OBJECTIVES, PROCEDURES, AND FINDINGS OF ETHNOARCHAEOLOGICAL RESEARCH IN THE VICINITY OF HESBAN IN JORDAN

by
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Introduction

This preliminary report describes the objectives, procedures, and findings of ethnoarchaeological research carried out in Jordan between October 1, 1980 and March 10, 1981 by Øystein S. LaBianca, principal investigator, and Asta S. LaBianca, photographer. The report describes the questions which originally motivated the research, the process of thought and inquiry which led to the discovery of the importance of the concept of the "food production system" for interpreting the archaeological record at Tell Hesban and its vicinity; introduces concepts for use in studying food production systems; and shows how these concepts guided in the execution of an ethnoarchaeological survey of present-day food production in the vicinity of Hesban, how this fieldwork, in turn, made possible the formulation of a hypothesis about how food production systems change, and finally, how this hypothesis makes possible reconstruction of ancient food production regimes from the fragmentary data of the archaeological record.

Objectives

This research constitutes a continuation of the Heshbon Expedition[1] in the sense that it is concerned with finding answers to questions which have arisen in the course of synthesis and preparation for final publication of the findings which have resulted from five seasons of archaeological excavations at Tell Hesban (Biblical Heshbon, adjacent to the present-day village of Hisban) and four seasons of archaeological site reconnaissance by means of surface surveying in the region within a 10 km. radius of Tell Hesban (henceforth referred to as the "study area"). Among the questions which had arisen were the following:

One, why is it that there has been such enormous variation in the intensity of settlements in the surveyed area and at Tell Hesban throughout antiquity? For example, Ibach's[2] surface survey resulted in the following wide-ranging differences in the number of sites identified to various historical periods:

ca. 1550 - 1200 B.C.	Late Bronze	5 sites
ca. 1200 - 918 B.C.	Iron I	28 sites
ca. 918 - 332 B.C.	Iron II-Persian	59 sites
ca. 332 - 63 B.C.	Hellenistic	17 sites
ca. 63 B.C. - A.D. 193	Early Roman	54 sites
ca. A.D. 193 - 365	Late Roman	45 sites
ca. A.D. 365 - 661	Byzantine	125 sites
ca. A.D. 661 - 750	Umayyad	32 sites
ca. A.D. 750 - 1200	'Abbāsids-Crusader	0 sites
ca. A.D. 1200 - 1456	'Ayyūbid-Mamlūk	49 sites
ca. A.D. 1456 - 1870	Late Mamlūk-Ottoman	0 sites

[1] See the bibliography for Hesban references.

[2] R. Ibach, the Heshbon Region Survey, Heshbon Author's Conference, Andrews University, Berrien Springs, Michigan, March 22-27, 1981.

Tell Hesban itself has a correspondingly fluctuating settlement history judging from the descriptions of its occupational strata provided by Herr, Mitchell, Storfjell, and Devries for the Iron, Hellenistic-Roman, Byzantine-Early Arab, and 'Ayyū-bid-Mamlūk eras respectively:[3]

Strata 20-18	*ca* 1200 - 918 B.C.	Iron I	Small Village, destroyed and rebuilt
Strata 17-16	*ca.* 918-539 B.C.	Iron II	Village developing into town, destroyed
207 year gap	*ca.* 539-332 B.C.	Persian	No sedentary occupation attested
134 year gap	*ca.* 332-198 B.C.	Early Hellenistic	No sedentary occupation attested
Stratum 15	*ca.* 198-63 B.C.	Late Hellenistic	Small fortified settlement, some caves used
Stratum 14	*ca.* 63 B.C.-A.D. 130	Early Roman I	Small village, many cave dwellers
Stratum 13	*ca* A.D. 130-193	Early Roman II	Rapidly growing village
Strata 12-11	*ca.* A.D. 193-365	Late Roman	Village becoming temple town, earthquake
Strata 10-7	*ca.* A.D. 365-661	Byzantine	Major town with temples, churches, acropolis
Stratum 6	ca. A.D. 661-750	Umayyad	Town continues to grow, sudden decline
Stratum 5	*ca.* A.D. 750-969	'Abbāsids	No architectural remains, artefacts only
239 year gap	*ca.* A.D. 969-1200	Fātimid-Early Crusader	No sedentary occupation attested
Stratum 4	*ca.* A.D. 1200-1260	'Ayyūbid	Small village in beginning stages
Stratum 3	*ca.* A.D. 1260-1400	Early Mamlūk	Large-scale reconstruction using Roman-Byz ruins
Stratum 2	*ca.* A.D. 1400-1456	Late Mamlūk	Gradual abandonment of Early Mamlūk town
414 year gap	*ca.* A.D. 1456-1870	Late Mamlūk - Ottoman	No sedentary occupation attested
Stratum 1	*ca.* A.D. 1870-1980	Late Ottoman-Modern	From cave dwellers to major villages

Two, why the apparent difference from period to period in the amount of investment in public works? For example, a large reservoir was constructed on the *tell* during the Iron II period, while the Late Roman and Byzantine inhabitants constructed and maintained numerous silos, cisterns, paved streets, temples, churches,

[3] L. G. Herr, Tell Hesban, Jordan: The Iron Age, Paper presented November 15, 1979; L. A. Mitchell, Tell Hesban, Jordan: The Hellenistic and Roman Remains, Paper presented December 30, 1979; J. B. Storfjell, Tell Hesban, Jordan: The Byzantine and Early Arab Remains, Paper presented December 30, 1979; B. DeVries, Tell Hesban: Archaeological Remains in the Ayyubid-Mamluk Period, Paper presented November 7, 1979.

and other impressive public works. They also paved roads throughout the surrounding region. During the Early Mamlūk period and also in the present-day village, many of these Roman-Byzantine cisterns and reservoirs were reused. Compared with these periods, the Iron I, Persian, Hellenistic, 'Abbāsids, Fātimid, Seljuq-Zengid, Early Crusader, Ottoman and Early Modern settlers in this region invested relatively little in the construction of public works.

Three, why the apparent difference from period to period in the kinds of quantities of animals exploited by the inhabitants of Tell Hesban? For example, while sheep and goats, cattle, swine, horse, donkey, and camel were attested in most strata, cattle was relatively much more important during the Iron periods, while during the Roman and Byzantine periods swine, chicken, horse and donkey were more important than cattle, sheep and goats. In contrast, during the Mamlūk period, chicken, camel and wild game play a prominent role in the economy of Tell Hesban. In the earlier Iron periods, however, the chicken is absent and camel and wild game are relatively unimportant.[4] Today poultry, followed by sheep, goats, cattle, horses and mules are the dominant species.

These were the types of questions which motivated the present research which had as its main objective *to ascertain what the underlying organizing principles are that might account for the manifest variation and covariation through time in settlement intensity, investment in public works, and kinds of animals exploited at Tell Hesban and in the surrounding region during the various periods* Why, for example, do we find an association between the intensity of settlement in the region surrounding Tell Hesban, intensity of investment in public works on the *tell* itself, and intensity of exploitation of certain species of animals? How are these and other covariances to be explained?

The research task which these questions pointed to was that of constructing and refining a model positing assumptions and hypotheses about the interrelationship between settlement patterns, public works, landuse and diet. I arrived in Jordan with this realization and a very rudimentary model in mind[5] My research, therefore, aimed at refining the conceptualization of the components of this model and to seek to understand and document the interrelationship of these components by means of analysis of pertinent literature, interviews with persons with various pertinent expertise, and ethnoarchaeological study of Tell Hesban and, more importantly, the region surveyed previously by the Heshbon Expedition surface survey team.

Procedures

After obtaining the necessary permits and accommodations for myself and my family to live and work in Jordan, I began to work on refining the components of the model and studying their interrelationship. This task was simplified by a strategy decided upon before coming to Jordan, thanks to the advice of Dr. Hunt; namely to focus attention upon the interrelationship between two of the components: that between landuse and diet. The question I sought to answer was what is the effect of landuse upon diet? Since this presumably was a question of practical concern to a developing nation like Jordan, I anticipated, correctly it turned out, that somewhere, some pertinent research had already been done and that it was my task to "dig it out" from the literally hundreds of specialist reports and published articles about the Middle East in general and

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[4] A. Von den Driesch, Mammal Remains from the Tell Hesban Excavations, Heshbon Author's Conference, Andrews University, Berrien Springs, Michigan, March 22-27, 1981.

[5] See the Bibliography for LaBianca, 1979, and for Geraty and LaBianca.

Jordan in particular.[6]

The result of this search and interviews was that not only did I find the studies documenting the inter-relationships of landuse and diet;[7] but, also that both landuse and diet were variables dependent upon a third variable, the food production system, i.e., the "purposive, institutionalized, and interconnected activities" carried out by a society in its quest for food.[8] Furthermore, I began to realize that settlement patterns and investment in public works can be treated as variables dependent upon the food production system. This lead me to ask and search for an answer to two other questions: if the food production system is the organizing principle which underlies settlement pattern, investment in public works, landuse and diet, what are the factors which determine the character of such systems in various places throughout the world? What are the factors which shape food production systems in semi-arid countries like Jordan?

Again, these questions were not new, and indeed I found many pertinent articles and books, but found myself most influenced by: Arnon 1972; Boesrup 1965; Clawson et. al. 1971; Cox and Atkins 1979; Duckham and Masefield 1971; Grigg 1974; and Kates, Johnson and Haring 1977. This literature introduced me to such concepts "agroecosystems", "farming food chains," "locating factors," and "dry land livelihood systems," all of which are pertinent to answering the two questions I was asking. Indeed, thanks to this and other literature I began to understand the interdependencies which exist between the various components of my emerging model, and to understand the complex synergistic processes whereby food production systems change over time.

It remained, however, to operationalize the model so that not only by means of environmental and ethnographic data, but also by means of the fragmentary data of the archaeological and zooarchaeological record, the model could serve as an *investigatory device* whereby long term changes in food production systems could be studied. To this end, six parametres of food production systems were identified, each of which could be measured independently of the others archaeologically as well as ethnographically, and each of which afforded a different clue to the character of the food production system. The six parametres and their particular data requirements follow:

Climate:-

Measured in terms of mean daily

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[6] The search for the pertinent studies took me to the following libraries in Amman, the University of Jordan Library; the "Jordan Room" of the University of Jordan Library; the United Nations Documents Depository at the University of Jordan library; the reading room in the Department of Agriculture Building at the University of Jordan; the library at the Department of Research and Extension of the Ministry of Agriculture; the Royal Scientific Society Library; the Natural Resources Authority Library and the British Council Library.

Experts whom I asked for guidance and favours along the way included Dr. S. Tukan, Nutritionist, University of Jordan; Dr. Ahmed Faqih, Chairman, Department of Nutrition, University of Jordan; Dr. Walid Abu Gharbieh, wheat expert, Department of Agriculture, University of Jordan; Abdullah al Masri, UNDP World Food Programme field expert; Ralph Monte, Director, CARE-Jordan; Adel-Raouf Nabulsi, wheat expert, Ministry of Agriculture; Fouad Koshier, USAID agricultural officer; Jack Thomas, USAID population officer; Charles R. Jenkins, USAID agricultural officer; Dr. Usama Bilbeisi, Director, Department of Research and Extension, Ministry of Agriculture; Hussam Ghishan, field expert, Kerak extension Office, Ministry of Agriculture; Dr. Joseph Nazarella, Physician, Madaba Hospital, Tarique Nicola Bajjalli, Madaba farmer; Shogi Keradchi, Director, Agricultural Extension Office, Ministry of Agriculture, Madaba: Farouk Shleeff, Administrative Director, CARE-Jordan. These names are presented in the approximate order in which they appear in my journal.

[7] L. Evora, Survey of Beliefs and Practices Affecting Food Habits in Jordan: A preliminary Report, Amman, CARE-Jordan, March, 1979.: E. M. H. Lloyd, *Food and Inflation in the Middle East: 1940-45,* Stanford, 1956.; J. M. May, *The Ecology of Malnutrition in the Far and Near East,* New York, 1961,; P. F. M. McLouglin, *African Food Production Systems: Cases and Theory,* Baltimore, 1970.; S. M. Yacoub, Sociological Evaluation of a Pilot Project for Bedouin Settlement: A Case Study, Faculty of Agricultural Sciences, American University of Beirut, Publication No. 40, 1969.

[8] R. Dyson-Hudson and N. Dyson-Hudson, the food production system of a semi-nomadic society: the Karimojong, Uganda, in *African Food Production systems,* Baltimore, 1970, p. 93.

temperatures and the distribution and amount of ground and surface water available over one year. Archaeologically, macro- and micro- climatic changes can be inferred from ancient plant and animal remains, and from present-day conditions. Ethnographically, climatic data can be obtained from meterological records available from government agencies and from interviews with local residents.

Topography:-

Measured in terms of amount of elevational change, soil and vegetation characteristics within 1 km. of settlement. Archaeologically, topography can be inferred from stratigraphic excavations, ancient plant and animal remains, and present-day conditions. Ethnographically, topographic data can be obtained from cartigraphic and natural resource assessments available from government agencies and from stereoscopic aerial photographs analyzed in conjunction with field observations.

Settlement:-

Measured in terms of population numbers and the distribution and character of dwellings and public buildings within a settlement and the distribution and character of settlements within a region. Archaeologically, settlement can be inferred from the distribution and character of architectural and artefactual debris found within settlements and regions. Ethnographically, settlement data can be obtained from cartigraphic, population and economic assessments available from government agencies and from field surveying carried out with or without the aid of aerial photographs.

Operational facilities:-

Measured in terms of the distribution and character of water collection, storage, and distribution works, terracing practices, draft power sources, fencing works, animal shelters, food processing facilities, food storage facilities, and food distribution facilities within a settlement and within a region. Archaeologically, operational facilities can be inferred from the distribution and character of architectural, artefactual, plant and animal remains uncovered by excavations or discovered by means of surface surveying. Ethnographically, data about operational facilities can be obtained from records maintained by various government in charge of development of agricutlure, commerce, public health, communication, etc. Field surveys with or without the aid of aerial photographs can also provide pertinent data.

Landuse:-

Measured in terms of the distribution and types of crops and stock produced on lands within and surrounding settlements and within regions. Archaeologically, landuse can be reconstructed from analysis of plant and animal remains and from present landuse. Ethnographically, data about landuse can be obtained from records maintained by various government agencies concerned with agricultural production. It can also be obtained by means of landuse surveys carried out with or without the aid of aerial photographs.

Diet:-

Measured in terms of the proportion of various plant and animal foodstuffs consumed by individual households within settlements and within regions. Archaeologically diet can be reconstructed from plant and animal remains. Ethnographically data about diet can be obtained from government survey data concerned with public health and nutrition, from local hospital and physician's experience, from household diet surveys and from analysis of household refuse.

Since the archaeological data I needed to reconstruct the food production regime had been gathered during previous seasons by the Heshbon Expedition, it remained for me to complete the ethnographic survey of the village of Hesban and, in particular, the region within a 10 km. radius of the village — the area previously studied by Ibach.

In January 25, 1981, we moved to Madaba, Jordan. The pertinent data was collected primarily by means of walking tours around Hesban, Madaba and Jalul, interviews with several residents in each of these places, automobile-assisted tours across most of the landscape accessible by auto and through 31 of the 36 villages in the study area, and recording of agricultural data collected by the local agricultural

extension office. Collection of data was aided by the use of an instrument similar to the one shown in Appendix 2, the use of a tape-recorder for recording observations and interviews, black and white and color photography, regional maps, and the assistance of several local experts. In addition to these means I also kept a daily journal into which my observations and reflections by the end of each day was recorded.

In all, 31 villages were visited. These include El Wakhyan, Al Loba, El Mukkhyat, Ain Musa, Kufeir Abu Sarbut, Kufeir Abu Khanan, Jureina, Gharnata, El Aresh, Mushaggar, Hesban, El Manshiya, El Al, Es Samik, El Mansura, El Rawda, Um el Kutein, Naur, El Amriyah, El Adissyah, Abu Nugleh, Um el Asakar, Um el Basatin, Um el Gabbya, Um el Amad, Um el Zeituna, Um el Rumana, Manja, Hanina, Jalul, and Madaba.[9]

Findings

In the previous section I described the procedure followed in order to develop a general model or investigatory device for discovering the organizing principles that account for the apparent systematic relationships which seem to exist between settlement intensity, investment in public works, and the kinds of animals exploited at Tell Hesban. In this section I reconstruct, by means of data gathered using this device, the development of the present day food production regime on the fields of Hesban. Thereafter the systematic relationships embedded in this analysis of the present are made explicit in the form of a hypothesis. How this hypothesis can be used as the basis for reconstructing the food production regimes of ancient Hesban is discussed last:

The Present Day Food Production Regime:-

Geographically, Hesban is located approximately 20 km. south-west of Amman near the western edge of the highland edging the Jordan Valley. Approximately 8 km. to its north lies the town of Naur, and 10 km. to its south lies Madaba, the headquarters of the surrounding district.

Standing on the summit of Tell Hesban, which lies some 880 m. above sea level, one has a panoramic view of the surrounding region. To the north lie the "northern heights," some of which appear as gently rolling hills, others appearing as steep escarpments. To the west lie the "western slopes" which lead gently at first, then steeply down into the Jordan Valley. To the south and east lie the "southern" and "eastern" plains which disappear in the horizon to the south and in the desert to the east. Looking north and west, one notices small patches of cultivated land in the valleys and on the gentle slopes, and in the distance scrub and forest clinging to the bedrock which crops up everywhere in these northern hills and western escarpments. Looking toward the plains to the south and east one sees large expanses of cultivated fields interrupted only by occasional villages and the road.

In January, the mean daily temperature ranges between 10-14° C in the western slopes, but remains at 8° C in the northern hills and in the plains. In June, the mean daily temperature ranges between 26-30° C in the western slopes, while it ranges between 24-26° C in the northern hills and on the plains. Rainfall is most abundant in the northern hills where the annual amount ranges between 400-500 mm. rainfall annually, with the southern plains receiving consistently above 300 mm. The annual rainfall at Hesban is about 400 mm[10]. Most of this rainfall occurs between November and March. While the northern and western parts drain into the Jordan Valley Basin, the southern and

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[9] At various times I was accompanied by the following individuals on my tours to these villages: Issa Ghishan, Husam Ghishan, Asta LaBianca, Diab Abu Assef, James Flannagen, and Erik LaBianca. In various ways, all of these individuals helped me make the pertinent observations and obtain information from local residents. I am particularly indepted to Husam for teaching me about horticulture on these tours.

[10] K. Ferguson and T. Hudson, The Climate of Hesban, Jordan, Heshbon Author's Conference, Andrews University, Berrien Springs, Michigan, April 22-27, 1981.

eastern plains drain into the the dead sea Basin. The principle *awdiyah* (wadis) in the region are Wadi Hesban and Wadi Kufrein and their tributaries. These *awdiyah* (wadis) flow primarily during the rainy season, while about thirteen springs, especially in the northern and western parts, flow for longer periods, though not every year in all instances. The most active springs are 'Ain Hesban and 'Ain Musa. Otherwise, groundwater lies several hundred metres below the surface and has to this day not been tapped by means of well shafts.

Over the past 100 years, food production on this landscape has evolved from predominantly production of camels, sheep and goats by nomadic and semi-nomadic subsistence pastoralists to today's production primarily of wheat, olives, grapes, chicken, cattle, sheep and goats by sedentary market-oriented farmers. This transformation has been accompanied by interrelated changes in settlement pattern, operational facilities, land use and diet, as well as by a change in the general appearance of the landscape.

In the previous century, two great tribal confederations vied for control of the pastures of this landscape. One of these was the semi-nomadic sheep and goat breeders of the Adwan confederacy who in the summer would graze their sheep and goats in the hills and plans of this landscape, but who would descend to the lower slopes, valleys and plains of the Jordan Valley during the cold months. There they generally had permanent homes with agricultural lands. The other was the nomadic camel and horse breeders of the Beni Sakhr confederacy who, beginning in the previous century, maintained agricultural lands on the eastern plains of this landscape during the summer months, but who would penetrate with their animals to the lower lying desert areas to the east during the cold winter months. Attached to the Beni Sakhr were a small number of Palestinian "fellahin" who produced grain on a share-cropping basis for the tribesmen on their lands in exchange for protection against the Adwan tribesmen.

During most of the Ottoman period, this landscape was used exclusively for pasture by nomadic tribes.[11] It was not until the later part of the nineteenth century that year round settlement by market-oriented cereal producing mixed farmers began. These early cultivators included members of the Adwan confederacy and other tribes such as the Azizat, Keradchi, and Ma'ayeh who had come up from Kerak around 1880. At first these early semi-sedentary farmers, whose numbers were less than 1000, camped year around in tents pitched near caves which they and their animals retreated into during the coldest months of the winter. As their numbers increased they began to re-inhabit ancient tell sites like Hesban, Madaba, Jalul and Um Rommana where they began to reuse the intact Roman cisterns and the available building materials. These early dwellings are readily recognizable as one tours the villages in this region. Most of them constructed from stones removed from nearby Roman-Byzantine ruins and cemented using mud. Furthermore, these buildings have walls with minimal or no windows and their roofs — made of tree-logs, mud, and straw — rest upon one, two, or three imposing Roman arches which result in each house being open in the centre and divided into four, six, or eight stalls along two opposite walls (Pl. LV: 1, 2)

This architecture makes good sense in light of the feuding and raiding within and between the Adwan and the Beni Sakhr which prevailed in this region during pre-monarchy days, because not only were these buildings fortresses protecting their human occupants from attackers, they served also as protective shelters for animals, lest they be stolen, and as grain storage facilities — grain being stored in granaries constructed in one or more of the stalls between the Roman arches. Thus, these fortified farm houses served as homes and

[11] W. Hutteroth, The pattern of settlement in Palestine in the sixteenth century, in *studies on Palestine during the Ottoman period,* Jerusalem, 1975.

as operational facilities in an era when sedentary food production was at the mercy of nomadic predation.

Not only the architecture, but also the distribution of dwellings within villages and the distribution of the villages themselves within the region can be understood with reference to the organizing influence of the prevailing, largely animal-based food production system. Thus, on the village level, these early fortified farm houses tended to be located in a clump often right next to each other thus "saving a wall." Indeed, at Hesban one finds evidence of a group dwellings built in a U with a wall enclosing the exposed courtyard to the north. By clumping their dwellings together in this manner, these early villagers ensured the protection of their families and belongings through joining forces in defending themselves against attackers.

On the regional level it is significant to note that settlements tended to be located especially on the plains to the south and east, but also in the gently rolling hills to the north. This follows from their emphasis on grain production, primarily wheat, barley, and millet, which is easiest produced in these less hilly and flat regions. The western slopes and the hillier regions in the north were only seasonally inhabited by tent-dwelling pastoralists of the Adwan confederacy herding their animals. Tree-crops like olives and grapes, and vegetables were generally not produced in this region during these early days of sedentary agriculture for fear of the trees being felled during raids, and the lack of horticultural and viticultural knowledge. The diet of the inhabitants, therefore, consisted primarily of cereals, fermented milk in the form of yoghurt and leban, milk fat in the form of butter and ghee, and the meat of sheep, goats, and camels. Since there were no paved roads, the fruits and vegetables that seasonally became available were hauled by camels and donkeys, the chief means of transportation until the mid-twentieth century in this region.

Intensification of food production in the present century was, as suggested earlier, accompanied by changes in settlement pattern, operational facilities, land use, and diet. To begin with, the number of villages and towns increased from less than twelve in the region at the turn of the century, to twenty-four in 1955, and approximately thirty-six in 1980. This increase is reflected in the changes in population as well: from only a few thousand persons at the turn of the century to about 13,000 persons in 1955 and about 40,000 persons in 1980. These figures suggest a growth in the size of the villages as well: indeed, aside from the disproportionate growth of towns like Madaba and Na'ur, especially the villages in the northern hills and on the western slopes have grown, while those on the eastern plains have actually peaked and are experiencing a declining population. Except for in the case of Na'ur, madaba, Hanina, and El Manshiya, where growth is also related to the emergence of government services, centralization of markets, industry (Hanina) and mining (El Manshiya), population dynamics in all of the other villages are linked to food production changes.

For example, the noticeable growth in the size of villages in the hilly regions, and the establishment of many new villages, has occurred simultaneously with the recent shift to market-oriented tree and vegetable production which had its beginnings with the arrival of large numbers of Palestinian refugees who brought with them experience in vegetable and tree crop production *and* the rapidly growing demand for these products in the urban areas. By this time, the fear of nomadic predation had also fairly ceased to exist as a practical obstacle to these enterprises, thanks to Glubb Pasha and the Arab Legion he organized to pacify the countryside. Thus, today the windows in the newer cement homes are much larger and there is greater distance between dwellings. Interestingly, however, among many long time residents of the region, the fear of nomadic predation still exists as a mental obstacle.

Facilitating this shift to intensified market-oriented production, not only of grains, fruits and vegetables, but also of chicken and eggs (produced on large commercial chicken farms), beef, and sheep

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Appendix 2

VILLAGE FOOD SYSTEM SURVEY OBSERVATION GUIDE

DATE_____

VILLAGE NAME_____ ROAD SIGN SPELLING _____

KM FROM MAIN ROAD_____ PANORAMIC APPEARANCE _____

CONDITION OF ACCESS ROAD_____ LOCATION ON MAP VERIFIED _____

A. Topography of Village Hinterland

1. Slope—no slope, less than 20% slope, 20-40% slope, more than 60% slope
2. Ease of Cultivation — easy, medium, hard
3. Soil Depth — in metres of cultivatable soil
4. Soil Texture — heavy clay loam, calcium soil, light clay loam
5. Biochemical Status — high pH, normal pH, acid
6. Soil Stability — good, fair, poor
7. Vegetation — Batha, garigue, woodland, forest

B. Landuse on Village Hinterland

1. Tree Crops—Olives, grapes, almonds, pears, apricots
2. Vegetable Crops—tomatoes, cucumbers, lentils, cauliflower, eggplant
3. Cash Crops—tobacco
4. Grain Crops—wheat, barley, millet, sorghum, maize
5. Pasture Animals — Sheep, goats, local cattle, foreign cattle
6. Barnyard Animals—chicken, geese, turkeys, doves, rabbits, pigs

C. Operational Facilities

1. Waterworks — reservoir, cistersn, aquducts, water tanks, water-line hook-up, pumping stations, roof-collection facilities.
2. Terracing Works — terraced wadis, terraced slopes, diversion dams, detension dams
3. Draft Power — Camels, oxen, horses, mules, donkeys, tractors
4. Processing Works — olive presses, grape presses, mills, trasing grounds, combines

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ca. A.D. 661-750	Umayyad	High
ca. A.D. 750-969	Abbasids	Medium-Low
ca. A.D. 969-1200	Fatimid - Crusader	Low
ca. A.D. 1200-1260	Ayyubid	Low-Medium
ca. A.D. 1260-1456	Mamluk	Medium-High
ca. A.D. 1456-1870	Late Mamluk - Ottoman	Low
ca. A.D. 1870-1950	Early Modern	Medium
ca. A.D. 1950-1980	Modern	High

This proposed reconstruction of the ancient and modern food production regimes of Hesban and vicinity reveal that through time, there has been oscillations back and forth between low, medium and high intensity food production regimes since the Late Bronze period. It also suggests that these oscillations have generally been long-term, occuring over periods of time lasting from a few decades to hundreds of years. No doubt, the process was much more gradual than this representation indicates in the case of most alterations. Obviously much more study is needed to understand the particular causes and processes which lie behind each alteration. In this study the groundwork has been laid for such future research in that by means of the procedures discussed here, the necessary information about the type of food production regime which existed at various times in the first place, can now better be reconstructed.

Conclusions

This report has presented concepts and procedures for systematically reconstructing food production regimes on the basis of various types of archaeological data. These concepts and procedures have enabled us to begin to offer answers to the questions asked at the outset of this research, including why we find an association between intensity of settlement in the region surrounding Tell Hesban, intensity of investment in operational facilities and public works, and intensity of exploitation of certain species of animals. Central to these procedures has been the development of an investigatory device for use in constructing local food production alteration hypotheses. These hypotheses, in turn, promise to make the task of simulating the structure of food production regimes and alteration of such regimes more fruitful.

Of general interest also may be the implications of this research for our understanding of the history of Transjordan. There has been a tendency among scholars, begining perhaps with Rostovtzeff[12] to argue that "the growth of Transjordanian towns is to be accounted for by trade alone." This hypotheses has tended to minimize the importance of food production in accounting for the character of settlement in Transjordan. Indeed, in some scholarly circles and publications, including a recently published guide to the antiquities of Jordan, it is stated that during certain periods, when there were no "towns" in Transjordan, the region was "lifeless".

As is clear even from this preliminary report, this is a misguided understanding of the history of Transjordan. It is misconception which follows from a focus on "trade alone" in accounting for the growth of towns in this region. The fact is, however, that the growth of towns in Transjordan cannot be understood apart from a focus on local food production as well. Trade and local food production must *both* be reckoned with in any attempt to account for the pattern of settlement on the Transjordanian landscape. Indeed, it is only as patterns of food production are reckoned with that the misconception that there were periods of "lifelessness" in Transjordan is disspelled.

[12] M. Rostovtzeff, *Caravan Cities,* Oxford, 1932, p. 62-64.

slopes.

Third, the surface survey site descriptions will be examined to ascertain the use and to plot the location and date of the remains of any operational facilities throughout the region — mills, wine presses, olive presses, cisterns, reservoirs, water channels, paved roads, etc. — for according to the hypothesis, under low intensity production, investment in operational facilities will be minimal, at best concerned with water works and animal shelters; under medium intensity production, investment in such facilities will be in accordance with the production, processing, storage and marketing needs of grain farmers; whereas under high intensity production, investment in such facilities will be in accordance with the production, processing, storage and marketing needs of orchardists and gardeners, as well as grain farmers.

Fourth, the stratigraphic data from Tell Hesban will be examined to ascertain changes over time in population densities on the *tell* and the nature of the dwellings, public buildings, and operational facilities constructed or used during the various cultural periods. Thus, during periods of low intensity production, our hypothesis predicts that there will be no signs of sedentary occupation on the *tell.* During periods of medium intensity production, we will expect to find some type of evidence of fortifications or defensible location of dwellings on tops of mounds. We will also expect to find objects and operational facilities consistent with mixed production of grains and sheep and goats. During periods of high intensity food production we will expect to find operational facilities and objects consistent with the production of fruits and vegetable in orchards and gardens, in addition to the facilities needed to produce, process, store, and market grains.

Fifth, the animal bone data from Tell Hesban will be examined to ascertain changes over time in the types of animals produced for draft power and meat. Thus during periods of medium intensity production we will expect to find the remains of large numbers of cattle (used for ploughing grain fields) in addition to plentiful remains of sheep and goats. On the other hand, during periods of high intensity food production we will expect to find a rise in the numbers of horses, mules, and donkeys (used for draught on terraces), while we will expect a decline in the quantity of sheep and goats (due to removal of pasture lands on hills) and a rise in barnyard animals (such as pigs and poultry) and other imported sources of meat (including game and fish). Furthermore, we will expect that the sheep and goats eaten during periods of medium intensity production will be younger than those eaten during periods of high intensity production due to differences between those systems in their ability to supply sheep and goat meat.

A tentative summary-reconstruction of the food production regimes of ancient and modern Hesban follows. It is based on preliminary analysis of surface survey reports, reports on the stratigraphic and object findings at Tell Hesban, reports on the bone finds from Tell Hesban, and ethnographic data about the recent history of food production in Jordan. These data have been analyzed using the procedures described above.

Period		*Intensity Level of Food Production Regime*
ca. 1550-1200 B.C.	Late Bronze	Low-medium
ca. 1200- 918 B.C.	Iron I	Medium
ca. 918- 539 B.C.	Iron II	Medium-High
ca. 539- 332 B.C.	Persian	Low
ca. 332- 198 B.C.	Early Hellenistic	Low-Medium
ca. 198- 63 B.C.	Late Hellenistic	Medium
ca. 63 B.C. - A.D. 193	Early Roman	Medium
ca. A.D. 193-365	Late Roman	Medium-High
ca. A.D. 365-661	Byzantine	High

plants and animals they eat except that the mixed farmer eats more meat. Dwellings consist of readily defendable houses, caves, and tents in season.

Under *high intensity food production regimes,* actual population numbers are relatively high and the majority of the producers are permanently settled orchardists, gardeners and grain farmers. While the olive and grape growing orchardists are settled primarily in the hills and on the slopes, the grain producing farmers remain on the plains. Investment in permanent operational facilities are high, especially in the case of the orchardists who need to build and maintain terraces and presses. While oxen remain the principle source of draught power on the plains, horses, mules and donkeys are favoured in the hills and slopes because they are better able to manoeuvre on the steep terraces. The staple diet continues to include grain, but it includes more vegetables and fruit in season. There is far less red meat eaten, however, because most of the potential pasture land is under cultivation. As a result barnyard animal such as poultry and pigs play an important role in the diet. Furthermore, the existence of good transportation facilties, needed to market the crop, encourages import of exotic foods in the form of fish and wild game. When red meat does become available, thanks are due to the semi-nomadic and nomadic herdsmen who graze their animals on the stubble fields in the summer. These herdsmen tend to sell their older animals — those which cannot make another migration to the desert. As a result, the red meat which is consumed in villages tends to be that of older sheep and goats.

The *intensification of food production regimes* tends to be sequential from low to medium to high, whereas the relaxation of such regimes may be sudden involving an alternation from high to low. While low intensity regimes tend to be subsistence oriented, medium intensity regimes tend to be transitional or partially subsistence, partially market-oriented; while high intensity regimes tend to be primarily market-orented. The transition from low to medium intensity regimes is associated with hostilities between subsistence-oriented pastoralists and semi-market-oriented cultivators, because the latter is laying permanent claims on lands previously held by the former. On the other hand, the transition from medium to high intensity food production tends to be associated with political stability maintainted by centralized powers. These centralized powers tend to provide the incentives for intensification of food production through providing markets, building roads, and maintaining political stability in the countryside.

The Ancient Food Production Regimes

While it is beyond the scope of this preliminary report to offer quantitative data pertinent to reconstructing the food production regimes of ancient Hesban, it seems appropriate to provide an idea of the way in which the above hypothesis can be used as a device for making sense out of the fragmentary archaeological record. This was the original motivation for the fieldwork effort needed to derive this hypothesis in its present form.

The reconstruction process begins with analysis of the surface survey maps. First the number of sites within the study area will be used as a basis for estimating the size of the population in the study area during each of the archaeologically defined cultural periods. According to our hypothesis, herein lies the first clue to the food production regime, for, it associates low intensity production with a relatively small population, medium intensity production with a relatively larger population, and high intensity production with a relatively large population.

Second, the location of sites — whether on the plains, in the hills or in the slopes, will be examined, for according to our hypothesis, under low intensity production there are no or only a few permanent sites anywhere in the region; under medium intensity production sites will tend to be located on the plains and gently sloping hills; whereas under high intensity production sites will be numerous throughout all four natural resource zones, including in the difficult terrain in the western

and goat meat, was the improvement of the road system in the region throughout the late sixties and seventies. The introduction of the tractor had the impact of reducing the quantity of draught animals, especially oxen, maintained in the cereal growing villages of the plains. On the other hand, donkeys, horses, and mules gained an importance in the hilly villages where they generally perform better than tractors as draught power on the steep terraces. Significant also is the fact that as the hilly regions were being terraced for tree crop production, they were simultaneously being removed as pasture resources. This shift resulted in a general reduction in the sheep and goat population maintained by settled villagers and at the same time it led to an increase in the proportion of goats in the herds because of the fact that goats are hardier than sheep and can graze the remaining steep slopes unsuitable for terrace development. However, the stubble fields which remain on the plains following summer harvest of cereals continue to be grazed by the sheep and goat herds of market-oriented nomads who still migrate in and out of the region during the summer and fall.

Changes in the diet reflect the changes in the land use. Whereas formerly the staple diet in this region consisted primarily of grains and milk products, supplemented by camel, sheep and goat meat, today there are more fruit and more vegetables in the staple diet, and the meat of chicken is consumed as often or more often than that of sheep and goats even among nomads who formerly thought it beneath them to eat chicken. Still, however, the milk products of sheep and goats continue to be important.

Levels of Food Production Intensity:-

Thanks to the assumptions and parametres furnished by our general model it has been possible to relate data about changes in topography, settlement, operational facilities, land use and diet in our study area to overall changes in the regional food production system which have occurred since the middle of the previous century. The functional relationships embedded in the preceding analysis will next be made explicit in the form of a local food production alteration hypothesis.

Food production on the lands within the 10 km. radius of Hesban is constrained by at least four distinguishable natural resource zones: the relatively moist, but hilly "northerly heights"; the mountainous escarpments and crevices of the relatively moist "western slopes"; the gently rolling hills and plains of the relatively drier "southern plains"; and the flatlands of the relatively dry "eastern plains." This diverse natural resource tends to favour diverse food production strategies coexisting in a "food production regime." For example, intensity of food production on this natural resource can be either low, medium, or high, depending on the kinds of crops and animals emphasized by each regime.

Under *low intensity food production regimes,* actual population numbers are low and the producers are nomadic or semi-nomadic herdsmen producing sheep and goats on the hills and slopes and camels on the plains. They occupy the land seasonally, dwelling in tents and caves and making only minimal investments in permanent operational facilities, mainly reusing ancient cisterns. Landuse consists of unimproved pasture lands and the staple diet consists of milk and its by-products, supplemented by various edible plants, dried figs or dates, grains and meat.

Under *medium intensity food production regimes,* actual population numbers are relatively higher and the producers are semi-sedentary mixed farmers producing grains on the plains and sheep and goats on the hills and slopes in the winter and on the stubble fields in the summer. While these mixed farmers occupy the land year-around, there are also semi-nomadic and nomadic herdsmen who pasture their animals on the land seasonally, maintaining trading relations with some of these farmers and hostile relations with others. Using primarily oxen to pull the plough, these farmers produce wheat for themselves and barley for their animals. Their diet is much like that of their semi-nomadic and nomadic counterparts in terms of the

5. Fencing Works — stone fences, wire fences, mud fences, brush fences
6. Animal Shelters — caves, tents, old buildings, aluminium sheds
7. Storage Installations — Silos, granaries, storage buildings, large jars
8. Transportation — pickup trucks, large, horse-drawn carriages, camels, donkeys, private cars
9. Communication — paved roads, dirt roads, pats, radios, televisions, post offices

D. Village Settlement Pattern

1. Fixity — degree to which community is migratory or sedentary
2. Compactness — dwellings clumped close together, dwellings strung out along roads, dwellings widely dispersed
3. Size — 1-0 dwellings, 11-25 dwellings, 26-50 dwellings, 51-100 dwellings, more than 100 dwellings
4. Type of Dwellings — neo-Roman stone houses, simple unpainted cement houses, elaborate painted cement houses, add-on cement houses, mud houses, tents, caves, shacks
5. Public Buildings — mosques, shops, schools, meeting halls, post office, suq, government office buildings
6. Ethnic Groups — Ajarma, Circasians, Palestinians, Thoabyya, Nabulsi, Sarabne, Balqawie, Keratchi, Azzizat, Maayeh

E. Archaeological Remains

1. Waterworks — reservoirs, cistersn, aqueducts, water-lifting works
2. Terracing Works — terraced wadis, terraced slopes, dams
3. Processing Works — wine process, olive process, mills
4. Fencing Works — Stonne fences, mud fences, large walls
5. Animal Shelters — caves, craals, stables
6. Storage Instllations — silos, granaries, storage buildings, jars
7. Communication — pave roads, communication towers
8. Domestic Dwellings — mud houses, stone houses, caves
9. Public Buildings — temples, churches, mosques, baths
10. Fortifications — large walls, guard towers
11. Pottery — Iron, Persian, Hellenistic, Nabataean, Roman Byzantine, etc.
12. Bones — sheep or goat, cattle, equine, poultry, fish, etc.
13. Tombs — Islamic, Byzantine, Roman, Iron, Bronze