some stone trees. The mountainous areas non suitable for cultivation

are used for grazing animals.

A natural water spring is found near the village. Water from this spring is taken through a pipe to the center of the village. This water is not used for irrigation. Few people in the village use this water for drinking the animals and washing clothes. The village is provided with electricity and drinking water. The main road from Nablus to Jerusalem passes 1 km near the village. A small street connects the village with this road and then with the other parts of the district.

In April 1996, a committee of 8 members was formed in the village. Each large family (called Hamouleh) chose a member to represent it in the committee. Choosing the member within the Hamouleh was not by elections but by obtaining the agreement of the majority in the meeting of the Hamouleh. The head of the committee was assigned by the Palestinian Authority. This committee is the legal representative of the village and takes care of all the public affairs which concerns the village as water, electricity, development projects, etc. This committee replaces the Mokhtar, the person who was assigned by the Israeli authorities as a head of the village during the occupation.

An Israeli settlement called Alon-Moreh was established in 1979 on the mountain near the village. This has deprived the villagers of about 3000 dunums of their land. Farmers are not allowed to enter their olive orchards or graze their animals near the settlement. This even became worse after the Palestinian uprising in 1987. Two roads were made in the 1980's to connect this settlement with others in the West Bank. Land confiscation, cutting olive trees and destroying agricultural crops were the most revealing effects of making these roads. Another road of 40 meters width was made in 1996. This road passes through the mountain, then through the plain east and south of the village dividing them each into two separate parts. It became more difficult for the peasants to pass to their lands on the other side of the road. For the farmers in

the village, this settlement is the major constraint which blocks the development of agriculture in their village.

Part Two: Methodology

I- The Choice of the Study Village

This study comprised one of two studies made simultaneously in the district of Nablus each in one village. For this study, the choice of the village was made such that it was considered representative of the mountainous villages located nearby plains, which is the case of an important proportion of the villages in the district of Nablus.

A pre-diagnostic phase was made on the level of the district in which many villages were visited. In each village, different people including farmers were shortly inquired. They were asked about the main features of their village : habitants, approximate number of families, land, surface of cultivated areas, main cultivated crops, machinery used, livestock production, species bred, approximate number of animals, and services available. The objective of these inquiries was to form a general idea about the villages and the main features of their agricultural production. In the final decision, the willingness of farmers to cooperate and to be involved in the study, as well as the availability of transport services for the displacement of the research team, were taken into consideration. After a discussion with representatives of the Ministry of Agriculture, the French consulate in Jerusalem, V.S.F. (*Vétérinaires Sans Frontières*) and PARC (Palestinian Agricultural Relief Committees) it was decided to make the study in the village of Deir-Elhatab in the eastern part of the district of Nablus. This village was chosen because it has some agricultural characteristics present in many other villages in the district. It is a mountainous village located nearby a plain. Agriculture in this village is traditional and farming is rain-fed. It also suffers from the presence of an Israeli settlement which is the case of most of the Palestinian villages in the district. Deir-Elhatab constitutes one of several villages in the district that need to be given attention in rural development.

II- The Pre-Inquiry Phase

A list of family heads in Deir-Elhatab was provided to the research team by the

village-committee. This list also included information about their main activities, location of their lands (in the plain, the mountain or the Ghor), type of livestock production and size of each family. The list was taken as a starting point. Those who deal with agriculture were separated into another list. About 140 families were found to have a type of agricultural production. Nearly all these families were inquired, directly by meeting the head or a member of the family, or indirectly through their neighbors and relatives. Most of the families were inquired directly. General questions were asked about : holding size, types of plant crops, type of land tenure, location of parcels, animal species bred and their numbers and the importance of agricultural production as a source of income for the family relative to other sources.

III- The Study Sample and the Questionnaire

In the pre-inquiry, it was found that about 27 % of the families had agriculture as a main activity while 73 % had it as a secondary activity. Each category was divided into sub-categories according to type of production. Random sampling within each sub-category was then made according to its proportion in the main category. A total of 50 farms was finally chosen but 47 farms were actually inquired.

A questionnaire was designed to elaborate the inquiries. It aimed at obtaining information about the technical as well as the socio-economic aspects of each farm. It included mostly opened questions. The bulk of questions covered the family, labor force, holding size, parceling, location of plots, crop types, work calendar, means of production, productivity, animals and their breeds, their numbers, feeding and management practices, their performance and productivity, milk production and transformation, consumption of farm products, marketing, income and farm history. Concerning livestock production, most of the questions were adapted from the guide of Bourbouze and Chassany, 1989 [7]. Most of the farmers were inquired more than once. The year 1995 was taken as a basis of the study.

IV- Analysis of the Questionnaire

The questionnaire was analyzed manually. For each farm, some estimations were made. These concerned working time, crop productivity, milk production, reproductive and demographic indicators for sheep and goats.

Work Time : working time in UTA (*Unite de Travail Agricole* = Agricultural Work Unit) was estimated for crop production and animal breeding on each farm. One UTA was taken as 2400 hours.

Crop Productivity : Average crop production per dunum was estimated on each farm and then for all farms. This was done according to farmers declarations. Because of the alternative bearing phenomena in olives, the average of the last four years was considered. Olive production was estimated from the quantity of oil produced. Oil content in olives was taken as 25 % as an average for the village which was agreed on by the farmers. Most of the production was given by the farmers in sac or can units. Unless specified by the farmers, the following estimations were used (averages declared by the farmers) :

A sac of wheat grains = 70 kg,

A sac of barley grains = 45 kg,

A sac of sorghum grains = 40 kg,

A sac of wheat straw = 12 kg,

A sac of barley straw = 10 kg,

A sac of vetch and lentil hay = 15 kg,

A can of olive oil = 17 kg.

Milk Production : milk production per lactation was estimated for cows, and per year for sheep and goats on each farm. This was done based on the declaration of farmers. The weighted average was then calculated for all farms. For sheep and goats,

the total amount of milk produced in the year was first estimated and then divided by the average breeding females in the herd. In mixed farms (sheep and goats) where mixed milking was practiced, an indicative ratio of milk production for sheep and goats was roughly estimated using information available from other farms. This estimated ratio was: $Q1/Q2=2.35$, where $Q1$ is the quantity of milk per year produced by a goat of Bandouk breed and $Q2$ is the quantity of milk per year produced by a sheep of Awassi breed. This ratio was used to estimate milk production for sheep and goats separately on these mixed farms. In most of the farms, the lactation period was divided into 3 stages (first, second and late stage) to make it easier for farmers to declare the amounts of milk produced. Some farmers gave their production in bottles of milk or cans of cheese from which the amount of milk was estimated taking :

Milk bottle = 7/4 liters of milk,

A can of cheese (white fresh cheese) = 20 kg of cheese,

Transformation rate of milk into cheese = 3:1.

Reproduction Indicators in Sheep and Goats: Prolificacy (T.P.), fecundity rate (T.F.), birth rate(T.M.B.), rate of multiple births(T.M.B.M.), were estimated according to the following formulae :

$T.P.$ = number of animals born (alive and dead) \div number of births.

$T.F.$ = number of animals born alive during the year \div number of breeding females in the herd.

$T.M.B.$ = number of births \div number of breeding females in the herd.

$T.M.B.M.$ = number of multiple births \div total number of births.

Demographic Indicators : for sheep and goats, the following indicators were estimated in each herd :

Exploitation Rate(E.X.) = number of animals sold + consumed + granted \div herd

average number.

Gross Growth Rate(C.B.) = final herd number-initial herd number ÷ herd average number.

Net Growth Rate(C.N.) = final herd number-initial herd number - number of animals bought ÷ herd average number.

Numerical Productivity = $E.X.+C.N.$ Where the final herd number is the total herd number at the end of the year, the initial herd number is the total herd number at the beginning of the year and the average herd number is the difference between them divided by 2.

Mortinatality = number of animals born dead ÷ total number of animals born.

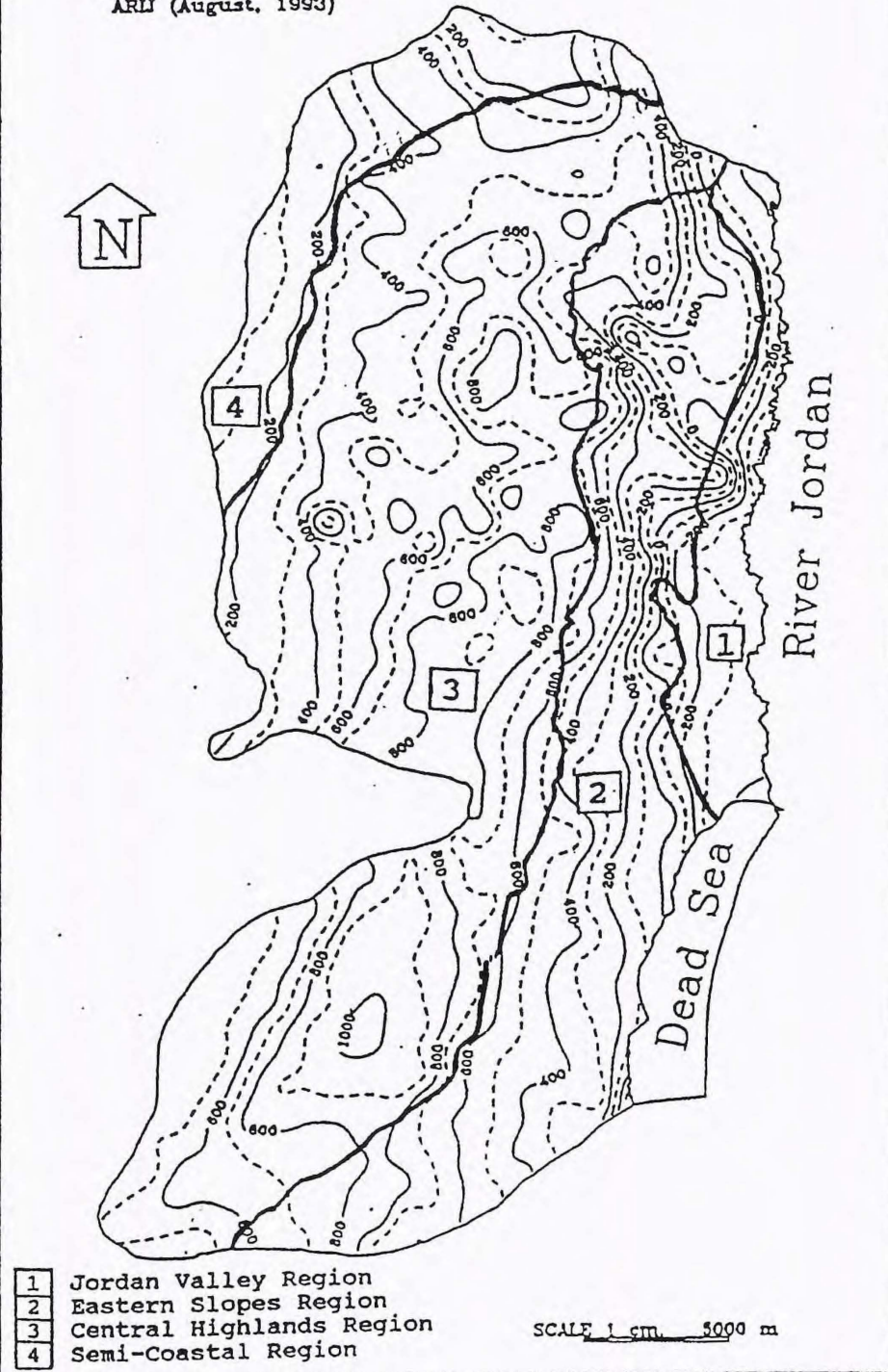
Mortality Rate(in animals <1 year) = number of animals dead <1year ÷ total number of animals < 1year.

Mortality Rate (in animals >1 year) = number of dead animals > 1year ÷ total number of animals > 1 year.

Generalized Topographic Map

The West Bank

ARLJ (August, 1993)

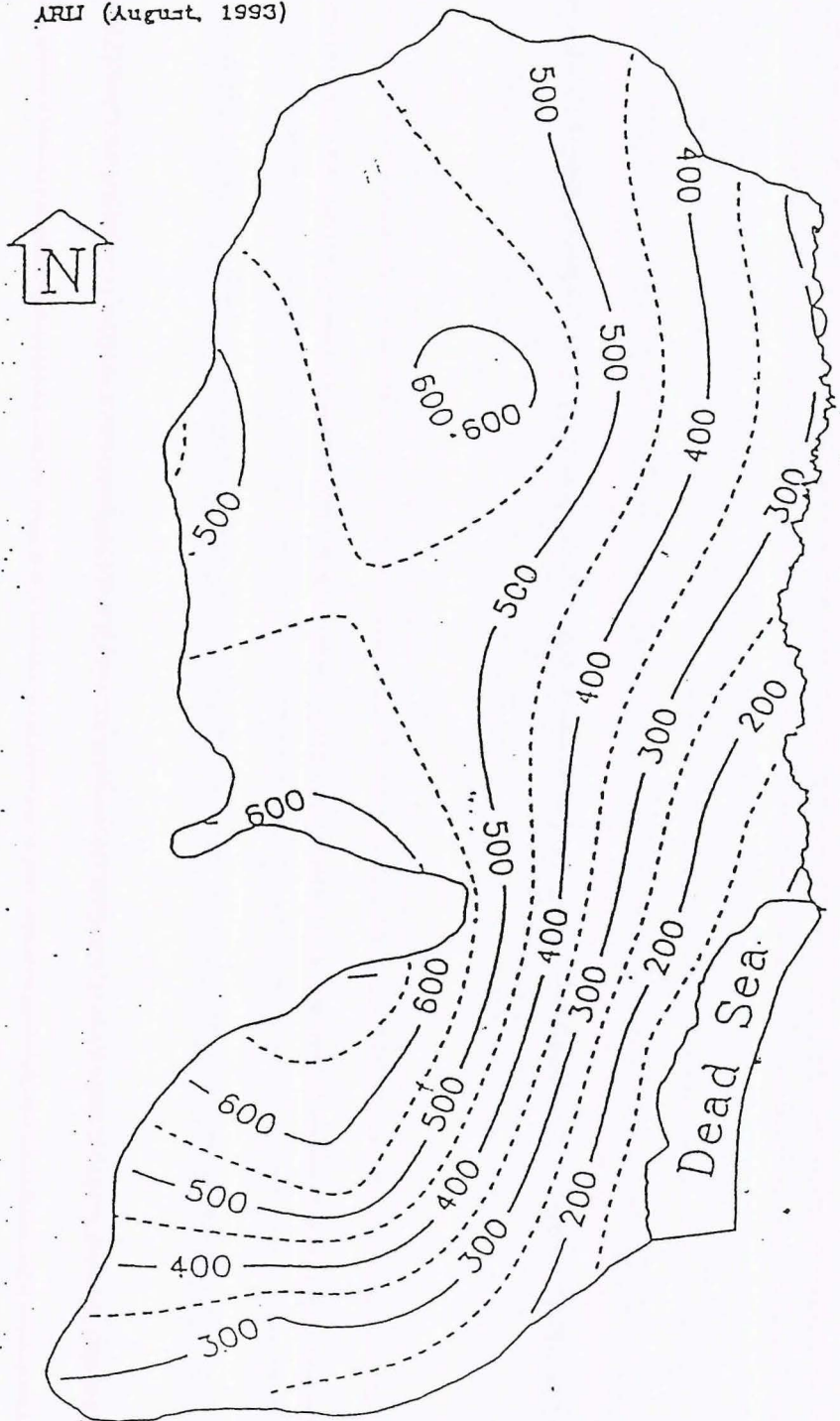


Map (1)

Mean Annual Rainfall

The West Bank

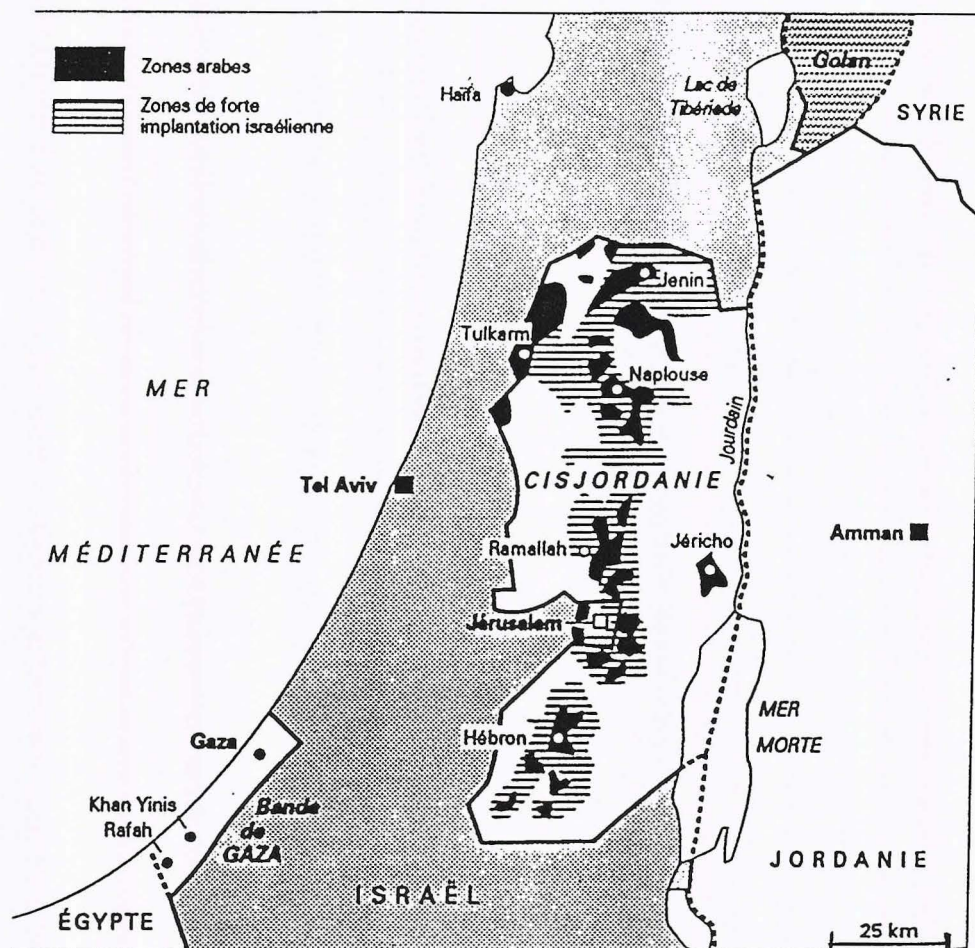
ARLI (August, 1993)



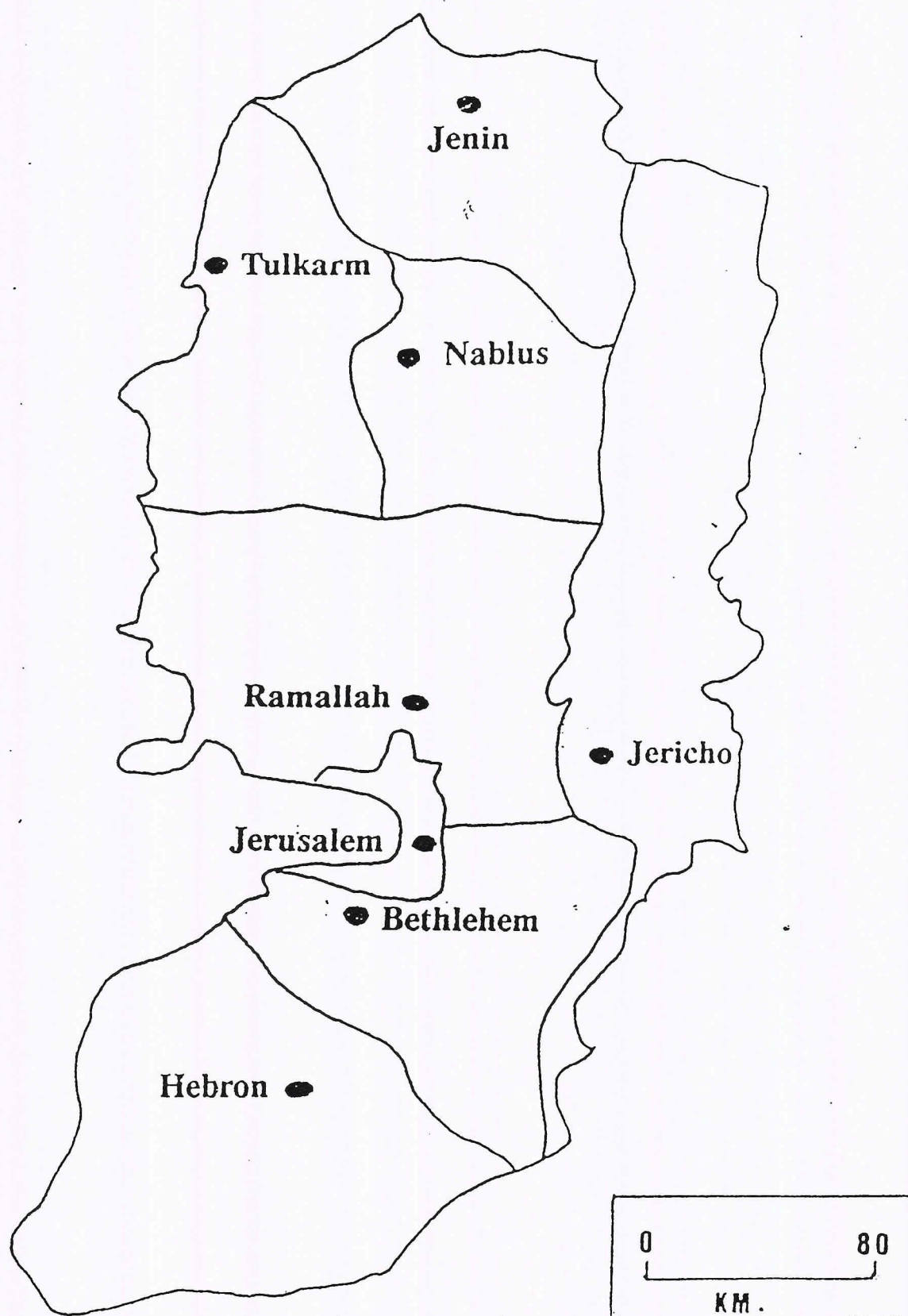
SCALE 1 cm = 5000 m

Map (2)

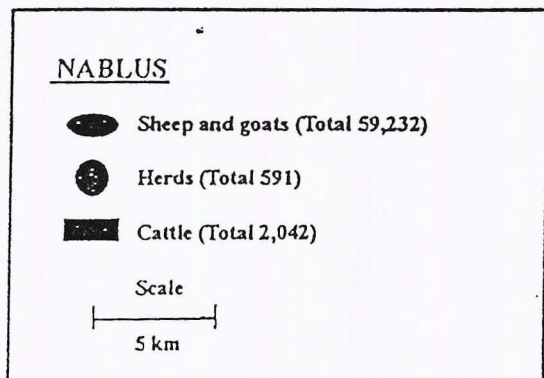
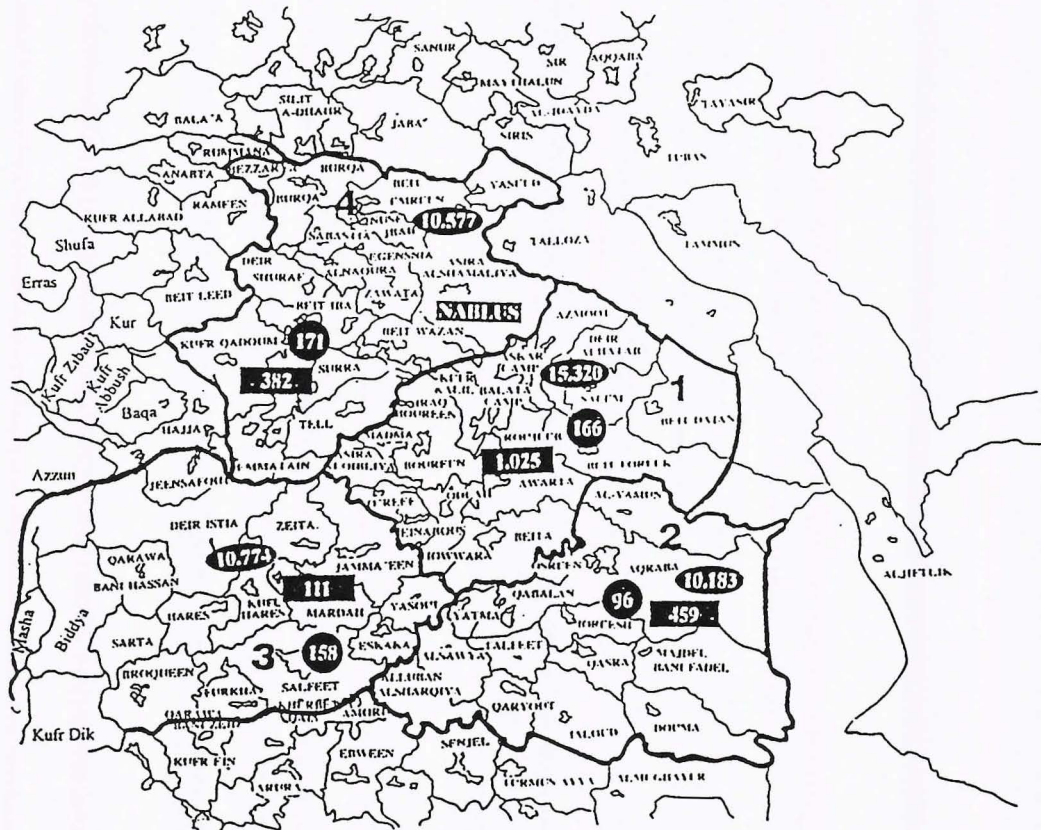
CARTE DES TERRITOIRES OCCUPES PALESTINIENS



Map3: [9]



Map 4: Districts of the West Bank . Source : [16].



Map 5: The district of Nablus. Distribution of herds and numbers of cattle and sheep and goats. Source: [16].

Part Three: Results and Discussion

I- Crop Production Systems

Crop production at Deir-Elhatab is based on rain-fed farming. The area of cultivated land and yield fluctuate according to the quantity and distribution of rainfall. The total holding size varies from 4 to 310 dunum with an average of 65 dunums, but the average cultivated area was only 39 dunums. This is not different from farms in other countries in the Near East region where the area of cultivated land is mostly less than 100 dunums and constitutes up to 25 % of the arable land [18]. Excessive fragmentation is the main feature of holdings as a result of inheritance system under the Islamic law. In the main plain, most of the holdings have a small size with an average of 10 dunums. In the Ghor, holdings are quite bigger with a mean size of 32 dunums but most of them are in share cropping. In the mountain, holdings are even larger (49 dunums on the average) but most of the land is either non suitable for cultivation or blocked by the settlers. Plots are not only small but are also scattered which increases production costs and makes the use of machinery none feasible. Olive trees occupy the first position in terms of cultivated area followed by wheat then sorghum. Barley, vetches and lentil are also cultivated but on a smaller scale.

1- Fruit Trees

1-1- Olive production (*Olea europia*)

Olives are mainly planted in the hilly and mountainous areas where the land is not suitable for cereal crops. In the last 30 years, farmers began to abandon the cultivation of cereals and replaced them by olive trees which were considered more profitable and more suitable in these hilly areas where the soil is thin, rocky and of low fertility. Olives constitute the main crop produced in the village. For the farmers at Deir-Elhatab (and in the whole West Bank) olive trees have a socio-economic and political importance. It was named in the holy Koran so it has a cultural and religious

symbol that farmers are keen of their olives and would not replace them for any other crop. During the Israeli occupation, this tree became a means to mark the land against confiscation by the Israelis.

Sori and Nabali are the main cultivated varieties. These are well adapted to the climate and soil as compared to Improved Nabali (improved variety). Olives are mainly used for oil production and a small part goes for pickling. The main by-product of olive oil extraction is olive-cake which is extensively used by the peasants as a fuel. An advantage of olives is that they do not require work all the year and thus farmers can have other activities or work off farm. Management practices are carried out by a low-cost family labor force except sometimes for plowing. Old family members, children and women participate, especially in picking.

Plowing under olive trees is done one to four times a year. This depends on the availability of family labor force and whether the farmer has another activity or not. Most farmers at Deir-Elhatab perform three plowings. The first comes at the beginning of the rainy season after the harvest is finished (usually in late December). The objective of this plowing is to improve water collection. Subsequent plowings are usually done in February, April and May. This may vary according to the distribution of rainfall over the season. The aim of these plowings is to control weeds, facilitate harvesting and improve soil aeration. Farmers usually use animals for plowing under olive trees. This is due mainly to soil topography which makes it difficult to use tractors. This also lowers production costs and make use of the available family labor force. Donkeys are mostly used for this purpose and sometimes horses. On flat plots, tractors may be used. It is frequent for farmers who do not have traction animals to borrow a donkey from neighbors or relatives. Olive-tree owners who do not have time or can not plow their orchards themselves rent others to do this or rent a tractor if the soil topography permits. It was found that two-horse owners in the village plow the

land for others. This cost the farmer 85 NIS (New Israeli Shaqel) per dunum in 1995. Organic and chemical fertilizers are used. It was noticed that those who have enough animals use manure for fertilizing their olives while those who do not have animals or have few of them use chemical fertilizers. The Gra'aon complex with 10:5:15 N:P:K ratio is used. Some farmers do not use fertilizers. It was also noticed that fertilizers are not applied each year or on all plots. They are usually used for small plantations. This may, in part, explain the variation of productivity between farms and between years. Farmers usually transport manure to their plots in summer without spreading it, then after the harvest is finished (at the beginning of the rainy season), they spread it under trees. Chemical fertilizers are applied in January or February. Picking is the principal activity in terms of time and labor force used. Beside the family members, married sons and daughters and their children, relatives and friends come to give help. This is important as it reduces production costs but is also important on the consumption level. These helpers are usually given a part of the produce (oil or/and olives) as an award for helping. It is common for olive-tree owners who don't have enough family labor force to give some plots to other families for picking against one third of the oil produced. Pruning is done after or during the harvest. Old people usually do this task. Pruning increase fruit size, improves light penetration, facilitates picking and controls the alternative bearing [5].

After the harvest, olive fruits are taken to the press for oil extraction. In addition to transport costs, a farmer pays one tenth of his oil produced to the press. Olive fruits are usually transported to the press in closed plastic sacs, where they may remain few days near the press before pressing. This reduces the quality of oil produced due to the catabolic reactions favored by the increased heat under anaerobic conditions. This problem may be overcome by putting olives in open mesh, well aerated plastic crates.

Alternative bearing is a major characteristic of olive trees. One year gives a high

yield and the next one gives a low yield. This is a physiological property of the olive tree. Farmers store a part of the oil produced in the high yield year to be consumed or sold in the next year when the yield is low. A part of the oil produced is sent to relatives living in Jordan and the Gulf countries as gifts. This is very common not only in Deir-Elhatab but also in the whole West Bank.

The average yield of olives for the last 4 years at Deir-Elhatab was estimated at about 93 kg/dunum. This estimation is rough as trees with different ages are planted on the same plots. Also some almond trees may be found among olive trees. Error in estimation may also be due to the procedure of estimation which was based on the percentage of oil content in olives. But this estimate seems to be reasonable when we compare it to the average in the district (105 kg/dunum) for the years 1989 to 1992 and that of the West Bank (3-270 kg/d) [5].

1-2- Other Fruit Trees

Almonds are also grown at Deir-Elhatab, but they are of negligible importance compared to olives. These are found scattered among olive trees or on rocky mountainous plots which are further away from the village. Farmers do not give much attention to these trees and most of them do not have access to their plots because of the Israeli settlers who prevent farmers from entering their plots. As low attention is given to them, the productivity of almonds is very low. They are frequently replaced with olive groves. Some farmers have few fig trees. Their production goes for the family consumption. As for almonds, they are also of negligible importance to farmers and low attention is given to them so they are always exposed to pathological agents. In some other villages of the district, fig trees have a very important commercial role and constitute an important source of income for many families. However, the attitude toward this tree seems to vary from one village to another.

2- Annual Crops

2-1: Wheat (*Triticum spp.*) : It is the main annual crop cultivated in the village. It is grown in three different places: in the main plain, where it is cultivated in rotation with sorghum, vetches or lentils on a yearly basis, in the *Ghor* where it is grown once out of two years on the average depending on the quantity of rainfall at the beginning of the season (December and early January). It may be cultivated in two successive years on the same plots when the quantity of rainfall is sufficient. It is also grown on terraces and in a small plain within the hilly areas to the east of the village. On terraces, it is grown in fallow rotation (wheat-fallow-wheat) and in rotation with sorghum or vetches in the small plain.

Wheat is very important as a subsistence crop. Grains go for the family consumption and straws are used in animal feeding. It is cultivated in winter as a rain-fed crop, thus the yield varies according to the quantity and distribution of rainfall. Farmers usually perform two plowings: deep plowing in summer to turn over the residues of the previous crop and control summer weeds. This also help control soil borne diseases and reduce water loss. The second plowing is done directly after sowing in December or early January when the land has enough moisture content. Hand broadcasting is used in sowing. Almost all farmers rent a tractor to plow their lands in the *Ghor* and the plain. the cost of plowing was about 13 NIS/dunum in 1995. On terraces, animal traction is used and only once (after sowing). Fertilizers are only applied in the plain. Organic fertilizers are usually used and either simultaneously with sowing or after seedling growth (mostly in February). Manual weeding is done several times in February and March. This task is usually accomplished by women and children. Few farmers use chemicals to control weeds. This is done when the plots are large or have high weed proportion.

The harvest starts earlier in the *Ghor*, usually in mid-May while in the plain and

terraces it starts in early June. This is important for the distribution of labor time over May and June especially when wheat is grown in both areas. This is done either manually or using a reaper. This depends on location, plot size and availability of family labor force. Manual harvesting is used on small plots, hilly areas and when family labor force is large enough. In the *Ghor*, farmers stay in tents with a part of the family until the harvest is finished. Threshing is carried out using a rented thresher. At least 4 persons are needed to supply the thresher with the crop and to fill grains into bags. The cost for renting a thresher was 35 NIS/hour in the *Ghor* and 30 NIS/hour in the other places. The difference in cost is due to the higher demand for threshers in the *Ghor*. Before threshing, the crop is gathered in one or more places according to plot size. This is done manually or using animals especially on terraces where the crop has to be transferred into a flat area which the thresher can reach. After threshing, grains and straws are filled into sacs and then transported to the house. The cost of transport from the *Ghor* to the village is very high compared to the other locations and seems to have a considerable impact on the feasibility of cropping in this area.

Average yield and mean work-time per dunum vary between locations (Table 2). The highest yield was in the plain while the lowest yield was on terraces. The average yield in grains was 198, 114 and 77 kg/dunum in the plain, the *Ghor* and terraces respectively. The average yield in straw was 241.5, 177 and 140 kg/dunum in the three locations respectively. This variation may be due to differences in rainfall, type of soil and use of fertilizers. The overall mean in the three locations was about 113 kg grains/dunum which is slightly different from the average in the district of Nablus (128 kg/dunum) over the years 1985 to 1992 [5].

Table-2 : Average wheat production and labor-time in three locations in the village of Deir-Elhatab.

Location	Yield (in kg/dunum)		Labor-Time (hours)
	Grain	Straw	
Plain	198	241.5	34
The <i>Ghor</i>	114	177	26
Terraces	77	140	39

The average labor-time was lowest in the *Ghor* (34, 26, and 39 hours/dunum in the plain, the *Ghor* and terraces respectively) due to the higher use of machinery as the size of plots there is larger. It is highest on terraces where most of the agricultural operations are done manually.

2-2 : Broom Sorghum

This crop comes second after wheat. It is a summer crop but cultivated as a rain-fed crop. It is mainly cultivated for commercial purposes to provide some cash for the family. Straw is sold for broom-makers while grains are used in feeding animals, especially fowls. Broom sorghum is usually grown in the plain in rotation with wheat. Two to three plowings are done by farmers. The first plowing is a deep plowing done in summer (August or September). A second deep tillage may be done in January or February. As with wheat, farmers usually hire a tractor owner to do this task. A third plowing to prepare the seed bed is done in April at the end of the rainy season but when the soil has enough moisture content. Animal traction is common in the last plowing but some farmers hire a tractor owner. All agricultural operations are then performed manually. Weeding is done frequently all along the growth period of the crop. Farmers

keep removing seedlings, especially when the density is high. Seedlings and weeds are then taken home for feeding animals. This task is usually done by women and elder people. High density and none uniformity of seedlings is a result of hand broadcasting. The harvest is done in early August. This is done manually using sickles. The crop is then taken home where leaves are removed. The crop is then dried in the sun several days before removing grains. These are removed manually with the aide of small metallic pieces. These tasks are mostly done by women. Some farmers, especially those who have animals, remove the leaves before cutting the crop. They do this over several days to provide animals with leaves. Farmers keep a part of broom straws to make their own brooms. Broom sorghum requires low inputs but high labor-time. The average work time on broom sorghum was estimated at 49 hours/dunum. The average yield in grains was about 77 kg/dunum and that of straw was about 72 kg/dunum. In the last year (1995), prices of straws decreased as the demand by broom-makers was low. This was due to the increased use of imported plastic brooms. This may decrease the area cultivated by broom sorghum in the future.

2-3 : Vetch (*Vicia sativa*) and Ervil (*V. ervilia*)

These legume forage crops are cultivated in the plain in rotation with wheat and sorghum. They might be cultivated on terraces and the Ghor in rotation with wheat or barley. This helps maintain soil fertility, increase production of cereals and provide a good quality feed for animals. Vetch is more cultivated than ervil (about 90 %). Tillage and sowing time is the same as wheat. No fertilizers are applied. Manual weeding is performed when grains are to be kept and little weeding is done when the crop is fed to animals as hay or by grazing. The crop is harvested manually in late April and is usually done by women and children. The crop is left on the plots 3 to 4 days for drying. The crop is then threshed in the same way as wheat or taken home for feeding animals as hay (without threshing). The average yield was estimated at about 66 and

134 kg/dunum in grains and straw respectively. Farmers who do not have animals or have a surplus sell their produce. Straws of vetches and ervils have higher prices than wheat or barley straws. Grains are sold at high prices at the time of sowing when the demand is high.

2-4 : Barley (*Hordium spp.*)

In Deir-Elhatab, barley is less cultivated than the previous crops but it comes after wheat in the total area cultivated with cereals in the West Bank. It is grown on terraces and in the *Ghor*, mainly by farmers who have large number of animals. Barley withstands hard conditions more than wheat and thus farmers grow it on low quality soils. It has the same agricultural operations as wheat but the harvest is earlier (in early May). Based on 36 cultivated dunums identified in the inquiry, the average yield was 140 and 121 kg/dunum in grains and straws, respectively. The average production in grains was 164 and 175 kg/dunum in the district of Nablus and the West Bank, respectively, for the years 1985 to 1992 [5].

2-5 : Lentil, Pulses and other crops

Lentil (*Lens culinaris*) is grown by few farmers on small plots. Grains are used as human food and straws go for animal feeding. It has the same calendar as vetches and ervils. On 18 dunums identified during the inquiry, the average production per dunum was 102 kg in grains and 242 kg in straw. Its productivity seems higher than for vetches. This may be because farmers choose the best plots for this crop.

Broad bean (*Vicia faba*) is also cultivated by some farmers but less frequently than lentils. It might be found on plots near houses or among small olive plantations. It is a winter crop and the grains used for the family consumption.

The same goes for the check pea (*Cicer arietinum*) but even less frequently than broad bean. It is a summer crop cultivated in April and harvested in June. It is

consumed either green (*Hamleh*) or dried and kept for cocking. Safflower and gumbo are also cultivated to satisfy the family needs. These are summer crops cultivated in April on very small plots near the houses or on the borders of plots cultivated with broom sorghum.

II- Livestock Farming Systems

Livestock production has an important social and economical role for the peasants of Deir-Elhatab. It seems that the consumption of animal products is a main aim for many families, but the commercial interest is well evident for many others. This presentation will focus on the technical and management aspects of animal breeding at Deir-Elhatab as well as the main problems which face the farmers.

1- Dairy Cattle

About 40 milking cows were counted at Deir-Elhatab and owned by some 30 families. Seventeen cow-owning farms were inquired. 40 % of cows were of Holstein breed and 60 % of cross breed (Holstein X Local breed (Baladi)) and usually called Bandouk by the farmers. These Bandouk cows contain different proportions of Holstein blood. Farm size varies from 1 to 3 cows but most farms have only one cow. Cows are housed in the ground floor of the family house or in small buildings constructed of block and zinc and usually joined to the family house. Feeds are also stocked in these buildings. Cows are fed with manufactured concentrate (18 % protein) added to wheat bran or wheat straw. The first two stuffs are purchased from the feed market. Their prices have increased more than 50 % in the last year. Feed costs for cows may exceed 80 % of total costs. In the spring, some farmers bring their cows to graze under olive trees and women cut grass and bring it home for the cows. These are important practices to reduce feed costs but also need labor force and done by few farmers. It is usually women who take care of cows, milk and feed them, remove the manure and transform milk into yogurt. This allows men to work off farm or have another activity.

Milk production varies from low to medium (Table 3). It is higher for Holstein than Bandouk cows (4208 vs. 2850 liter/lactation/cow). Lactation period varies from 9 to 11 months and cows usually give a birth each 12 to 15 months. About 60 % of farmers use artificial insemination, 23 % use natural insemination while about 17 % of them use both methods. Farmers hire a vet to do the artificial insemination who also provide the semen. For natural insemination, farmers take their cows to a nearby village and pay about 45 NIS/cow each breeding. No farmer has a bull at Deir-Elhatab.

Table-3 : Milk productivity of dairy cows at Deir-Elhatab.

Breed	Average (in liters/cow/lactation)	Range
Holstein	4 208	3 080-5 478
Bandouk	2 850	2 199-4 160

Calves are weaned at 3 to 4 months of age. Farmers still get milk before weaning the calves. They leave one or two quarters to the calf and milk the others. After weaning, male calves are fattened 2 to 3 months and then sold for meat. Female calves are either sold at 5 to 6 months or kept to be bred. Little milk goes for drinking and most of it is transformed into yogurt. The average consumption of the family in yogurt is about 2 kg and the rest is sold.

2- Sheep and Goats

In 1996, there were about 1 350 heads of sheep and 150 goats in the village owned by 42 families. Farm size varied from 1 to 130 heads (Table -4).

Table-4 : Classes of sheep and goat farms at Deir-Elhatab and the number of farms in each class.

Class	Number of farms
1-5	10
6-20	14
21-49	7
50-130	11

Twenty-eight farmers were inquired. 46 % of inquired farmers were found to have mixed holdings (sheep and goats), 36 % have goats and 18 % have sheep. The proportion of goats in mixed herds was small (less than 15 %). The interest of farmers to have mixed farms is that goats have a longer lactation period than sheep and thus prefer to keep some goats with their sheep to have a milk supply over a longer period of time, especially, when ewes are dry. Yogurt from goat milk is also more preferred for cooking purposes. Another benefit may be the more homogeneous utilization of pastures, including shrubs.

About 97 % of sheep were of Awassi breed and 3 % of a cross breed (Awassi x Assaf) usually referred to as half-tailed. Concerning goats, 4 % was of the Shami breed and about 96 % Bandouk. Actually, it was difficult to define the second breed as there was a confusion in distinguishing local Baladi goats from crosses with shami. It seemed more appropriate to refer to them as *Bandouk* as farmers do.

2-1 Farming Systems

Range land extensive farming dominates at Deir-Elhatab. Three farming systems of sheep and goats were identified in the village, these are : Transhumance system,

Range land sedentary system and confined system.

2-1-1- Transhumance System

In January or February, farmers move to the Ghor with their animals and some members of the family. Living in tents (*Ezib*), they stay 2 to 3 months to exploit the natural pastures benefiting from the warmer climate of the Jordan Valley. At night or in rainy days, animals are confined in tents or in small caves present in the area. In mid-April, when pastures become dry, they go up to the mountainous areas near the city of Nablus to exploit the pastures which are still green in this period. They stay there about one month. Water is provided by tanks bought by the farmers. In late May, farmers go back to the village to exploit crop residues in the plain and nearby areas. At night, farmers keep their herds in the plain with other herds from the village. Animals return home only in mid-day for drinking and to be milked. Milking is done only once per day in this period. This practice increases grazing time and improves soil fertility. It is also the beginning of the reproduction season and farmers can benefit from the presence of males from other herds. Farmers who have cultivated crops in the Ghor do not go back to the village. They move again to the Jordan Valley and stay there until the harvest is finished. Transhumance is practiced by farmers to overcome the high feed costs, the high stocking rate on pastures near the village and the inaccessibility to some pastures due to the presence of the Israeli settlement. Others do that because they do not have enough space in the village to keep their animals, These farmers move early to the Jordan Valley. Some of the farmers began to practice transhumance recently but others inherited that from their parents. This practice needs high labor force and thus it is done by farmers who have large families.

2-1-2- Sedentary Range Land Farming System

In this system, animals are kept on pastures during the day and go back home at night or on very rainy days. They utilize the mountainous grazing areas near the

village, on the sides of roads and sometimes near neighboring villages. After the harvest, animals utilize crop residues. Large herds (more than 50 heads) are kept in the plain at night and go back to the village for drinking and milking.

2-1-3- The Confined System

This system is found in farms who have less than 5 heads. Owners usually have another activity off farm. They keep their animals and feed them at home most of the year.

2-2- Housing

In the village, animals are housed in a traditional way. This may be a small building made of block and covered with zinc, the basement of the family house or an ancient house no more used by the family. These are usually joined or very near to the farmers houses. These usually have poor ventilation, lack proper hygienic conditions and are usually crowded with animals in large herds. This makes animals more exposed to sanitary problems, especially, the respiratory diseases. Farmers use this way of housing to minimize investment costs and to overcome the lack of space.

2-3- Feeding Management

Most farmers depend on natural pastures for feeding their animals during two to three months in the spring (February to May) and on crop residues during the harvest period. Otherwise, they use a concentrate supplement. They supplement once a day from mid-June to the end of October when animals are in the breeding season and early stage of gestation, and twice a day from November to February when pastures have low hay and females are nursing or in late gestation. The supplementary ration consists of barley added to wheat bran, wheat or vetch straws. After weaning, males are fattened two to three months on manufactured concentrate of 18 % crude protein. Weaned females are kept with the breeding flock. In some cases, female lambs are weaned by putting them with other herds. This is done to ensure that when they are put with their

mothers they will not suckle them. Farmers may sell lambs or kids at or even before weaning when prices are high or when they are in need for cash. Wheat and vetch straws are produced on the farm. Wheat bran and in most cases barley are purchased from the feed market. Their prices were nearly doubled in the period between August and December 1995. This has highly increased feeding costs (more than 70 % of total costs). At the same time, animal prices were decreased due to the high offer as farmers tried to decrease their herds to reduce feeding costs.

2-4- Reproduction Management

The breeding season begins in June, but the majority of mating occurs in July to August in sheep and in August or September in goats. Natural mating is the rule for sheep and goats in the village. Some farmers use hormonal synchronization but irregularly. It is very common in small herds (less than 5 heads) to borrow a male or to put the animals with other herds having males during the mating period. Females reach puberty at about 9 to 10 months of age. The age at first birth varies from 15 to 24 months. They are usually kept in the herd more than 5 years. The reproductive performance (Table -5) varies largely between farms. This can be observed from the wide range of values for farms. Extreme values were mostly exhibited by small herds. This variation may also be due to management practices. The variation denotes that it is possible for improvement. Reproductive performance seems to be higher in goats than in sheep. Prolificacy is moderate in sheep (117 %) due to moderate birth and multiple birth rates (104 % and 16.2 % respectively). These results are comparable and even higher than some findings in neighboring countries (Jordan, Syria, Iraq and Turkey) for the Awassi breed (<110 % and 67 to 100 % for prolificacy and fecundity rates respectively) [2].

Table -5: Some reproductive and demographic indicators for sheep and goats at Deir-Elhatab.

Indicator	Sheep		Goats	
	Average %	Range %	Average %	Range %
Prolificacy (T.P.)	117	100-167	172.5	100-300
Fecundity Rate (T.F.)	103	77-175	146	0-300
Birth Rate (T.M.B.)	104	65-167	94	50-106.7
Multiple Birth Rate (T.M.B.M.)	16.2	0-66.7	57	0-100
Mortinatalty Rate	2.7	0-7.4	10	0-100
Mortality Rate <1 year	12.4	0-40	6.2	0-64.3
Mortality Rate >1 year	7.4	0-27	0	0
Exploitation Rate (E.X.)	50.5	27.5-94.5	66.1	0-300
Gross Growth Rate (C.B.)	19.7	-6-66.7	35.4	0-100
Net Growth Rate (C.N.)	18.9	-6-66.7	34.6	-8.7-100
Numerical Productivity	67.3	33-150	100.7	0-300

Prolificacy is higher in goats (100 to 300 %) with an average of about 173%, with a high multiple birth rate (57 %). The fecundity rate (146%) seems to be lowered by the low birth rate (94 %) and the high mortinatalty (up to 100%) with an average of 10 %. This also explains the low numerical productivity (about 100 %). Numerical productivity is lower in sheep (about 67 %) which is also explained by the high

mortality rates in new born lambs and adults (12.4% and 7,4% respectively). Farmers renew their breeding stock from their herds. This is revealed by the very slight difference between gross growth rate (C.B.) and net growth rate (C.N.) of herds (19.7 % and 18.9 % respectively in sheep and 35.4 % and 34.6 % respectively in goats). This may increase inbreeding rate but reduce transmission of diseases.

2-5- Milk and Wool production

Lambs and kids born early (December-January) are weaned at the age of three months while those born in February or later are weaned at about two months of age. Little milk is harvested before weaning and this goes for the family consumption. The highest quantity of milk is taken in March and April then milk production decreases gradually. Most of the ewes are dried in July while goats are dried later, in September. Milk yield is low in sheep. It is higher for goats (Table-6). Lactation period is longer in goats than in sheep. Average milk production varies among farms and also differs among breeds. Milk yield for the Awassi sheep was estimated at about 57 liters/head/year and that of Half-Tailed sheep was about 83 liters/head/year. Average milk production for Shami and Bandouk goats was respectively 503 and 137 liter/head/year. The average for the Shami breed was obtained from only three goats found in two farms which is not an enough number to reflect the real average of the breed which might have been overestimated.

Table-6 : Average milk production of sheep and goats at Deir-Elhatab.

	Breed	Average (in liters/head/year)	Range for farms
Sheep	Awassi	57	34-106
	Half-Tailed	83	54-97
Goats	Bandouk	137	88-205
	Shami (n = 3)	503	274-617

Determining milk productivity in such traditional farms is problematic as no

records are kept by the farmers. The previous estimations were based the declaration of farmers and systematic error may have been committed. However, the estimates for the Awassi sheep are consistent with those found in Syria (27 to 85 kg/head) and Turkey (50 to 55 kg/head) for the same breed under field conditions. Estimations in experimental stations were higher (116, 164, 125, and 90 to 180 kg/head) in Iraq, Lebanon, Syria and Turkey, respectively [2]. This reflects a higher production potential of these animals and denotes that a substantial improvement could be achieved through improving the management practices on the farms.

Most of milk produced by sheep and goats is transformed into fresh white cheese and a small part transformed into yogurt. No heat treatment is applied in making cheese which reduces fuel cost but increases the risk of getting Brucellosis if consumed without boiling. It is also easier to market cheese than yogurt especially for Transhumants.

Sheep are usually sheared in May. Wool production varied from .5 to 2 kg/head. This goes mainly for making covers and mattresses used by the family and a little wool is sold.

2-6- Health Management

This inquiry showed that farmers give little attention to sanitary conditions of their animals. The poor housing conditions increase the incidence of sanitary problems. Respiratory diseases, mastitis, pregnancy toxemia, interotoxemia, diahaeria, babisiosis, external and internal parasites are common in herds. Mortinatality and mortality in new born animals were high (Table 5). In some farms, mortality reached 40 % in lambs and 64% in kids. Similar results were found in Syria (0 to 39 %) with an average of 15 % [6]. Farmers may call a vet only when they have a serious problem. Deworming is done once a year. Few farmers deworm twice. They do not vaccinate their animals unless the public veterinary services does. The public veterinary services visit the

village once a year or when there is an epidemic disease in the region. Some small-herd owners complained that the veterinary services give vaccines to large herds only and forget small herds. It seemed that the veterinary services do not organize regular visits to the village and depend on the initiative of farmers to call them when there is a problem. Some farmers also complained the high cost and the inefficiency of some medicines prescribed to them.

3- Poultry Production :

Except for one broiler farm, there is no commercial poultry production in the village. Lack of experience, poor housing conditions and diseases were behind the failure of some farmers. A type of poultry production based on keeping some hens and pigeons is widely spread in the village. Its aim is to satisfy a part of the family needs in meat and eggs but with no commercial significance. More than 65 families have such production. Hens and pigeons get their feed by scavenging in the yards and from the residues in the feeders of other animals. Farmers may also feed them with sorghum grains, thus the cost of this production is marginal.

III- Marketing Agricultural and Animal Products

Although the basic interest of farmers is to satisfy the family needs in protein and energy, there is a trend in many farms towards having agricultural income through selling farm products. This trend is mainly found in farms having livestock. Marketing of farm products is done directly to the consumer or through an intermediate. The intermediate is a person from the village who has a shop in the city. He also has a car in which he may transport the products. He takes the products from the farmers and sells them in his shop. He then gives the farmers a certain amount of the selling price and keeps the difference for himself. Two persons from the village have shops in the city and do this activity. Yogurt and cheese are mostly sold this way. Most farmers inquired complained that these intermediates give them low prices for their products compared

to selling prices in the city. Some farmers sell cheese and yogurt directly to people in the refugee camps located about 1.5 km away from the village. Families from the village who don't have animals buy their needs from their neighbors who have animals. Olive oil is sold in the press and sometimes in the village. It is very common that customers go to the press or to the villages to buy olive oil rather than purchasing it from the merchants. Sorghum straw is mostly sold in the village to broom makers who come from nearby villages to buy this product. Live animals are usually sold in the animal market (*Souk Elhalal*) located about 2 km's from the village. Farmers rent a truck to transport their animals to the market. To minimize transport costs, transhumants commercialize their cheese once each two or three days.

IV-The Family Concept and Distribution of Work

The family at Deir-Elhatab is mostly an extended family as married sons usually live with their parents in the same house. The average number of persons living on the farm was 10.7 individuals. This is very important for the work on farm and no labor force is rented from outside the family. This also decreases the need for renting machines in some agricultural operations. A high respect is given to the head of the family by the other members. Decisions on the farm are usually taken by the head of the family. Women play a major role in the work on farms, especially in crop harvest, feeding and milking animals and transformation of dairy products. This allows men to have work off farms except for those who have large herds of animals. Sowing, plowing and keeping animals on pastures are exclusive to men.

V- Farm Types

Five types of farms were identified according to production systems.

Type I : This includes farms with crop production activity. Some hens and pigeons may be raised in the yard of the house. This type comprises about 48 % of all farms. The average cultivated area is about 27 dunums and the average labor time spent on the

farm is 0.46 UTA (Table 7). Production goes mainly for the family consumption. Some cash is earned through selling straws, olive oil or wheat when there is an extra over the family needs. The agricultural activity is seasonal in which women play a major role. The main source of income for these families is the work off farm and sometimes the money sent by members of the family living abroad.

Type II : In this category, farmers keep one or two milking cows beside crop production. Some hens and pigeons may also be kept in the yard. The average cultivated area is about 35 dunums. Labor time on farm is larger for this category (1.11 UTA). In this system, the agricultural activity contributes more to the family income than in Type I. This is achieved through selling calves and yogurt from the cows, but the main income is still earned from off farm work. Women take care of cows and thus men can have another job. About 13 % of farms belong to this system.

Type III : This system includes crop production and small ruminant breeding. About 23 % of farms belong to this system. The average cultivated area and labor time spent on the farm are respectively 35 dunums and 1.32 UTA. More time is needed to keep sheep and goats on pastures. Income from the farm varies according to the herd size. Farms with herds less than 10 heads depend on off farm resources while those with large herds (> 50 heads) have the agricultural activity as a main source of income, with medium sized herds falling in between. Cash is earned through selling animals, cheese, yogurt and extra crops.

Type IV : This class contains farms with crop production, one to two milking cows and small ruminants. In this system, farmers try to diversify their agricultural activities to attain income security. About 11 % of the farms belong to this system. The average cultivated land and labor time spent on the farm are larger than in the previous systems (47 dunums and 1.90 UTA respectively). More area is cultivated for feeding animals. Herd size of sheep and/or goats varies from 2 to 20 heads. The family income from the

agricultural activity is considerable, but the family still depends on off farm resources as well.

Type V : This includes the transhumance system. It comprises 5 % of farms. It is based on sheep and goats production. Farmers move with their herds looking for good pastures, which necessitates more labor force than any other system (an average of 3.2 UTA), thus it is done by farmers who have large families. The average cultivated area is also larger (about 65 dunums) most of which in the *Ghor* and in share cropping as they do not own large lands. They frequently cultivate vetches in rotation with wheat and barley to feed their animals. Olive production is much less important than in the other types. The agricultural activity is the main source of income, mainly through the selling of animals and cheese.

Table-7 : Average cultivated area and mean labor-time spent on the farm for each farm type at Deir-Elhatab.

Type	Average cultivated area (in dunums)	Mean labor-time (in UTA)
I	27	0.46
II	35	1.11
III	35	1.32
IV	47	1.90
V	65	3.20

Conclusions and Recommendations

Agriculture at Deir-Elhatab is based on rainfall. Small farms are subsistence-oriented and most of the production goes for the family consumption. A commercial trend is found in larger farms, particularly, those having milking cows or large herds of sheep and goats. Women have an important role in the work on farms which allows men to work off farms. Agricultural operations, management practices and crop productivity are diverse between farms and could likely be improved. The traditional extensive farming is the dominating farming system in the village. Milk production and reproductive efficiency of animals vary largely between farms and there could be a substantial possible improvement through the improvement of management practices. Some of the major constraints are : the high feed costs, the poor housing conditions, the lack of health management and inaccessibility to some natural pastures and plantations due to the presence of an Israeli settlement near the village. It seems important to look for cheap feed alternatives to overcome the high feed costs. Olive-cake could be a good alternative. This by-product is relatively abundant and can be used up to 20 % to substitute barley in the ration of lambs without affecting growth rate and with lower costs [1]. Cereal-forage legumes rotation by sowing seeds of forage legumes in fallow lands in place of cereal-fallow rotation could improve cereal production and provide higher quality forage for grazing animals [12]. Meanwhile, research work should continue in the future on the farm level. Causes of neonatal mortality in kids and lambs, reasons of low reproductive performance, evaluation of pastures and their impact on livestock productivity and using feed alternatives constitute important cases to be studied in the future.

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