

HELMAND VALLEY
DEVELOPMENT PROJECT

AFGHANISTAN

ECONOMICS OF AGRICULTURAL PRODUCTION IN HELMAND VALLEY

Report by

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for

AGENCY FOR INTERNATIONAL DEVELOPMENT
DEPARTMENT OF STATE

OCTOBER, 1965

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

Economics of Agricultural Production in Helmand Valley, Afghanistan

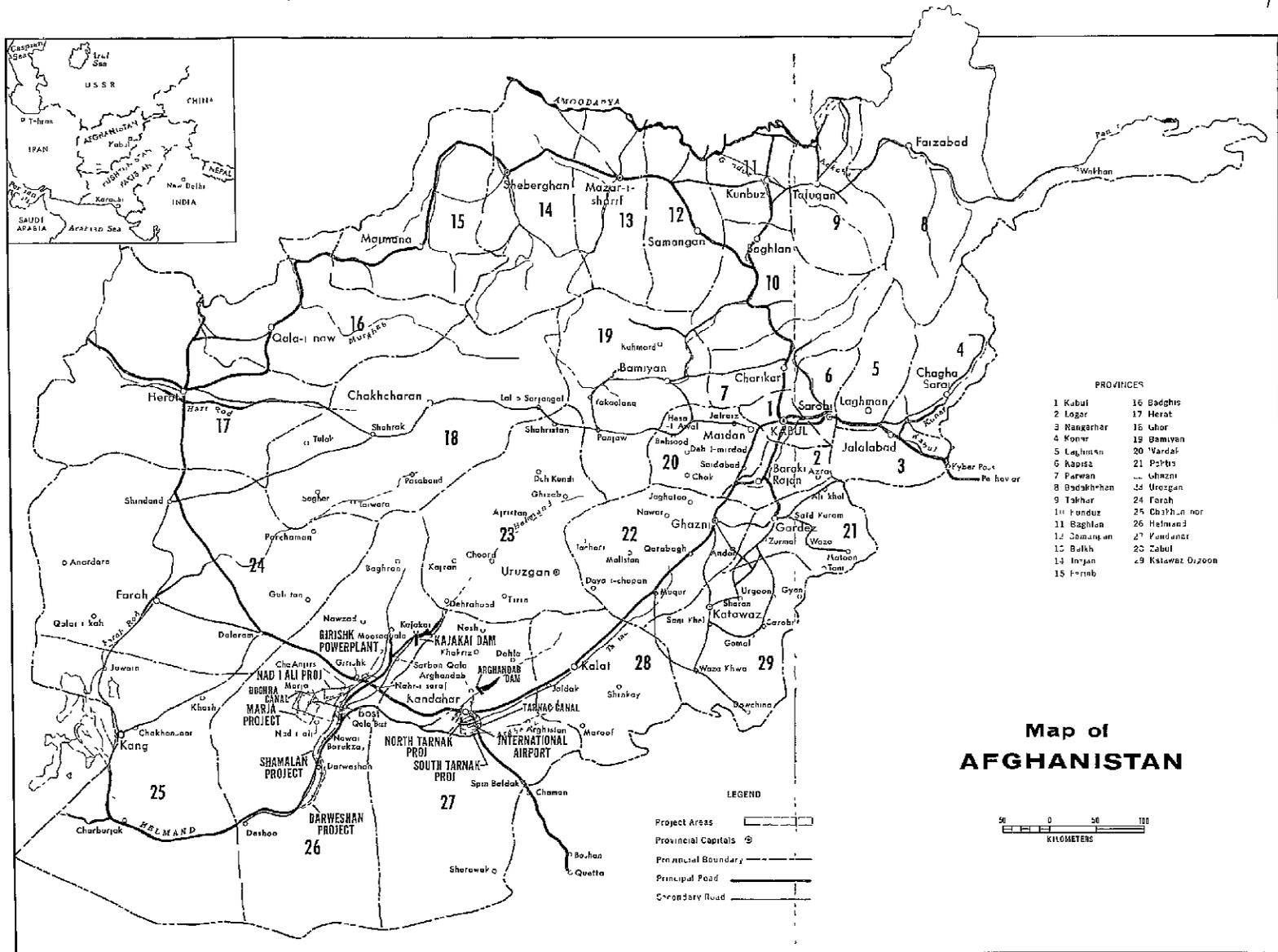
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Denver, Colorado
October 1965



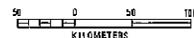
PROVINCES

- | | |
|--------------|----------------|
| 1 Kabul | 16 Badghis |
| 2 Logar | 17 Herat |
| 3 Nangarhar | 18 Nur |
| 4 Konar | 19 Bamyan |
| 5 Laghman | 20 Wardak |
| 6 Kapisa | 21 Paktia |
| 7 Parwan | 22 Ghazni |
| 8 Badkhashan | 23 Uruzgan |
| 9 Takhar | 24 Faryab |
| 10 Farduz | 25 Chakhcharan |
| 11 Baghlan | 26 Helmand |
| 12 Samangan | 27 Kunuz |
| 13 Balkh | 28 Zabul |
| 14 Inyan | 29 Katawaz |
| 15 Faryab | |

Map of
AFGHANISTAN

LEGEND

- Project Areas
- Provincial Capitals
- Provincial Boundary
- Principal Road
- Secondary Road





UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
WASHINGTON, D.C. 20240

IN REPLY
REFER TO

To: F. Gordon Whitaker, Project Manager
Bost, Afghanistan

From: Ira M. Stevens, Agricultural Economist

Subject: Report, Economics of Agricultural Production in
Helmand Valley, Afghanistan

I am pleased to transmit the subject report to you. As you know, it represents a summary of much of my work during my two and one-half years with the Bureau of Reclamation team in the Helmand Valley.

When I arrived in Afghanistan in November 1962, I found very few agricultural statistics or data pertaining to the Helmand Valley. After careful consideration of the Project objectives and problems related to agricultural economics, and after consultation with many Afghan, AID, Bureau, and other American leaders, a detailed farmer-interview survey was planned. Actual request for the study came from Helmand Valley Authority officials.

Before the study was completed, HVA requested us to make an economic analysis of the Marja district for the purpose of helping them to determine the size of an economic farm unit for new settlers. This report, entitled "Economic Analysis of Marja Farms," was published in mimeograph form in November 1964. Its problems and recommendations summary is reproduced herein as Appendix III.

Your counsel and support and the assistance of fellow team members is gratefully acknowledged. I have mentioned specifically a number of men who participated in planning and conducting the survey in the section on acknowledgements, but many others, not mentioned, also helped with their encouragement and suggestions. The painstaking work done by Mr. Ira Watson, Chief, Economics Branch, Denver, and others who participated in preparation of the final report is acknowledged and appreciated.

Ira M. Stevens
Agricultural Economist

Enclosure

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FOREWORD

Helmand Valley, in southwest Afghanistan, has a rich agricultural potential. Irrigation farming has been carried on in the Valley by diverting water from the Helmand and Arghandab Rivers in this Valley for many centuries. In the early 1950's a large irrigation dam was built on each of these rivers. This has given security to farmers by assuring a supply of water throughout the season.

This report represents results of 2-1/2 years of work done by the writers in 1963, 1964, and 1965. It was inaugurated at the request of officials of the Helmand Valley Authority, who have kept closely in touch with the results as they have been found.

Procedures used in planning this project, securing the data, analyzing the results, and preparing the report should be helpful to agricultural leaders and USAID Mission leaders in other developing countries.

Ira M. Stevens was the first agricultural economist to serve with the Bureau team in Afghanistan. He reported for duty November 21, 1962. He departed from Bost May 21, 1965, having extended his 2-year assignment for 6 months, mainly for the purpose of completing his work on this study. He received his B. S. degree in 1947 and his M. S. degree in 1953, both in Agricultural Economics from the University of Wyoming. After he graduated in 1947, he continued with the university as an agricultural economist in the field of marketing until 1955. He then joined the U. S. Department of Agriculture in Washington, D. C. , as a marketing specialist with the Farmer Cooperative Service. He was widely recognized as a specialist in his field and frequently was called to speak at state, regional, and national livestock and wool-marketing groups. He did extensive research in the field of modern livestock auction markets and livestock grading and pooling in the United States. He was reared on an irrigated farm on a Reclamation project in Northern Wyoming and was a ranch manager for two large ranches in Wyoming and New Mexico before he joined the staff of the University of Wyoming.

Mr. Kamaluddin Tarzi attended grammar and high school in Afghanistan. He studied Agricultural Economics at Texas A & M, College Station, Texas, from 1959 through 1961. He also attended college at Bombay, India, during 1963. From 1954-1955, he worked with the Settlement Program in the newly developed Helmand Valley Project at Nod-i-Ali. In 1962, he worked with the Farm Machinery Department. In June of 1964, he was assigned to work as counterpart to Mr. Stevens as an agricultural economist, which led to completion of this study. He is also joint author with Mr. Stevens and Mr. Khan Mohammed on the report, Economic Analysis of Marja Farms, published in 1964 by the Helmand Valley Project.

ACKNOWLEDGMENTS

Much detailed planning went into this project before it was begun. We appreciate help given by each of the following government officials with whom we held conferences to discuss and plan procedures for conducting the survey: Dr. Abdul Wakil, HVA President; Mr. Sayed Wadat Shah, Advisor to HVA General President; Mr. Abdul Hakim, HVA Vice-president, Agriculture; Mr. A. S. Zia, HVA Assistant Vice-president, Agriculture; Mr. Abdul M. Shinwari, HVA General Director of Land Office; Mr. Shah Mohammad, former HVA General Director of Extension; Mr. Payenda Mohamed, HVA Director of Experiment Station; Mr. Abdul Rahim, Former Director of Agriculture, Kandahar Province; Mr. A. Aziz Wadan, former Director of Foreign Office, Kandahar; Mr. Habib Khaliqi, former Assistant Governor of Grishk Province.

Several American advisers also participated in discussing plans for this project and made a number of worthwhile suggestions. These include the following: Mr. F. Gordon Whitaker, Project Manager, U. S. Bureau of Reclamation, Bost; Mr. Sam Logan, former Head, Agriculture Advisory Group, USAID, Bost; Mr. P. R. Nalder, Assistant Director, Helmand Valley Region, Bost; Dr. R. H. Allen, Head, Nathan Team, Advisory Group to Ministry of Planning, Kabul; Dr. Louis Dupree, Anthropologist, American Universities Field Staff, Kabul; Mr. Don Davis, Head, and Mr. Roscoe Roberts, former Assistant Head, Food and Agriculture Organization, Kabul.

We are also grateful to the 495 farmers and village chiefs throughout the project who willingly supplied information about their farming operations. The general cooperative attitude of these men made the fieldwork a joy to conduct.

Several men participated in the work of field interviewing. Mr. Khan Mohammed, working as a counterpart trainee in agricultural economics, shouldered a heavy part of this responsibility in the Helmand River districts. Mr. Abdul Qadim Yusufzai and Mr. Abdul Monir of HVA Agricultural Staff helped with some of the interviews in two districts. Some Faculty of Agriculture students of Kabul University, who were in the Valley for a month's training, participated in interviewing in one district. These included S. H. Herman, Sahibi, Saily, Shah Mahmud, Ghafoor Gul, and Ghiasi. Abdul Khaliq served as an able interpreter for most of the interviews conducted by Mr. Stevens. Other interpreters include Khauja, Ammonullah, Hussain, and Sayed.

Khan Mohammed was also the wheel horse in summarizing and tabulating the data. Abdul Khaliq also helped in this aspect of the work.

Mrs. Mable Urano and Mrs. Glenna Steele were responsible for typing the manuscript.

Extension Service district agents were called on to supply special bits of information to fill in where we were short. Mr. Payenda of Shamalon, Mr. Harif of Darweshan, Mr. Ghulam Jan of Marja, and Mr. Haya Mohammed of Nod-i-Ali, as well as the sub-district agents and village-level workers, were all cooperative and helpful.

Each of the following men reviewed the manuscript and offered useful suggestions: Mr. Whitaker; Mr. Zia, Mr. Howard Johnson, Agricultural Economist, and Mr. Thomas Crawford, Acting Chief, O&M Branch, U. S. Bureau of Reclamation Team, Bost; Dr. Raymond Moyer, Head, J. G. White Team, Bost; and Mr. Raymond Cason, Head, Agricultural Advisory Group, USAID, Bost.

SUMMARY

This study was undertaken to secure badly needed information on crop yields in the Helmand Valley, Afghanistan and factors affecting them; also to compare production now and before the dams and irrigation works were built. The data were obtained from interviews with 496 families and village chiefs, and from observation of farming practices throughout the Helmand Valley.

Farming in the Helmand Valley is mainly of the subsistence type, characterized largely by production of wheat, the major food staple, although several other types of crops and livestock are grown. Yields of most crops were found to be low--from less than 3 bushels of wheat per acre in Nod-i-Ali to about 24 bushels in Dund. Cotton yields were also low--less than one-third of a bale of lint cotton per acre in Shamalon, where yields were highest. On the basis of yields and prices received by farmers during the time of the study, wheat was more profitable than cotton.

Irrigation water generally was abundant in the Helmand River districts, but in two of the Arghandab River districts, it was quite short. Even in districts where water was adequate, a large amount of the land was idle each year, and there was little double cropping.

On the basis of number per farm, livestock seemed to be in short supply. Oxen varied from about one to each two farms in Dund to a little more than one per farm in Shamalon; milk cows from one to each three farms in Nod-i-Ali to 1.3 per farm in Shamalon. Sheep and goats were more numerous in Marja and Nod-i-Ali, with an average of 2.5 and 3.8 head on each farm in these districts, respectively.

Commercial fertilizer is used relatively little in Helmand Valley. Only about half of the farmers had ever used any, but most of those who had used it felt the results were good. All farmers were aware of the value of animal manure in their farming program, and most of them used some on at least a small part of their land. Green manure was not used extensively. A few farmers had observed its use on the mechanized farm in Marja and recognized its value.

Farmers throughout the whole Valley seemed aware of the value of spreading soil from old ditchbanks onto their land. Land leveling, using primitive equipment, was also done over much of the project. Drains were recognized as essential by most farmers in areas which actually needed them. Some farmers expressed apprehension about the loss of their farming land if an open drain was dug through their land. Where drainage investigations indicate the need for close drain spacing, the feasibility of tile drains should be studied.

Little systematic crop rotation was used. Part of the reason for this was that wheat on most farms represented well over half of the crop grown.

A large mechanized farming operation has been underway as a demonstration program by the Helmand Valley Authority for several years. However, the program has not been as successful as originally anticipated.

Most of the farm equipment now used is of a very primitive type. A much better job of farming could be done with improved machinery and equipment. A continuing program

of research as to how fast mechanization should come to the Valley and what sizes and kinds of equipment are best adapted is badly needed.

Weed infestation and lack of effective control measures is one of the most serious problems faced by farmers. A program of control is being given special emphasis by the H. V. A. Extension Service in 1965.

Insects are a real problem at times in some areas. A good start in insect control has been made. The program needs to be pushed and extended.

Theoretically, subsistence-type farming would make marketing unimportant. However, the trend is toward more cash sales. Cotton is produced entirely for sale to the Helmand Valley Authority, which buys it for their large commercial gin. The prices paid to farmers for seed cotton are low. Much fruit, especially in the Kandahar area, is produced for sale, and the larger wheat producers all sell a considerable portion of their product.

Viewed in this light, marketing becomes a more serious problem. The bad roads and transportation facilities of the past have been improved. However, as production in the Valley increases, the problem of finding adequate markets will probably be accentuated. A program of developing markets for expanded production is one of the urgent needs in the Helmand Valley.

The Royal Government of Afghanistan believes that an irrigation project such as this in Helmand Valley has value to the nation as a whole. It provides homes and means of a livelihood for a part of the population which had not enjoyed these things in the past. For this reason the government feels all construction costs should be borne by the public. New settlers in Nod-i-Ali and Marja were also supplied with oxen, simple farm implements, wheat seed for the first year, and building materials for a home, to be paid for over a period of years.

Financial assistance for most farmers through any form of credit from public sources is almost nonexistent. Loans from private sources--well-to-do landowners or merchants--are available to many farmers but at exorbitant rates.

Taxes are assessed only on land and livestock. Rates are very low--only about one-fourth to one-third of 1 percent on land and livestock. No water charges for amortization of construction costs or for operation and maintenance of the system have been made.

In recent years H. V. A. has inaugurated a cotton program whereby each farmer is required to plant a specified part of his land in cotton, which must be sold to the government. This program brings revenue to the government in lieu of taxes or water charges.

The low crop yields in Helmand Valley cannot be attributed to a single factor; several are responsible. Farmers who had insufficient capital received considerably lower yields than those with an adequate capital supply. Likewise settlers without previous farming experience received substantially lower yields than settlers who had previous farming experience. Farmers who were living on their land were receiving substantially higher yields than farmers who were living in the villages.

Many said that their yields now were lower than before the dams were built. Reasons given for this varied with the area. Just below Arghandab Dam, farmers complained that silt which had formerly enriched their lands during the flood season each year was now being trapped above the dam. In other sections farmers said the cotton they were now required to grow was taking fertility out of the soil. In some places the increased water supply was accentuating the salt, water table, drainage, and weed problems. Those farmers who indicated production had improved since the dams were built gave as the most important reason the fact that more water was available now and in some areas that water was now also available late in the season.

Other major problems were observed: The extremely difficult credit situation and need for credit reform; the lack of management know-how; and lack of education and basic knowledge. All of these can be solved with careful planning and hard work.

The problems of low production can be overcome to some extent by larger acreages. Although the gross farm revenue in Darweshan is lower than in any other district, the large acreage per farm makes the total gross revenue per farm higher than in any other

district--\$423. The opposite is true of Arghandab where gross farm revenue per acre is highest--\$27. The small acreage makes the total gross revenue per farm only a little over half as much as that found in Darweshan.

Review of Recommendations

1. Appendixes

The three appendixes should be considered as part of the recommendations. Appendix I stresses first tackling programs that will give best results in relation to costs. Appendix II suggests how Kochi livestock men might be better integrated into the economy of the Valley and the Nation. Appendix III is the "problems and recommendations" section of a special report on the settlement area of Marja indicating the size of farm unit recommended for different qualities of cropland.

2. Larger Farm Units Essential

Farmers in the Helmand Valley need units large enough so that they can accumulate a little surplus which can be used to buy better farming tools and equipment and better seeds.

3. Nod-i-Ali

Our study confirmed that in Nod-i-Ali lands and conditions are so poor that people cannot hope to make a living from cropping this land. In lieu of large expenditures for drainage and development of Nod-i-Ali, it should be used for a pasture-livestock program.

4. Proper Rate of Stocking

Lands in Helmand Valley are now severely overstocked. Pasturelands should be improved and ways found to limit the grazing on public lands.

5. Credit Reform

An adequate credit system is one of the greatest needs of farmers in Helmand Valley today. Every effort should be made to find solution to the problems and a source of funds to set up a sound credit program.

6. Production Credit

A government-sponsored production credit program is suggested. This would provide loans to responsible tenants as well as to landowners.

7. Consumer Credit

Thousands of small farmers are badly in need of a reasonable source of credit. If possible the present agricultural bank should be expanded to take care of this on a cooperative basis with the government and private investors encouraged to buy stock.

8. Adoption of New and Improved Farming Practices

The best way to increase production in Helmand Valley is through improved farming practices which will increase the output per acre. Bringing more new land into cultivation would probably be much more costly and would produce no greater results.

A well-trained Extension Service must shoulder this responsibility.

9. Soil Fertility

H. V. A. should make an all out effort to help farmers increase the fertility of their soils. This should include conserving and use on the land of animal manure. A green manure legume such as alfalfa or clover turned under with a good moldboard or disc plow would be very useful. Further commercial fertilizer trials should be carried on both in the field and at the experiment station. A program where this fertilizer could be

supplied on credit and taken out of crop receipts in the fall would do much to encourage its use.

10. Farm Size

Farms need to be of sufficient size and productivity to accomplish two goals--providing surpluses for urban development and improving of living standards on the farm. Increasing the size of the present subsistence farms and increasing their productivity are necessary to accomplish these goals.

Definition of Terms

Mun, a weight measurement, as used throughout this report is also referred to in other writings as "moun, " "mound, " "maun, " and "mahn. " It is known locally as the "Kandahar Mun" and has a weight value of 10 pow. One pow is approximately $15/16$ of 1 pound. For practical purposes we consider 1 mun as equal to 10 pounds.

Jirib, a measurement of land area, is considered by some authorities to be 1,936 square meters, by others to be 2,000 square meters. The latter measurement is exactly one-fifth of a hectare and approximately .49 acre. For convenience we consider 2 jiribs per acre.

Afghani, unit of currency, equals 100 pul. Value at current exchange rate, \$U.S. 0.0154.

INTRODUCTION

Progress in agricultural production is evident from close observation in Helmand Valley. The exact amount of progress, however, cannot be measured because accurate production statistics are not available. Afghanistan, like many other developing countries, is very short on all kinds of agricultural statistics.

To measure progress in any field we must have a benchmark to describe where we are now and compare with yesterday and tomorrow. A major objective of this study was to establish such a benchmark. Another objective was to determine factors that affect production. A third was to find first hand from farmers what they felt their major problems were.

We hoped to discover how farmers in the Valley were doing economically compared with their situation before the dams and irrigation works were built; also, how farmers in the newly settled areas of Nod-1-Ali and Marja were doing compared with the first years after they came to these projects, and reasons for the differences.

Fieldwork for this study consisted of observing the farming operations and securing records of the farming activities of a sample of farmers throughout the Helmand Valley where water was supplied from Arghandab Dam and from Kajaka Dam through Boghra, Shamalon, and Darweshan Canals and other diversions.

In drawing this sample we worked through the hakims' (subgovernors) offices in the Kandahar area and through the Helmand Valley Authority Extension offices in the rest of the Valley. Each hakim's office supplied the names and populations of all villages under its jurisdiction. We arrayed these villages according to population and chose some large, some medium, and some small sizes. The hakims sent clerks or soldiers to help us find the villages and make our contacts. We interviewed the village chief and four farmers in each village. It would have seemed reasonable to choose more farmers from the larger villages, but the representation by size was attained by choosing a greater number of the larger villages. In addition, the larger total number of villages contacted by this method allowed us to get better representation from all sections.

Part of the farmers were landowners and part were sharecrop tenants. At the beginning of the study we chose the names of farmers to be interviewed from lists supplied by the village chief. These names were chosen at random and farmers were usually called to come to the village chief's home where we interviewed them. After following this procedure several days, however, we changed our method and began contacting farmers at their homes or in their fields without previous knowledge of the village chief. We felt this procedure eliminated some of the bias we seemed to have been getting by the previous method.

The Agricultural Extension Service in most of the Helmand Valley is well organized. It seemed preferable to work through this organization in all except the Kandahar area. Before beginning the interviewing in a given area we determined from Extension Service records the number of farmers by block and division within the area. Then at random we selected a proportionate number of farmers from each. In Nod-1-Ali and Marja most of the farmers were landowners. In the other areas, however, many were sharecrop tenants. Part of the interviews in these areas, therefore, were with tenants and part with landowners.



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Figure 1. -- This report was based on interviews in the field with 485 farmers and village chiefs. K. Tarzi, one of the authors, conducts this interview.

The fieldwork, begun in the summer of 1963, was interrupted several times and finally was completed in the summer of 1964.

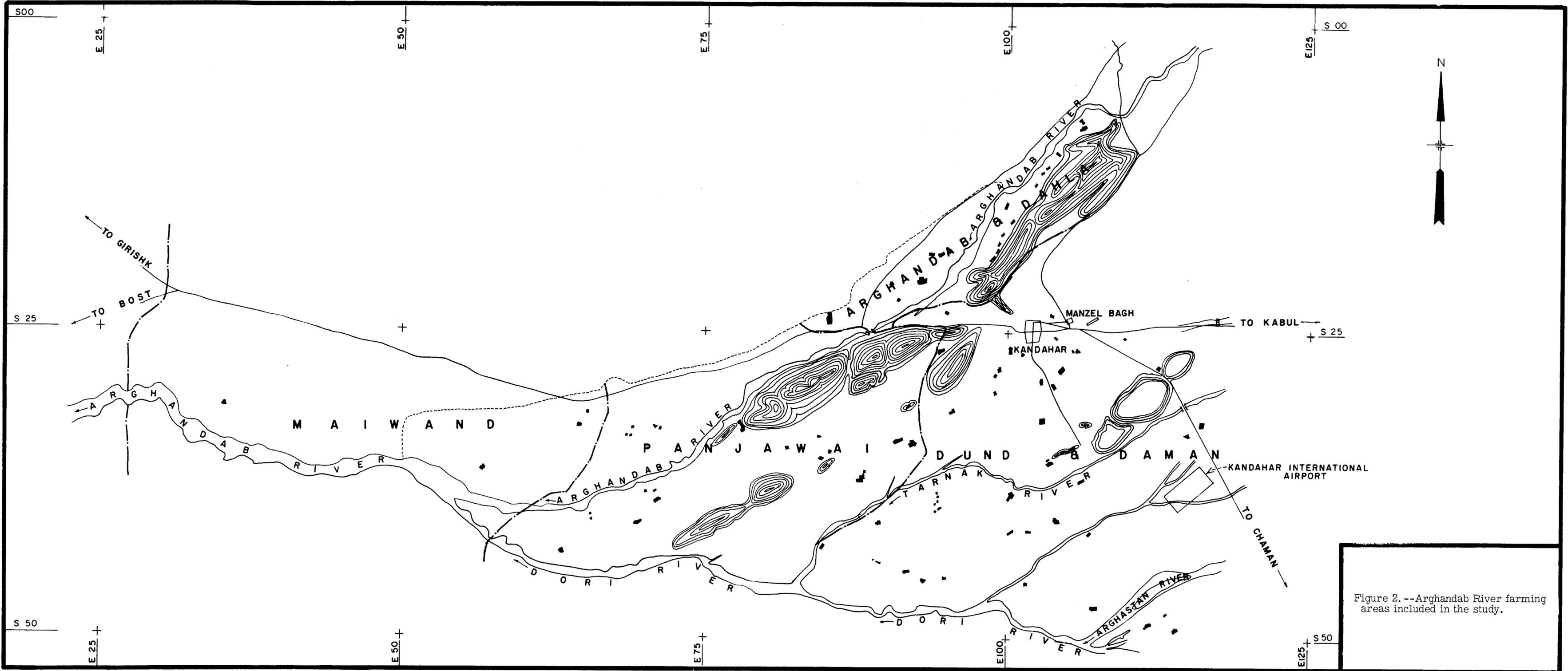
Following are the numbers of responses secured in the different areas

Responses to Interviews

	<u>Landowners</u>	<u>Tenants</u>	<u>Total farmers</u>	<u>Village chiefs</u>	<u>Total responses</u>
Arghandab	23	6	29	7	36
Dund	14	19	33	7	40
Panjawai-Maiwand	14	2	16	6	22
Nod-i-Ali	51	1	52	11	63
Marja	163	0	163	10	173
Siamalon	66	15	81	0	81
Darweshan	33	22	55	0	55
TOTAL	320	64	384	41	425

Figures 2 and 3 show the seven areas covered in the survey. The Arghandab River districts of Arghandab, Dund, and Panjawai-Maiwand are shown in Figure 2 and the Helmand River districts of Nod-i-Ali, Marja, Siamalon, and Darweshan in Figure 3. The Arghandab district referred to in the report included a few interviews also from Dama, the area up the river from Arghandab. The Dund district also included a few interviews from Dama. Because of the small number of interviews in Panjawai and Marward, these districts were considered together in the analysis. Marward, only part of which is shown on the map, is farmed largely with groves and water. Our interviews, however, included only the relatively small area receiving water from the Arghandab River.

1/Usually, a series of hand-dug irrigation wells is joined together by tunnels. Water flows through the tunnels on a grade that eventually brings it to the surface. From here it is carried in open ditches to the farmland.



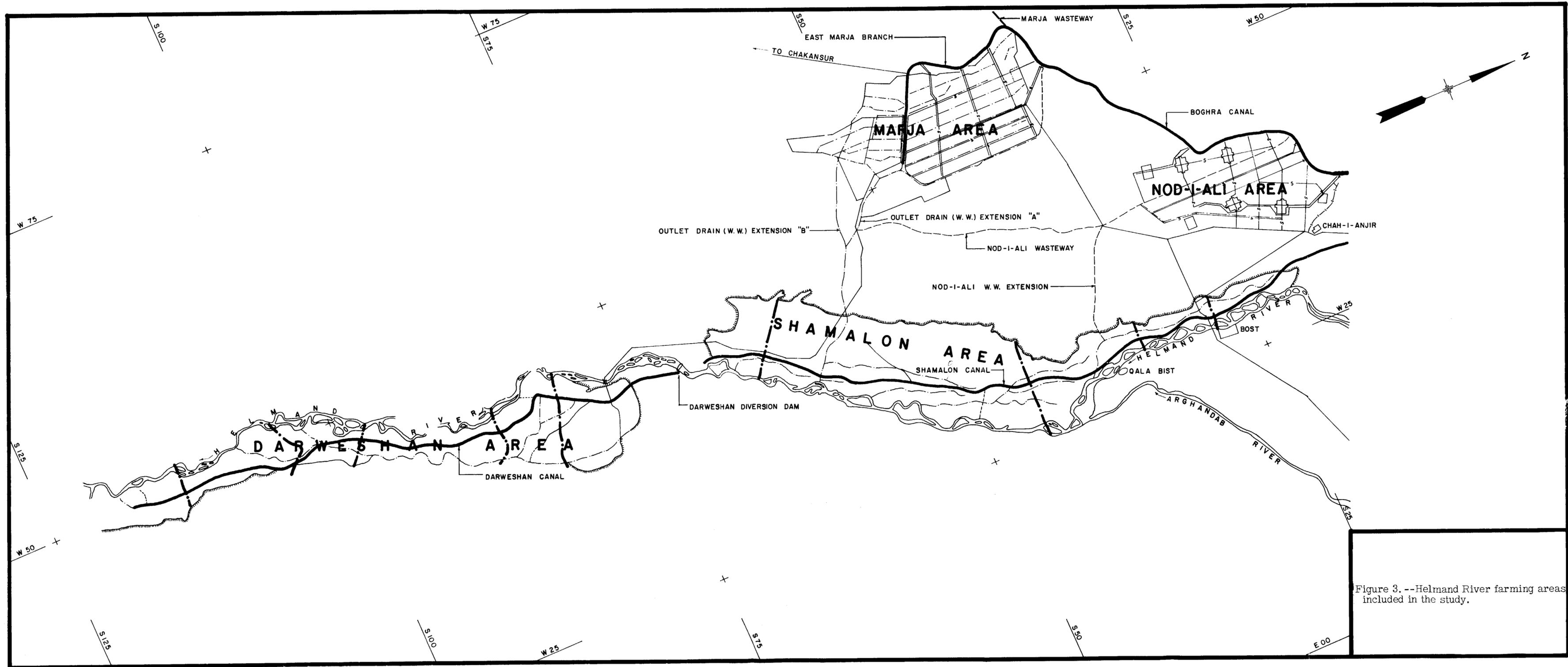


Figure 3. --Helmand River farming areas included in the study.

At the time of the survey, settlers were farming only part of the Marja district. The remainder of the land was either in the mechanized farm or unassigned to settlers. The part of Marja district covered is indicated on the map.

Before dams and canals of the present irrigation system were built, farmers took water from the rivers by use of their own diversion dams and hand-dug juis (ditches). Some of this is still done. Most of the lands farmed now, however, are irrigated from diversions, canals, and major laterals engineered and constructed in the development program of the past 10 or 15 years. Beyond these major canals and laterals most of the sublaterals and farm ditches have been built by the farmers--some of them centuries ago. Most of the project area is still served by these old crooked waterways with the silt piled high on either side. Exceptions to this are the completely new projects of Nod-i-Ali, Marja, and South Tarnak. Here all canals, laterals, sublaterals, major farm ditches and drains were built as part of the development program. Land leveling was also done in some areas where need was great.

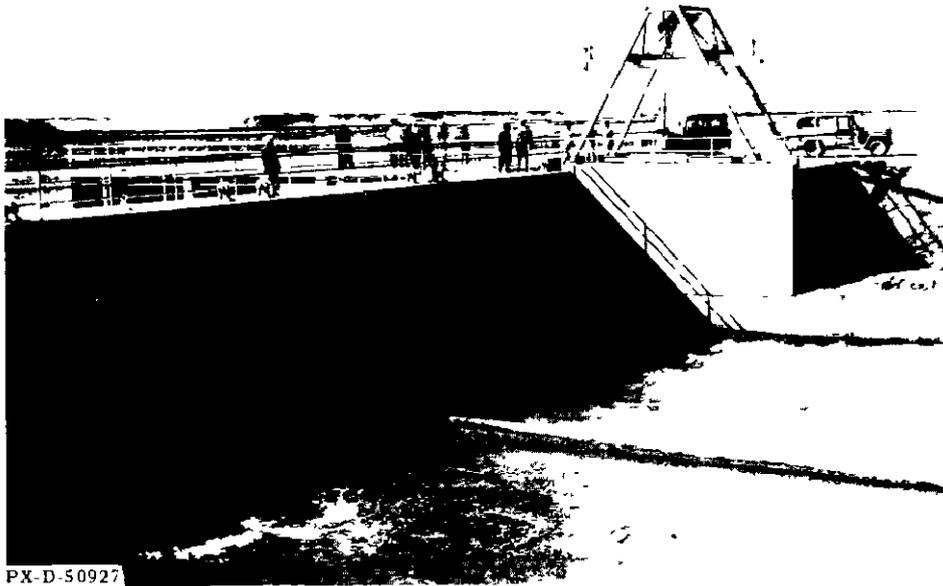


Figure 4. --This diversion dam takes water from the Helmand River and directs it into the head of one of the large canals. It replaces many hand-built rock and brush dams which had to be rebuilt each year.

LAND AND CROPS

Most farms in the area produce only enough to support the farmer and his family. Exceptions are the larger landowners with several tenants who receive cash from the sale of wheat, cotton and other products, and the fruit farmers in the Arghandab and Dund districts.

Type of Farming

Farmers in the Helmand Valley engage in several different types of farming activity, including the growing of field crops, fruits, and livestock.

The farmers tend to prefer a certain type of farming. Weather and soil quality have a limited influence on some crops; habit and tradition of farmers is an important consideration; and the relative income that can be expected from different crops and the availability of markets for the crops produced weighs heavily. This last factor--market availability--varies with the area. For example, most of the commercial vegetable gardening in Helmand Valley is done near Kandahar where there is a ready market. Since most farms are of the subsistence type and wheat is the major food staple, wheat is the main crop grown.

Raising of livestock is common among farmers of Helmand Valley. Besides oxen, necessary for power, a few other animals are raised on most farms to complement the farming enterprise. However, relatively few farms raise livestock as the major endeavor.

Cultivated Land and Percent Farmed

Two types of farmers are found in the area studied, farmers who were born in the area and have farmed there all their lives, and settlers who have come from other areas and may or may not have had previous farming experience. The first type of farmer is farming in Arghandab, Dund, Panjawai-Maiwand, Shamalon, and Darweshan. The second type is farming in Nod-1-Ali and Marja, with a few in Shamalon.

Total area owned was computed to be 463,303 jiribs and total farmed, 309,217 jiribs. Table I lists the number of farms in each district as indicated by Government officials at time of the survey, also number of jiribs owned and farmed per farm as found from analysis of the interview records, calculated by multiplying jiribs per farm by number of farms. The jiribs owned per farm is based on only the landowner interviews. It does not include tenant interviews. In this table the land of each man is considered to be a farm even though sometimes several units were farmed together.

Table I shows that the greatest area owned and the largest area farmed per family were in Darweshan. There are fewer landowners in this district, each with larger holdings. Average farm size in Darweshan has been reduced from the figures shown here because our study was made before H. V. A. traded water for land in Darweshan. This program, recently completed, had the effect of reducing appreciably the size of private landholdings, particularly among larger landowners.

Farm sizes in Nod-1-Ali do not vary greatly because land was distributed almost equally among settlers in this area. The same was true of Marja. There was a wide variation, however, in individual farm size in other districts.

Table I

ESTIMATED AREA OF LAND OWNED AND PERCENT FARMED
By District--1963-1964

	Arghandab	Dund	Panjawai- Maiwand	Nod-i-Ali	Marja	Shamalon	Darweshan	Grand total
Number of farms	1,605	3,014	2,309	1,118	600	2,020	520	11,186
(Jiribs)								
Owned, per farm	24	44	37	31	24	44	128	41
Farmed, per farm	16	32	23	19	22	31	71	28
Total owned	38,520	132,616	85,433	35,776	14,400	88,880	66,560	1/463,303
Total farmed	25,680	96,448	53,107	21,242	13,200	62,620	39,920	<u>2/309,217</u>
Percent farmed	67	73	62	61	92	70	55	67

1/231,650 acres.
2/154,608 acres.

Table I shows percent of owned land that was farmed each year. It ranged between 92 percent in Marja and 55 percent in Darweshan, with an average of 67 percent for the entire area. This discrepancy between amount of land owned and farmed reflects the practice of farmers of leaving part of their land idle each year. We were told that this was done so that the land could accumulate and store fertility for the next planting season. It is necessary because of the low fertility of the soil caused by continuous cropping without addition of sufficient fertilizer or organic matter.

We can assume that the great difference in proportion of land farmed in Marja and Darweshan is because Marja farms are limited in size and it is necessary for each settler to farm almost all his land each year in an effort to make a living. In Darweshan, on the other hand, farms are much larger, and farmers can keep a higher portion of their land idle each year.

Crop Distribution

The most common crops in the Helmand and Arghandab areas are wheat, barley, cotton, mung beans, alfalfa and clover, corn, rice, grapes, pomegranates, apples, apricots, and vegetables. Table II shows detailed information about the kind of crops grown, area of crops, and the percentage of farmland in each crop. In this table a farm is considered to be land farmed together as a unit. In some cases two or three brothers or father and sons were farming together. Tenants as well as landowners are considered. Land grown in double crops is also indicated. For these reasons the total crops per farm may be different than shown in Table I.

As shown in the table, wheat is by far the most popular crop grown. Farmers in Panjawan and Maiwand planted 6 of each 7 jiribs of their cropped land to wheat. In Nod-i-Ali, the proportion was 4 of each 5 jiribs, while in Marja it was nearly 2 of each 3 jiribs. Three other districts--Darweshan, Shamalon and Dund--each planted more than half of their farmed land to wheat. Arghandab, with 40 percent, was the only district where less than half the crop was wheat. Very low income farming is found almost universally in Nod-i-Ali, Marja, and Maiwand--districts where highest proportion of farmland is in wheat. One further observation about wheat may be relevant. The high percentage of land in wheat undoubtedly reflects the need for food. It may also reflect the relative marketability of this crop. Because of its wide use as the major food staple, wheat can always be sold, usually at a fair price. It can also be stored and transported relatively easily. This is not true of many other farm products. Relative income from 1 jirib of wheat and other crops will be presented later in this report.



Figure 5. --Wheat, the basic food item, is the major crop in Helmand Valley. At present, there is very little mechanization.



Figure 6. --Yields of wheat varied widely from one area to another as shown in these pictures. Class of land as well as farm management and cultural practices account for this difference.

Table II lists wheat and barley together. Barley is much less important as a grain crop. Our records indicate it is grown on less than 2 percent of the farmland in the area. Corn is also not very important over the area, but it varies by districts. It was planted on about 9 percent of the land in Arghandab and 5 percent of the land in Shamalon.

There was a wide variation in the percent of farmland in fruit. It varied from 43 and 44 percent in the fruit specialty districts of Arghandab and Dund to less than 1 percent in Darweshan. Fruit in Dund is largely grapes, whereas in Arghandab there are pomegranates, grapes, and apricots, with pomegranates having the largest acreage.

Alfalfa and clover are grown over the entire area, although the amount varies widely from one district to another. In Marja 13 percent of the cropped land was in these crops, while in Panjawai and Maiwand it was only 1 percent.

Table II shows no cotton being grown in the Arghandab River districts. Interviews were conducted here in 1963 and were based on the 1962 crop year. This is just about the time the cotton program was getting started in this area. During 1964, more than 30,000 jiribs were planted to cotton in these districts and the plan is for further expansion in the future. Cotton in Darweshan occupied 38 percent of the cropped area during the year of survey. This high percentage was probably due to the H. V. A. regulation for landowners to grow 15 percent of their entire farm in cotton. As indicated in Table I, only about 55 percent of the land in Darweshan was cropped. Fifteen percent of the owned land is equal to 28 percent of the cropped land. Part of the difference between this 28 percent and the 38 percent shown in Table II may be due to sampling error. Shamalon district also grew a relatively large part, about 30 percent, of its cropped land in cotton. The situation here was similar to that indicated in Darweshan, although a larger proportion of the Shamalon land was farmed.

Yields

Determination of average crop yields was one of the major objectives of this study. Table III presents yield data in muns per jirib for the main crops grown in each district. This table also shows a value in Afg per mun for each crop grown and a calculation of Afg per jirib for these crops. The values per mun for the different crops are similar to those received by farmers in recent years.

In studying Table III, it would be well to bear in mind several facts. The errors due to smallness of sample may be relatively large in crops such as barley, corn, rice, apples, and melons where few of the farmers contacted grew these crops. The value of crops per jirib is useful as a comparison of gross income received from different crops. However, much more labor and other expense is necessary to produce some crops, such as fruits and vegetables than for other crops such as wheat. Probably the yield reported for fruits, especially in the Arghandab River area, was lower than normal because a heavy frost reduced production the year of the survey. Realizing this problem at the time of interviewing we attempted to compensate for it by basing our yield figures on the farmer's estimate of average production on his farm over several years. However, we feel they are still considerably lower than actual production in a normal year. Grape production is shown to be higher in Shamalon and Darweshan than in Arghandab and Dund. This is probably not true, but may be explained by the fact that the survey was conducted in different years in the two areas, with much heavier frost in the year we interviewed Arghandab farms.

Table III shows that gross income per jirib for wheat is high in relation to most other crops. In Arghandab district, wheat income at Afg 620 per jirib is higher than income from any of the following crops: barley, corn, cotton, mung beans, hay, grapes and raisins. As suggested above, however, weather may have been responsible for the low yield of grapes and raisins. In Dund, wheat shows a higher value per jirib than any other crop, while in the Helmand River districts of Marja, Shamalon, and Darweshan, it shows a greater value than cotton, corn, and mung beans. Value per jirib of alfalfa and clover hay is also high in relation to several other crops. Returns from alfalfa are higher than from cotton in all districts except Nod-i-Ali, and in Shamalon and Darweshan alfalfa returns are also higher than wheat.

Table II

AREA OF CROPS PER FARM AND PERCENT OF FARMLAND IN EACH CROP
By District--1963-1964

Crop:	Arghandab		Dund		Panjawai- Maiwand		Nod-i-Ali		Marja		Shamalon		Darweshan	
	Jiribs ^{1/}	% of Farm	Jiribs	% of Farm	Jiribs	% of Farm	Jiribs	% of Farm	Jiribs	% of Farm	Jiribs	% of Farm	Jiribs	% of Farm
Wheat and barley	6.8	40.3	12.5	51.8	20.3	85.9	16.0	78.9	14.2	65.3	18.2	54.8	42.0	58.6
Corn	1.5	9.1	--	--	--	--	--	--	--	--	1.5	4.5	.2	.4
Rice	--	--	--	--	--	--	1.0	4.9	--	--	--	--	--	--
Cotton	--	--	--	--	--	--	.2	1.0	3.1	14.2	9.8	29.5	27.1	37.9
Mung beans	.4	2.1	--	--	.1	.2	1.1	5.4	.6	2.9	1.3	3.9	.4	.6
Alfalfa and clover	.3	1.7	1.0	4.1	.2	.7	1.2	5.9	2.9	13.4	1.2	3.6	.6	1.3
Grapes	2.2	12.8	7.6	31.6	3.1	13.2	.7	3.4	.4	2.0	.4	1.2	.8	.4
Pomegranates	2.9	17.1	.2	.8	--	--	--	--	.3	1.4	--	--	--	--
Apples	--	--	.6	2.3	--	--	--	--	.1	.3	--	--	--	--
Apricots	2.3	13.3	2.2	9.4	--	--	--	--	.1	.3	--	--	--	--
Other fruit	--	--	--	--	--	--	--	--	--	--	.5	1.5	--	--
Melons and watermelons	.1	.4	--	--	--	--	.1	.5	--	--	--	--	.1	.3
All vegetables	.5	3.2	--	--	--	--	--	--	--	--	.3	1.0	.3	.5
TOTAL	17.0	100.0	24.1	100.0	23.7	100.0	20.3	100.0	21.7	100.0	33.2	100.0	71.5	100.0

^{1/}One jirib = one-half acre.

Table III

YIELDS AND VALUE OF CROPS PER JIRIB
By District--1963-1964

Crop:			Arghandab		Dund		Panjawai-Maiwand		Nod-i-Ali		Marja		Shamalon		Darweshan	
	Value in Afg per mun	\$ U.S. per cwt	Muns/jb ^{1/}	Afg/jb ^{2/}	Muns/jb	Afg/jb	Muns/jb	Afg/jb	Muns/jb	Afg/jb	Muns/jb	Afg/jb	Muns/jb	Afg/jb	Muns/jb	Afg/jb
Wheat	15	2.30	41.3	620	71.5	1,072	37.0	555	7.3	110	18.0	270	41.1	616	31.0	434
Barley	10	1.53	31.4	314	49.1	491	30.0	300	5.4	54	20.0	200				
Corn	9	1.37	40.3	363	16.0	144							52.7	474	26.6	239
Rice	20	3.06	--	--	--	--			9.6	192	--	--	--	--	--	--
Cotton	19	2.91	20.0	380	--	--			6.3	126	11.3	215	23.1	439	8.0	152
Mung beans	10	1.53	15.9	159	--	--			5.2	52	10.2	102	18.1	182	11.9	119
Alfalfa and clover hay	4	0.61	106.3	425	128.0	512	--	--	8.4	34	60.3	241	213.0	825	132.5	530
Grapes	12	1.84	50.9	611	51.5	618	--	--	14.8	178	39.6	475	171.0	2,052	140.5	1,686
Raisins	50	7.65	10.0	500	17.0	850	12.3	615	--	--	--	--	--	--	--	--
Pomegranates	6	0.92	119.9	719	36.0	216	--	--	33.3	200	60.0	360	79.0	474	--	--
Apples	30	4.60	36.1	1,083	13.3	399	--	--	--	--	--	--	--	--	--	--
Apricots	15	2.30	146.3	2,194	33.0	495	--	--	--	--	100.0	1,500	100.0	1,500	--	--
Apricots (dry)	30	4.59	37.6	1,128	25.0	750	--	--	--	--	--	--	--	--	--	--
Melons and watermelons	5	0.77	325.9	1,630	50.0	250	--	--	--	--	--	--	100.0	500	111.9	560
All vegetables	10	1.53	198.6	1,986	--	--	--	--	--	--	--	--	220.0	2,200	--	--

^{1/}One mun/jb = 20 lb/acre.

^{2/}One Afg/jb = U.S. \$0.0308/acre.

FARM MANAGEMENT PRACTICES

Farm management practices were observed and discussed with farmers during the interviews. These included such things as a determination of whether the land was all farmed each year or if part of it was allowed to lie fallow, amount of double cropping, fertilizer use, rotation of crops, kind of plowing and other tillage methods, etc. Yields and income depend to a great extent on farm management practices used.

Irrigation

Benz and Holmgreen^{1/} stressed the importance of double cropping and suggested that as much additional yield could be attained from double cropping all available land as from bringing in that many acres of new land and at only a fraction of the cost. Why, then, is not more double cropping done? Why, in fact, is much land still left idle each year? To try to find answers to these questions, all farmers were asked if they had enough water for all their land. For those who replied that they did, we asked, "Why do you not farm all of your land?" and, "Why do you not grow more summer crops after wheat?"

Tables IV and V show results of these questions.

Table IV

ADEQUACY OF IRRIGATION WATER
By District--1963-1964

	Arghandab	Dund	Panjawai- Malwand	Nod-i-Ali	Marja	Shamalon	Darweshan
	Percentages						
Enough water (reported "Yes")	74	35	11	96	96	77	95
Land farmed	67	73	62	61	92	70	55
Reasons for not farming all land: (reporting "Yes")							
Land not productive	38	34	--	79	56	44	21
Not enough fertilizer	14	--	--	--	1	--	--
Lack of labor and capital	7	--	--	12	--	7	25
High water table	--	--	--	2	--	--	--

Table IV shows a wide variation in adequacy of irrigation water reported by farmers. About 74 percent of the farmers in Arghandab indicated they had enough water. In Dund

^{1/}"The Helmand Valley, An Overall Review," John S. Benz and E. N. Holmgreen. U. S. Agency for International Development/Afghanistan, November 22, 1962.

the percentage was only 35 and in Panjawai and Maiwand it dropped to 11. In the Helmand River area, water supply was more adequate. Shamalon district indicated greater deficiency than other areas. Nearly one-fourth of the farmers in Shamalon said their water supply was not sufficient. Most of the Darweshan, Marja and Nod-i-Ali farmers reported enough water. Only 4 or 5 percent felt they were short. (These few may have been at the end of the ditch and had difficulty getting water when they wanted.)

Table IV shows the proportion of land farmed during year of survey. It varied from 55 percent in Darweshan to 92 percent in Marja. Other districts farmed from 61 to 73 percent of their available land each year. Thus 27 to 39 percent of the land in these districts was left idle each year. Obviously part of the land was left idle because there was not enough water. Other important reasons, however, were given by farmers who said they had enough water and were still leaving part of their land idle. The percent reporting each of these reasons is shown in the last four lines of the table. Lack of productivity of land was the major reason mentioned. Lack of labor and capital and insufficient fertilizer were other important reasons.

Double Cropping

Double cropping is not practiced widely in Helmand Valley. The percentage of farmers doing some double cropping varied from none in Panjawai and Maiwand to 47 percent in Shamalon (Table V). Actually, it is likely that a few farmers grew some summer crops on wheatland in Panjawai and Maiwand, but they did not happen to fall in our sample.

The percentage of land which was double cropped is considerably lower than the percentage of farmers who did some double cropping. It varied from none in Panjawai and Maiwand and 1 percent in Darweshan to only 10 percent in Arghandab. Dund, Nod-i-Ali, Marja, and Shamalon showed 4, 5, 6, and 7 percent of their lands being used for a second crop.

Table V
DOUBLE CROPPING
By District--1963-1964

	Arghandab	Dund	Panjawai- Maiwand	Nod-i-Ali	Marja	Shamalon	Darweshan
	Percentages						
Farmers who did some double cropping	25	7	0	12	37	47	4
Land double cropped	10	4	0	5	6	7	1
Reasons for not more: (those reporting enough water)							
Lands not fertile enough	35	48	25	74	72	34	27
Double crop decreases fertility	--	5	--	--	6	28	10
Enough water for one crop but not for two	3	--	75	--	--	8	--
Cannot get or do not have enough fertilizer	13	14	--	2	6	3	--
Lack of capital	--	8	--	4	3	5	25
Land too salty	--	--	--	6	1	5	23
Too many weeds	--	--	--	2	1	--	--

Reasons given for not growing more double crops were similar to reasons given for not farming all land. Lack of sufficient fertility to grow a second crop was mentioned repeatedly by farmers throughout the Valley. This reason was emphasized especially by farmers in Nod-i-Ali and Marja. A number of farmers said that their land lacked fertility to grow one good crop. How, then, they asked, could they hope to grow two? Lack of the fertilizer necessary to grow a second crop was mentioned several times in Arghandab

and Dund. In Shamalon a number of farmers indicated they could grow a second crop, but that it would deplete the soil fertility for the next crop so much that it was not worth the trouble.

Several Panjawai and Maiwand farmers said they had enough water for a first crop, but not enough for a second. In this predominantly wheat area, there was probably a real shortage of water between the time of harvesting one crop and planting of the next--the time when a summer crop would be grown. Lack of capital and land being too salty were emphasized in Darweshan as reasons for not growing summer crops.

There is no question that a program to increase the growing of summer crops would be a good thing. Our study has emphasized that to be successful it must be accompanied by a program that will increase the fertility of the land. This might be done through adding of animal manures or commercial fertilizers, or the growing of soil-building crops, or some combination of these practices.

Livestock

Livestock raising is common among farmers throughout the area. Practically all farms have some livestock, but few farms have many animals. The most popular livestock are oxen, milk cows, donkeys, sheep, and goats. Horses and camels are also found on a few farms. Chickens are produced on most farms; turkeys and ducks are found only occasionally.



Figure 7. --Many farms in Helmand Valley have a few head of livestock usually cared for by children. There are no fences.

Oxen, donkeys, horses and camels furnish power and transportation for farms in the area. Cows are kept for milk, sheep and goats for meat, milk, and wool. Ghee, the popular cooking fat, is produced from sheep and goat milk. A similar product, rogan, is produced from cow's milk. Chickens are raised for meat and eggs. Chicken is preferred over other meats in the Valley. Details of livestock numbers and inventory value per farm appear in Table VI.

Average livestock numbers per farm varied widely from one district to another, Oxen, for example, ranged from 1.2 per farm in Shamalon to only .5 in Dund (Table VI). Milk cows ranged from 1.3 in Shamalon to .3 in Nod-i-Ali. Sheep and goats varied from 2.5 and 3.8 per farm in Nod-i-Ali and Marja to .2 and .3 in Dund and Arghandab, respectively. Donkey numbers were more uniform throughout the area, averaging about one to every two farms. Chickens on hand at the time of survey ranged from 4.1 in Arghandab to .7 in Dund. (This does not consider the number that might have been raised and eaten during the year.)

Table VI
LIVESTOCK NUMBERS
By District--1963-1964

Species	Value per head (Afg)	Arghandab		Dund		Panjawai- Maiwand		Nod-i-Ali		Marja		Shamalon		Darweshan	
		Number per farm	Value per farm (Afg)	Number per farm	Value per farm (Afg)	Number per farm	Value per farm (Afg)	Number per farm	Value per farm (Afg)	Number per farm	Value per farm (Afg)	Number per farm	Value per farm (Afg)	Number per farm	Value per farm (Afg)
Oxen	2,000	.75	1,500	.53	1,060	.69	1,380	.63	1,260	.88	1,760	1.16	2,320	1.00	2,000
Milk cows	1,500	.78	1,170	.67	1,005	.64	960	.33	495	.53	795	1.31	2,155	.89	1,335
Other cattle	800	.80	640	.67	536	.67	536	.27	216	.46	368	.85	680	.63	504
Donkeys	1,000	.55	550	.46	460	.42	420	.38	380	.46	460	.52	520	.51	510
Sheep and goats	350	.30	105	.23	81	.58	203	2.54	889	3.76	1,316	.76	266	1.80	630
Horses	2,500	.04	100	.04	100	.03	75	.01	25	.04	100	.09	145	.04	100
Camels	3,000	--	--	--	--	.04	120	.14	420	.02	60	.10	300	.25	750
Chickens	25	4.12	103	.67	17	1.75	44	2.06	52	2.00	50	2.90	63	1.60	40
Turkeys and ducks	50	--	--	--	--	--	--	.03	2	.07	4	.12	6	--	--
Total value	--	--	4,168	--	3,259	--	3,738	--	3,739	--	4,913	--	6,455	--	5,869

While not large in number per farm, livestock are very valuable to the farm economy. Most farmers are dependent entirely on oxen as a source of power. Livestock products represent a considerable proportion of the family living. Investment in livestock runs from Afg 3,259 per farm in Dund to Afg 7,059 per farm in Shamalon. Oxen represent the largest item of livestock investment, usually accounting for at least one-third of the total. Milk cows are the second largest item in all districts except Nod-i-Ali. Here sheep and goats are worth more than milk cows. In Marja also, sheep and goat investment is larger in relation to other livestock species. Probably the reason for the heavy investment in sheep in Nod-i-Ali and Marja is that many of the settlers in these areas were recruited from among the Kochis. Before coming to the project their major source of living had been from sheep raising.

Commercial Fertilizer

Commercial fertilizer is not used extensively in the Helmand Valley. Several years ago it was first imported and used in small amounts for demonstration and experimental trials. During the past 3 years larger amounts have been brought in although the tonnage still is low. Records from H. V. A. indicate these amounts: 1962--424 tons; 1963--218 tons; 1964--246 tons. The Agricultural Bank in Kabul imported this fertilizer from the Soviet Union and H. V. A. bought a supply from the bank. The first 2 years only ammonium nitrate was brought in. During the past year some superphosphate was also included in the shipment. The ammonium nitrate probably tested about 33 percent nitrogen; the superphosphate, about 18 percent P_2O_5 .

H. V. A. paid about Afg 25 per mun (\$U.S. 3.77 per cwt.) for the ammonium nitrate in Kabul. Transportation cost for the 400 miles from Kabul to the Valley would amount to an additional \$U.S. .77 per cwt. The total cost of ammonium nitrate laid into the Helmand Valley would be about \$4.54 per cwt.

H. V. A. has tried to encourage farmers to use this fertilizer by selling it to them at cost or less than cost and allowing them to pay for it out of their cotton receipts. Each extension district has been given a quota of fertilizer to sell. The commercial fertilizer program has gone along with the cotton program. Since there has been an active extension and cotton program in the Helmand River districts these are the areas where most emphasis has been given to the commercial fertilizer program. Our interviews in Arghandab River districts and Nod-i-Ali did not cover commercial fertilizer. However, we feel that there is relatively little of it used in these areas.

Data were obtained on commercial fertilizer use in three districts--Marja, Shamalon, and Darweshan. Extension agents indicated that farmers offered considerable resistance to the use of this fertilizer. It was not easy to convince them that it would be to their advantage to use it. The study shows that about 45 percent of the farmers in Marja, 42 percent in Shamalon, and 52 percent in Darweshan had used commercial fertilizer at some time. About 70 percent of the farmers who had used it in Marja and Darweshan and 55 percent of those who had used it in Shamalon indicated they felt the results were good. Another 7 to 15 percent said the results were only fair. The remainder--15 to 28 percent--indicated they felt the results were not good. If the farmer was not sure of the results, his comments were considered to be negative. Other negative comments ranged from those who said the fertilizer did not improve their yields at all to those who admitted some improvement but said the increased yields were not large enough to pay the added cost.

Farmers who had never used any commercial fertilizer were asked the reasons. The major reason mentioned in Darweshan was that no one had given them any (52 percent) or they didn't know about it (21 percent). Another 16 percent indicated it was not available. The remaining 11 percent said the cost was too high or they did not have enough money to buy it. This reason of high cost or insufficient money was given by more than 80 percent of the Marja farmers. A reason for not using commercial fertilizer in Shamalon which was not mentioned in the other districts was that they did not need it or their land was sufficiently productive without it. About 22 percent of the Shamalon farmers who did not use commercial fertilizer gave this as the reason.

Animal Manure

All farmers seemed to have some knowledge of the value of animal manure to their land. Despite this knowledge, there were still considerable amounts of manure dried and burned for fuel. Some details concerning the use of manure as a crop fertilizer were secured in only two areas--Shamalon and Darweshan.

In Shamalon, 77 percent of the farmers said they used manure on their farms; in Darweshan it was 42 percent. All except one man indicated they got good results from the manure they used. None of the farmers had enough to cover all their land. The limited amount available was usually concentrated on a small area. Two-thirds of those who used manure applied it to 5 jiribs or less. The amount applied varied widely. Average rate in Shamalon was about 6,000 pounds per jirib or 6 tons per acre. In Darweshan it was about 4,200 pounds per jirib or a little more than 4 tons per acre.

Animal manure was used mostly on land being prepared and planted to wheat. Often it was hauled on donkeys, but it was also common practice to move the house and livestock area from one place to another each year or so. Mud walls were leveled and ashes as well as human and animal excreta were incorporated into the soil in the area where the buildings and yards had been. Usually this moving was done in the summer between the time of harvesting one wheat crop and planting of the next. Wheat is usually planted in these fertile areas. With this extra amount of organic material and soil fertility the wheat grows rank and thick. It is referred to locally as "khaseel," and is usually cut by hand and hauled to livestock, although sometimes it is also grazed. Almost every farmer has at least a small plot of wheat which he can use as khaseel. He relies heavily on it as a source of livestock feed during late winter and early spring, a period when food is short from other sources and yet is so badly needed.

Green Manure

No questions were asked specifically about green manure. However, observations indicated relatively little use of this practice. Farmers in some areas seemed to be aware of the value of alfalfa and clover as soil-building crops. But the need for every bit of vegetation that could be grown on the land for use as livestock feed was a real problem for most farmers. It is also difficult if not impossible to do a good job of turning under standing vegetation as a green manure crop with the present equipment. The practice of going over the land several times with this equipment incorporates part of this vegetative material into the surface of the soil. Less total power is required and a more effective job of covering is being done by a few farmers who are using the small moldboard plow.

There was more comment about the value of clover as a soil builder in Marja than in other districts. This may be associated with the practice of plowing under clover as a green manure crop at the mechanized farm in the Marja area. Farmers may have been told of the value of this practice and they could observe it for themselves.

Spreading Soil from Old Ditchbanks

It was common practice throughout the older farming areas--all except Nod-1-Ali and Marja--for farmers to haul silt which had accumulated in their farm ditches and laterals onto their land. The silt was dug out of the old jui (ditch) banks where it had lain for many years, hauled on donkeys, dumped into small piles, and spread on the land before plowing. This richer soil undoubtedly added some nutrients as well as improving the soil structure and tilth. It may be considered as a substitute for an inadequate supply of animal manure.

In Shamalon and Darweshan farmers were asked specific questions about this activity. About half of the farmers in Shamalon and about one-fourth of those in Darweshan indicated they did some of this work. Man-days worked per farm per year hauling and spreading soil varied from 4 to 60 in Shamalon and from 4 to 90 in Darweshan, with an average of 16 and 21 in the two areas, respectively. Almost without exception, the farmers reported they felt this practice resulted in better yields. Two of them said results were only fair, two others said they felt this soil produced as good results as animal manure. The other three who volunteered this comparison felt manure produced better results than the soil.

Land Leveling

Generally the topography of the land in the Helmand Valley is good. Large cuts and fills over most of the area are not necessary to make the land so it will irrigate well. The system of irrigating with small basins enclosed by border dikes makes it possible to cover most lands without further leveling. However, small leveling jobs can help improve water distribution on many farms. This activity was observed over much of the area studied. In three districts, farmers were asked about their land-leveling program. Nearly two-thirds of the Marja farmers, a little over half of the Shamalon farmers and almost one-third of the Darweshan farmers, said they did some leveling. Average number of man-days spent per year in leveling in these areas were 22, 17, and 24, respectively.

In Marja about half of the leveling was reported to be done by hand with only the use of a shovel. In Shamalon, on the other hand, it was practically all done with oxen. To carry out this procedure the land is first plowed to make the soil loose. Then the oxen are hitched by light chains to a board called a "racol." This board, with iron facing along the bottom, is held vertically by the ox driver. Soil is picked up from the high places of the field and pulled in front of the racol to the lower places where it is deposited and spread. In Darweshan about two-thirds of the leveling jobs were done with oxen and racol and only about one-third by hand.

Crop Rotation

Crop rotation as such has not been practiced extensively by farmers in the Helmand Valley. Throughout much of the Valley in the past, wheat has been "rotated" in alternate years or every third year with idle or fallow land. Alfalfa and clover in relatively small amounts have been grown in some areas. It is not possible to practice effective crop rotation where most of the crop grown each year is wheat and where some of the remainder is in permanent crop such as fruit orchards. In recent years, since cotton has been introduced as a requirement on every farm except in Nod-i-Ab, there is more opportunity to rotate crops on part of the land. One advantage of the contemplated H. V. A. program to require farmers to grow alfalfa or other crops such as sugar beets or oil seed is that an effective rotation might be worked out on each farm. This should serve to maintain and even increase soil fertility. Growing rice in some high-salt areas that have proper drains and are amenable to leaching should also improve availability of soil nutrients. When rice is grown it should be included in the crop rotation so that all fields on the farm will eventually receive the advantage of this program.

Mechanization

Over the past 4 or 5 years large blocks of land have been used in mechanized demonstration farms. Most of this has been done in Marja, but 1 year part of it was also carried out in Darweshan. The machinery was brought in and the program started by the Indamer Company. Later, as the operation expanded, H. V. A. joined with Indamer and for 2 or 3 years the mechanized farm was operated by joint agreement of the two. In 1965 Indamer sold its interest in the machinery to H. V. A. The plan is for H. V. A. to continue with a mechanized farming operation on a reduced basis. Part of the land formerly farmed with machinery is being assigned to new settlers.

The mechanized farm operation was set up to demonstrate the feasibility and possible Valley-wide acceptability of mechanized farming and to train men in the operation of farm machinery. These objectives have been only partially attained. Tractor drivers have been trained and some maintenance men and mechanics have been trained to repair tractors and other farm machinery. A crop rotation of wheat, cotton, and clover for a green manure crop has been followed. Some commercial fertilizer has been applied. H. V. A. officials expected substantial increases in yields over those obtained by farmers using their own equipment and methods on similar land. Some increase was achieved but not nearly as much as had been expected.

Numerous problems have been associated with the mechanized farming operation. Part of these problems may have grown out of the fact that the operation was not completely mechanized. Cotton was planted by hand. No cultivators were used to try to control weeds. Fertilizer spread by hand lost some of its potential effectiveness. With the large operation and limited labor supply it was not possible to get all work done at the right time. In addition, hired workers took much less interest in doing a good job than they might have done had they been farming their own land.



PX-D-50931

Figure 8. --Farmers usually store their wheat in this type of homemade mud-covered storage bins. Although most of them said this storage was adequate, there was some loss from insects and rodents. The willow mat on top keeps birds out.



PX-D-50932

Figure 9. --A mechanized demonstration farm has been operated in Helmand Valley for several years. It has served a useful purpose. Part of the land formerly in the mechanized farm is now being assigned to new settlers.

Besides training tractor drivers and mechanics, some of the major benefits to come out of the program so far have been that a few farmers have seen the operation and have bought tractors of their own. H. V. A. has encouraged this by offering tractors for sale with an attractive financial arrangement whereby the farmer could pay with one-third down, one-third at the end of the first year, and one-third at the end of the second year, with no interest charges. About 13 of the more prosperous farmers throughout the Valley have taken advantage of this offer and bought tractors and put them into operation during the past 3 years. There are still a number of problems, however, which need to be worked out before even a modest program of this kind can be successful. These include a better system of tractor maintenance and a better financing and credit program. Most farms are small, making it essential that the owner of a full-size tractor find other work to help pay costs of operation and accumulate funds for replacement. Several problems are inherent with ownership of large tractors and small parcels of land. It may be that smaller sizes and other types of tractors would be more practical.

If H. V. A. continues to push the use of these large tractors, several possibilities are apparent: (1) A group of farmers could go together and with encouragement and financial assistance from the government, work together in a cooperative arrangement whereby they could buy and operate tractors; (2) the present program of selling to private individuals who would work their own farms and then do work for other farmers on a straight custom basis could be continued. This program would also require a better program of credit; (3) H. V. A. might wish to cut their mechanized farming operation further, and with tractors and machinery they already have on hand, expand custom work to farmers.

Many observers feel that inadequate farm equipment and machinery is one of the important limiting factors to increased production in Helmand Valley. Some feel that this inadequacy and need should be filled by a program of rapidly pushing the full-scale mechanization of farming in all its aspects, perhaps along lines followed in the United States. Others take an opposite view. Labor here is very inexpensive, they say, and any mechanization development should come very slowly. Perhaps it will never reach the stage found in some highly developed countries.

Our position is somewhere between these two extremes. We agree that present farm equipment is definitely inadequate. However, what to do is not immediately apparent. For example, the small moldboard plow is a case in point. Considerable work has been done on it in the Valley. Mr. Dale Fritz has adapted one handle to the plow instead of two, thus overcoming some of the objections of the farmer. Numerous demonstrations have been held but still there is considerable resistance, some of which may be justified. This plow has some definite advantages but also a few disadvantages. Deep, open dead furrows or back furrow ridges are not easy to level with present hand- or ox-drawn equipment. Does the advantage of turning the soil with the moldboard outweigh the disadvantages of the furrows or ridges? Would a simple disc plow that could be reversed so that oxen could continue to plow back and forth as they do now do as effective a job of preparing seedbed and controlling weeds? The point is that we do not know. It would take a well-designed experiment under a variety of field conditions to find out.

The whole question of mechanization versus conventional methods should be thoroughly investigated. This should include a study of how far mechanization should go and the sizes and kinds of machinery and equipment best adapted to conditions of the Valley. A continuing program of research on better farming equipment and machinery--both animal-drawn and tractor-drawn--should be carried on. In this way the development that comes will be on a sound, economic basis.

Farm Equipment

At the present time the great bulk of land is plowed by oxen with a homemade wooden plow. All plows have points which are cast from steel. There is not much gravel or rocks in most of the soil so the plow points generally last a full season or longer. The ground usually is plowed from 3 to 5 inches deep. Plowing is done after irrigation when the land is still moist and less power is required. Some farmers plow several times before planting wheat or cotton, others only once or twice. Wheat is sown broadcast by hand on top of the ground and then plowed to cover. The land is usually smoothed and the seed further covered by use of a wooden implement made of two logs or poles joined together in a T-shape and pulled by oxen. The farmer usually rides on the log to help do a better job of breaking up clods and smoothing the field.

As described in the section on land leveling, a "racol" is sometimes used with oxen to help move soil from high parts of a field to lower parts. If land is leveled it is done before planting. Other equipment is mostly handtools such as shovels for irrigation, grubbing hoe type of implements for cutting camel thorn and other heavy-rooted plants, and various-sized sickles or knives with curved blades and serrated edges used for cutting grain, "khaseel," alfalfa, weeds, etc.

Extension agents in the Helmand River districts indicated that farmers irrigated wheat four to five times, cotton five to seven times and alfalfa seven to eight times.



Figure 10. --Many farming practices have not changed very much in Helmand Valley over the centuries. Farmers sow wheat by hand. Later they plow the land to cover the seed and perhaps use a small pole T-shaped leveling device to do a better job.

The number of times irrigated depends on the type of soil, the season, and the farmer himself. In most cases in the Helmand River districts there was sufficient water so this was not a problem. Insufficient water was a serious problem in some parts of the Arghandab River districts. Sometimes farmers felt they wanted to irrigate their winter wheat again during the 40-day period in December and January when water was out of the canal during the annual maintenance period. Observation indicated, however, that most wheatfields were not hurt from lack of water during this 40-day period.

Weed Control

Weeds, such as camel thorn, Bermuda grass, nut grass, bindweed, and dodder, are a serious problem over much of the area. Observations of the farmland during field interviews bore out the severity of the problem, especially in localized areas. The problem seems to be worse generally in the Helmand River area than in the Arghandab River area. One reason for this might be more intensive farming and cultivation in some parts of the Arghandab. It is felt that in some areas weeds contributed more to low yields than did high water table, salt, or poor drainage. Factors contributing to the severity of the weed problem might be listed as follows: (1) The inadequacy of the stick plow to cut the roots and turn under the weeds; (2) the lack of mechanical cultivators of any kind to cultivate between the rows; (3) the high cost of chemical sprays, and (4) the attitude of farmers about weeds.

Officials of H. V. A. are aware of the weed problem to some extent. In the past relatively little has been done on an organized program basis to deal with this problem.



Figure 11. --After the wheat has been sowed and covered, two men with a shovel and rope make dikes or borders around small tracts throughout the fields to aid in irrigating. This basin type of irrigation conserves water. If the land is properly drained it can also aid in leaching salts out of the soil.



Figure 12. --Most of the land in the Helmand Valley is plowed with a homemade wooden plow with a steel point. The farmer also holds a wooden yoke used on his oxen. These simple items are about all the farm equipment a farmer uses.

The Extension Service is making plans and beginning to emphasize weed control. Considering the very high cost of weeds in terms of lower crop yields, a further concerted effort should be put forth to solve the weed problem. Detailed recommendations are presented in Appendix III.

Insect Control

Much more has been done in controlling insects than weeds. H. V. A. has assigned a man full time to this field. He checks continually on outbreaks of insects and supervises their control. During the past few years a number of training programs have been conducted for extension agents on insect control. Help with these programs has been provided by USAID entomologists.

A good start has been made in insect control but still loss from insects is heavy at times. The program needs to be pushed and extended. More education and training needs to be given farmers so that they can do most of the work themselves. Insect infestation should be anticipated and a good supply of proper chemical sprays and means of applying it should always be kept on hand.

Marketing

Even though much of the farming in Helmand Valley is of a subsistence type where only a minimum amount of the production is offered for sale, marketing is still a serious problem. As mentioned elsewhere, wheat is the major crop because it is the major food staple. If a farmer produces more wheat than he needs for his family he can always sell or trade it. However, the seasonal fluctuations in grain prices are very wide. In order to meet payments on loans, many farmers are forced to sell their wheat at harvest time when prices are lowest. Often prices at this season are less than costs of production. If the farmer were able to keep his wheat until winter when prices have risen he might receive several times the cost of production. As indicated previously, however, a large snare of the farmers who sell wheat sell at harvesttime.

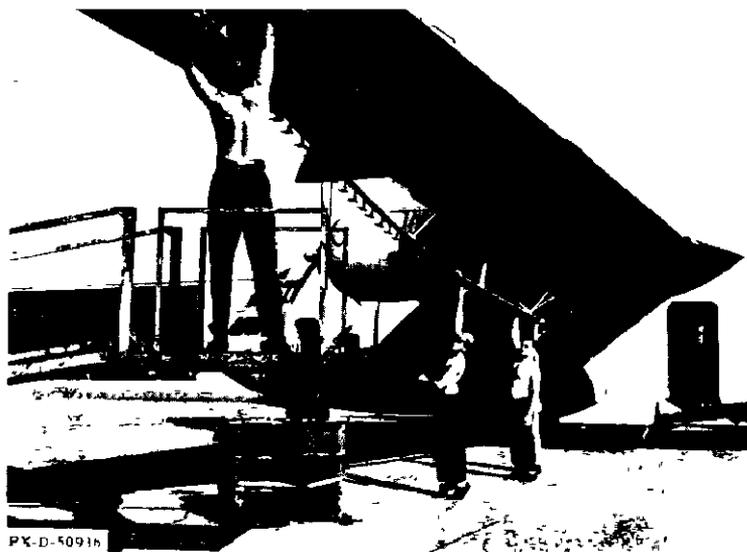


Figure 18. --When insect infestations occur, spraying equipment, including aircraft-mounted types, is used for effective control.

Farmers growing cotton are assured of a market. H. V. A. requires each farmer to plant a certain part of his land to cotton and buys all the cotton produced at considerably below world market price. H. V. A. gins and sells the cotton at the market price. While the farmer has no problem finding a market for all the cotton he can produce, he has a

real problem finding a market price that makes the growing of cotton really attractive. Although this program brings revenue to the government in lieu of taxes or water charges, we feel that it would be preferable to encourage private development of cotton processing and marketing, rather than continuing government ownership. Income to the government would then come through a broader tax base of these privately owned processing facilities. The farmers might be happier and more willing to produce if they were paid full value for the products they raised.

Markets for fruit vary with the year and with the area of the Valley where the fruit is grown. There is usually a market for all fruit produced in the Arghandab River area. If the year is good, with no frost damage and high production, prices are usually low. Much higher prices are generally associated with lower yields. Fresh grapes find outlets in the neighboring countries of Pakistan and India after the local market is saturated. Many grapes are dried into raisins and the market is thus greatly extended. A major problem in fruit marketing is that handling, packing, sorting, and grading are inadequate. There is also a problem of slow transportation from the more remote areas. This is particularly difficult in the case of the more perishable fruits such as fresh grapes. It means that often fruit produced in excess of the needs of the family or perhaps a small local market might be wasted. Better roads and transportation facilities are helping to improve this situation, but much remains to be done.

Storage Facilities and Crop Sales

As indicated previously, many of the farms are of the subsistence type, and a minimum of the crop is sold. Most of the wheat was consumed on the farms where it was produced. However, some wheat was sold. To get information on these transactions we asked farmers in two districts if they sold any wheat or corn. Those that did were further asked in what season of the year they sold. If it was at harvesttime when prices were always low we asked why they sold at this time.

Results of this study showed that about 30 percent of the farmers in Shamalon and 42 percent of the farmers in Darweshan sold some wheat or corn. Most of the farmers that did sell--63 percent in Shamalon and 87 percent in Darweshan--sold at harvesttime. The prevailing reason given for selling at harvest time was the need for money for various obligations. Nearly half of the Darweshan farmers mentioned the need for money to pay their taxes. About one-fourth of the farmers in each district said they had loan obligations, usually for wheat, which came due at harvesttime.

Farmers reported almost without exception that they stored their wheat at their homes, usually in a cylindrical mud-type bin. Two-thirds of the Darweshan farmers and nine-tenths of the Shamalon farmers who reported that they stored wheat indicated they felt the bins were adequate. Some reported problems with mice or other rodents.

PRODUCTION FACTORS

It was felt desirable to try to establish a relationship between certain production factors and wheat yields. Findings generally substantiated our belief that low yields were associated with shortage of the factors of production. In making these comparisons we used wheat yields because wheat was the only crop grown universally by farmers throughout the Valley.

Capital

Not all of the farmers had oxen. These men usually plowed their land with borrowed or hired oxen. When capital was short, as evidenced by lack of ownership of oxen, wheat production was lower. In Marja the farms with no oxen had an average of 46 percent less yield than farms that had oxen. In all other districts there was also a difference in average yields between farms that had oxen and those that did not, although the differences were less than those in Marja. In Nod-i-Ali the yield of "no-oxen farms" was 36 percent less than the "oxen farms." In Arghandab the yield was 37 percent less, in Panjawai-Maiwand it was 31 percent less, in Dund 29 percent less, in Darweshan 28 percent less, and in Shamalon 21 percent less.

A further check was made between farms that had only a single ox and those that had more oxen in Nod-i-Ali and Marja. It was found in Nod-i-Ali that farms with two or more oxen received an average of 45 percent greater yield than farms with only one ox. In Marja the average yield of farms with two or more oxen was 63 percent greater than farms with only one.

Management

In an attempt to measure the effect of management on production, settlers in Nod-i-Ali and Marja were asked whether they had had farming experience before coming to the project. When management know-how was short as evidenced by lack of farming experience, wheat yield was found to be lower. In Nod-i-Ali, average yield of farmers who had no previous farming experience was 29 percent less than yields of those who had experience. In Marja, average yields of inexperienced farmers was only about 5 percent less than yields of experienced farmers. This difference may not have been significant. Since nearly all farmers in the other districts had had experience farming for many years it was not possible to check this factor for its significance in those areas.

Labor

In an attempt to measure the effect of labor application on yield it was assumed that farmers living at their farms rather than in the villages would spend more time working on their land and that there would also be much greater and more effective use of family labor. A number of farmers in Nod-i-Ali had built houses on their land and had moved from the village to the farms where they were living on a permanent basis. Others lived on their farms only during the seasons of planting and harvesting. Nod-i-Ali settlers who lived on their land, either continuously or part-time, were getting an average of 63 percent greater yield than farmers who lived in the village. We also found a 30-percent greater yield among village settlers who said they preferred to live on their farms than among those who preferred the village.

None of the Marja settlers had moved from the villages to their farms. Probably a major reason for this was that H. V. A. settlement officials had learned from the experience in Nod-i-Ali and had planned much smaller villages and located them nearer to the farms. Thus there was less necessity for Marja farmers to live right on their land, since many of them were very close and none were really far away. Even with this better location setup, however, we found a relation between closeness of residence to farmland and yield. Average yield of Marja settlers who lived next to their land was more than one-third greater than yield of those who lived further away.

More effective use of labor can be translated into such things as more thorough and effective land preparation, irrigation, and weeding. But there were undoubtedly other factors in addition to more effective use of labor that helped account for higher yields of settlers who lived on or near their farms. These include better use of animal manure and other wastes, because of nearness for hauling these items, and more effective use of animal power and equipment.

As a further check on the relation of labor and capital to production, yields of farmers with small and large acreages were compared. It was assumed that more labor was expended per jirib on the smaller acreages than on the larger ones. This was also probably true of capital. More intensive land preparation and fertilization were likely to be supplied to the smaller than to the larger acreages. In every district there was a sizable difference in yield in favor of the smaller acreages. In Dund, for example, average wheat yield on the large acreages was 12 percent less than on the small ones. In Arghandab and Shamalon this difference was about 20 percent; in Panjawai and Maiwand the difference was 24 percent; in Nod-i-Ali and Darweshan it was about 36 percent; and in Marja it was 55 percent.

CROP YIELDS

One of the major objectives of the study was to try to determine how crop yields at the time of interview compared with yields before the dams, canals, and irrigation works were built. All farmers who had lived and worked in the area over the entire period were asked whether their yields now were generally higher or lower than 10 years ago (before the irrigation works were built). After this question had been answered, they were asked how much higher (or lower) yields were now than they had been 10 years ago. Answers were converted into a percentage figure--yield per jirib at the present time expressed as a percentage of yield per jirib 10 years ago. Settlers who had come to the project since the dams and canals were built were asked how their present yields compared with the yields the first year they farmed their land. These answers were also converted to percentages and analyzed in the same way as answers from farmers in the other districts.

Nearly all farmers who were interviewed responded to these questions. Following are the percentages developed from the farmer interviews.

<u>District</u>	<u>Present Yields as Percentage of Yields 10 Years ago</u>
Arghandab	74
Dund	120
Panjawai-Maiwand	111
Nod-i-Ali	$\frac{1}{22}$
Marja	$\frac{1}{51}$
Shamalon	58
Darweshan	37

1/These figures represent crop yields of settlers now expressed as a percentage of yields the first year they farmed the land.

Despite the good coverage we received on this question we have some misgivings about the reliability of the answers. Yields vary from year to year depending on weather, insects, and crop diseases, as well as on availability of water. It is difficult for farmers to remember what happened 10 years ago. Time seems to have an ameliorating effect on what people remember about yields in past years. They tend to forget the bad years and remember only the good ones. Thus if there is an error in the figures it would probably be on the side of being too low: That is, the percentage which the present yield was of yield 10 years ago may be higher than shown.

Even though the figures themselves may not be strictly reliable, they have value in indicating the relation between the various districts. Perhaps the most valuable result from this phase of the study is to find and examine the opinions farmers gave for yields being higher or lower.

Opinions as to Higher Yields

The major opinion held as to the reason for higher yields now than 10 years ago was that there was more water available now. This was the only opinion given in Arghandab and Darweshan and the main one in Dund, Panjawai-Maiwand, and Shamalon. An additional opinion expressed in Panjawai-Maiwand was that water was now available throughout

the season, whereas before the dam and canals were built, it was usually not possible to get water on some lands later in the season. Some Shamalon farmers said drains dug in recent years had helped account for higher yields. Relatively few settlers in Nod-i-Ali and Marja said they were getting a higher yield now than the first year they farmed their land. These few farmers thought their higher yields were due to: (1) Land being more fertile now as a result of using green manure; (2) tractor plowing that helped increase the yield over oxen-plowed land the first year they farmed, according to some Nod-i-Ali settlers; (3) drains dug in the land has improved yield; (4) their work and good-farming practices that had helped build up the land and increase yields, according to some of the better Marja settlers.

Opinions as to Lower Yields

Most Dund and Panjawai-Maiwand farmers said their yields 10 years ago, before the building of dams and irrigation works, were lower than now. There were some, however, who indicated lower yields now. Most who held this opinion felt there was less water available now. (Possibly these farmers were located at the lower ends of laterals with limited capacity.) When the dams and main canals assured a definite supply of water throughout the season, farmers on the upper reaches of the laterals began farming more land, leaving less water for the farmers down the ditch. This same problem--water shortage now resulting in lower yields--was also mentioned by a few farmers in Arghandab and Shamalon. The same location problem suggested above would probably apply in these areas.

A number of farmers in the upper end of Arghandab believed their yields were decreased now because silt that had formerly spread over their land to enrich the soil each spring was now being trapped behind the dam. Others felt that the colder irrigation water now was reducing their yields. More frost damage to fruit trees in recent years and the fact that trees were getting older were other reasons mentioned for lower yields now.

It was surprising to find that most farmers in Shamalon and Darweshan indicated their yields were lower now than before the dams and irrigation works were built. Opinions advanced as to the reasons for lower yields were as follows:

(1) Cotton that they are now required to grow takes much fertility out of the soil, reducing yields of wheat and other crops planted afterwards. This problem was stressed especially in Shamalon.

(2) Increased water table, salt, and drainage problems that had been accentuated as a result of building the major canals, in the opinion of a number of farmers in both areas.

(3) The more adequate and dependable water supply allows farmers to farm more of their land every year, rather than letting part of it remain fallow. The farmers felt that this continuous cropping reduced soil fertility and cut yields per jirib. This problem was emphasized especially in Darweshan;

(4) An increase in weeds since building the canal was also mentioned frequently in Darweshan.

Settlers in Nod-i-Ali and Marja thought lower yields now as compared with those the first year they farmed their land can be summarized in three categories:

(1) The soil basically is poor, lacking in fertility. When they first farmed the land it contained some fertility because it had lain for many years without being cropped. Yields were quite good the first year but gradually decreased afterwards. This problem was stressed especially in Nod-i-Ali.

(2) A severe water table, salt, and drainage problem has developed and contributed greatly to reduced yields. This problem was emphasized particularly by Nod-i-Ali settlers, but was mentioned frequently also in Marja. A few farmers in Nod-i-Ali recognized their water-table problem was aggravated by the conglomerate barrier under their land and mentioned this specifically as a factor contributing to their drainage problem.

(3) Weeds, especially camel thorn, and the inability of farmers to deal effectively with them was mentioned as often as the problems of poor land and inadequate drainage in Nod-i-Ali. Some Marja settlers also recognized this problem but they did not seem to be as concerned about it as farmers in Nod-i-Ali.

Observation confirmed the severity of the weed problem throughout the area. It may have developed worse in Nod-i-Ali than in some other districts because of the relatively large tracts each farmer was trying to farm, his lack of incentive to farm his land intensively because of its poor quality and the fact that many of the farmers were spending most of their time working at jobs off the farm so they did not have time to do a good job of farming.

FARM FAMILIES

Information was secured from all farmers about family size and composition, their tribe, and in some districts how long they had lived and farmed in the area. Settlers in Marja and Nod-i-Ali also reported information on their desire to live on their farms or in the village and the reasons for their choice.

Family Size

A family was considered to be all people living under one roof. It often included only the farmowner or operator and his wives and children. Frequently, however, it also included a father, a mother, a married son and his wife, or a brother, uncle or nephew who may or may not have been married.

Family size varied considerably from one district to another. The largest families were found in Arghandab, with an average of 9.7 people including adults and children. The smallest were in Panjawai-Maiwand and Marja with 5.2 and 5.4 people, respectively.

Table VII shows details of family size for both children and adults for each district.

Table VII

AVERAGE FAMILY SIZE By District--1963-1964

District	Children			Adults			Family members		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Arghandab	2.0	2.3	4.3	2.8	2.6	5.4	4.8	4.9	9.7
Dund	2.1	.7	2.8	1.9	1.4	3.3	4.0	2.1	6.1
Panjawai-Maiwand	1.7	.6	2.3	1.4	1.5	2.9	3.1	2.1	5.2
Nod-i-Ali	1.8	1.6	3.4	1.8	2.0	3.8	3.6	3.6	7.2
Marja	1.1	1.2	2.3	1.6	1.5	3.1	2.7	2.7	5.4
Shamalon	1.8	1.8	3.6	2.3	2.5	4.8	4.1	4.3	8.4
Darweshan	1.4	1.8	3.2	2.2	2.6	4.8	3.6	4.4	8.0

While a weighted average was not computed, it would probably be somewhat over 7 people per family for the entire area studied. There seems to be some difference in numbers of male and female children in some districts, particularly in Dund and Panjawai-Maiwand where the number of boys are shown to be nearly three times as high as the number of girls. Part of this may be error due to smallness of sample. We attempted to draw the line between children and adults at about 13 years of age. All districts had more adults than children. In one district, Darweshan, the number of adults was 1-1/2 times as great as children. The largest number of children in relation to adults was found in Nod-i-Ali, where the average was 3.4 children and 3.8 adults in each family.

Experience

As indicated earlier, the Helmand Valley is being farmed by two types of farmers--long-time residents and new settlers who have come in from other areas to farm new project lands. Specific questions about this subject were asked only of farmers in the

Helmand River districts. Most of the Shamalon and Darweshan farmers reported that they and their ancestors for many generations had lived and farmed in the area. Some of their people had been here longer than anyone had any record of. Only a very small number, except for settlers on new project lands, had come to the area in recent years. This was probably also true in the Arghandab River districts.

Tribal Origins of Settlers

Following are tribes found in each district:

Arghandab	Dund	Panjawai-Maiwand	Nod-i-Ali
Alikozai Barberi Tokhi Hotak Ludin Popalzai Mohammadzai Tajik Taraki Batakhail	Nurzai Barakzai Popalzai Barberi Baluch Mohammadzai Kakar Tarin	Nurzai Ishaqzai Alikozai Kakar	Kharuti Slemankhail Arab Daftani Kakar Baluch Tajik Taraki Achakzai Wardaki Abrahimkhail Shahikhail Mahikhail Molathail

Marja	Shamalon	Darweshan
Daftani Wardaki Barakzai Arab Alizai Tajik Slemankhail Achakzai Naser Abrahimkhail Safi Shahikhail Mohikhail	Barakzai Nurzai Popalzai Sayyid Esaqzai Tajik Achakzai Wardaki Baluch Shahikhail Safi	Alizai Nurzai Barakzai Popalzai Arab Tajik Baluch Slemankhail Tarin

Close examination of the record indicates that Barakzai, Nurzai, Popalzai are probably the most widespread and numerous of the tribes represented.

Settlers in Nod-i-Ali and Marja

Most of the settlers in Nod-i-Ali had come to the project when it was opened about 1954. A few had come more recently to accept farms that had been abandoned by earlier settlers. In Marja, most of the settlers had also come when the project was opened in about 1959, and a few had come more recently. Most of the Nod-i-Ali settlers had been nomads, but some had been landless farmers from other parts of the country. Marja settlers were about half nomads and half landless farmers. The former places of residence many of the settlers said they had lived were Wordak, Ghazni, Laghman, and Mukor.

At the time Nod-i-Ali was settled, H. V. A. officials felt there would be many advantages to the people if they all lived in villages rather than in houses on their own units. Consequently, seven villages with fairly large sun-dried brick houses and a large central mosque and bazaar area in each were planned and laid out. The villages were designated by letters,

A, B, C, etc., for easy reference by H. V. A. officials, but they were also given Pashto names by the local residents. There were 1,300 families settled in Nod-i-Ali originally. At the time of the survey 1,118 families were on record, a difference of 182. Actually, more than this number of families had left the project, but some who had left had been replaced with new settlers. Following is a list of the letter designations and names of the Nod-i-Ali villages, the approximate number of settlers, and the number of tribes living in each village at the time of the survey.

Letter designation	Village name	Meaning	No. settlers	No. tribes
Village A	Shinkalay	Blue Village	206	2
Village B	Khushal Kalay	Happy Village	100	1
Village C	Luy Bagh	Big Garden	300	5
Village D	Zerghunkalay	Green Village	350	6
Village K	Naqalabad	Built by Settlers	50	2
Village E	Groupa Shash	Group Six	40	2
--	Chah Mirza	Mirza's Well	55	2

Settlers Living on Farms or in Villages

After they had observed the farming operation of settlers in Nod-i-Ali for a number of years, H. V. A. officials began to question whether it was better to locate new settlers in villages or on their own farms. Some farmers in Nod-i-Ali villages have to walk 4 kilometers to their units. There is no question that farming efficiency is greatly reduced in these cases. Several of the better farmers have left the villages and built houses on their farms. A few of them live on their farms the year around, but others live there only seasonally during land preparation, planting, and harvesting.

Realizing this problem of too-long distances in Nod-i-Ali, H. V. A. officials planned villages in Marja that were designed to accommodate only a limited number of families. Groups of 25 to 30 families were so located in the village that every man's house was as near to his farm as possible. The distance varied from a few meters to about 1 kilometer. Even though the greatest distance is much less than it is for many of the farms in Nod-i-Ali, some of the farmers have become concerned about the disadvantages of living in the village. Some farmers have asked and been granted permission to build houses on their farms. Realizing that the closer a settler lives to his farm the more successful he is likely to be, H. V. A., since 1960, has eliminated the establishment of villages as such. It has adopted a new policy under which each new settler builds his house on his own farm along the road according to an approved plan. At the time of the survey more than 30 families had been settled in Marja on the basis of this new policy.

In order to gain further information that would be useful in determining the feasibility of moving Nod-i-Ali settlers to their farms, H. V. A. officials asked us to query all settlers interviewed about their desire to live in the village or on their farms.

We found only one farmer in our sample in Nod-i-Ali who had moved to his farm on a permanent basis. About one-third of all Nod-i-Ali settlers, however, said they lived on their farms seasonally. At the time of the interviews 17 percent were living on their farms.

As indicated, Marja settlers did not have the problem of very long commuting distances to their farms. Consequently most of them continued to live in the villages. However, when asked if they would prefer to live in the village or on their farms, more than half indicated a preference for the farm. Just half of Nod-i-Ali settlers said they would prefer to live on their farms. Actually these figures may be a little misleading because many of the settlers who indicated a preference for the village gave as the reason the fact that their land was very near their houses in the village.

Other major preferences for living in the village were for protection of the families and personal property and for association with friends; so that they could be near the mosque for convenience in praying; for protection of the house and other buildings as required by H. V. A. regulations; the farmland was so poor that it was not worth farming,

and therefore there was no use to live on the farm; and, finally, the village location is more convenient to go to a job off the farm.

Major reasons for preferring to live on the farm were for convenience in working the land; so that animal manure could be used on the land without a long haul; and nearly half of those who preferred to live on the farm indicated a desire to do a better job of farming and gave this as a reason.

FARMERS' ATTITUDES AND PROBLEMS

A farmer's actions are based on his attitudes and feelings. Before a worthwhile program can be developed to help Helmand Valley farmers it is necessary to determine their attitudes and to find out what their actual problems are and what they feel their problems are. To do this we discussed these questions with all farmers interviewed.

Landlord-Tenant Relationship

Land in Marja and Nod-i-Ali was distributed to settlers on the basis of what settlement officials considered to be family-size units--the amount of land that could be farmed by a man and his family and that would provide an adequate living. In most cases the settler was farming his land himself; tenants were used relatively little. In other districts, however, most farmers kept tenants. Since tenant labor is so inexpensive--only one-fifth of the crop--many landowners, as soon as they feel they can afford it, contract with tenants to do most of the work on their farms. Larger landowners have more than one tenant. The number varies with the area of land owned. Small landowners who have only one or two tenants frequently work with them in the field. Large landowners with several tenants usually only supervise. Most work on these farms is done by tenants. Frequently, however, the landowner also hires additional men to help do seasonal work such as planting and harvesting. These men also were usually paid in wheat or other farm products. The largest number of tenants was found in Darweshan because of the large landownership pattern in that area. It was common for tenants to work year round. However, some worked only seasonally. This was particularly true where farming was confined to growing only wheat. Tenants would often work only one season--from time of plowing and planting in October or November until after harvest in May or June.

Opinions as to Prosperity

Crop yields now compared to those 10 years ago were discussed on page 29. Happiness and prosperity among Helmand Valley farmers are related generally to their crop yields. However, this does not always apply. The attitude expressed by some farmers was that whatever happened was the will of Allah and therefore, happiness would not vary from 1 year to another, regardless of crop yields. A much larger proportion of the farmers in Nod-i-Ali than in the other districts seemed to be discouraged. In Arghandab, likewise, a large proportion of the farmers said they were less happy and prosperous now than they had been 10 years ago. In several of the other districts--Panjawai-Maiwand, Marja, and Shamalon--farmers were quite equally divided in their attitudes of more or less happy and prosperous.

Darweshan farmers mostly said there was no difference in their happiness and prosperity, whereas a majority of the Dund farmers indicated greater happiness and prosperity now.

Major reasons given by farmers who indicated more happiness and prosperity now, and the districts where they lived were as follows:

- (1) Production is greater now--all Arghandab River districts, Shamalon, and Darweshan.
- (2) More water now--Dund, Panjawai-Maiwand, and Shamalon.

(3) More sure water supply now--Dund and Panjawai-Maiwand.

(4) Living standard is higher or greater income now--Panjawai-Maiwand, Marja, and Shamalon.

(5) The government helps more or provides greater security and protection--Darweshan.

A few additional reasons for greater happiness now were given by some of the Marja and Nod-i-Ali settlers, many of whom had been nomads. Several of these settlers were pleased that they were now landowners--they did not have to move continuously, their children were able to go to school, and it was more healthful here.

Reasons given by farmers who indicated less happiness and prosperity now, and the districts where these farmers lived were as follows:

(1) Production is less now--all Arghandab River districts and Darweshan.

(2) Not enough water now--all Arghandab River districts and Shamalon.

(3) Cost of living is higher now--all Arghandab River districts and Shamalon.

(4) Lower standard of living now or land is less productive now--Helmand River districts.

(5) Water now is controlled by the government--Dund and Panjawai-Maiwand.

(6) Taxes are higher now--Panjawai-Maiwand, Shamalon, and Darweshan.

(7) Market is not as good now--Arghandab.

(8) Larger family to support now--Arghandab, Dund, and Darweshan.

(9) No silt deposited on land and colder irrigation water now--Arghandab.

(10) Must work harder now--Dund and Panjawai-Maiwand.

(11) Has to farm himself now--Arghandab.

(12) Making less money now--Arghandab.

(13) More frost and hail in recent years to damage fruit--Dund.

(14) No other work is available or H. V. A. won't let us do it--Helmand River districts.

(15) Dissatisfaction with cotton program--Darweshan.

Drains

Most farmers living in areas where the water table and the salt content were high seemed to realize the importance of drains. Only in the districts of Marja, Shamalon, and Darweshan, however, were specific questions asked about drains. There was a wide variation from one district to another and within districts in the need for drains. Usually in areas where need was greatest, such as in the lower end of Darweshan, farmers recognized this need. These farmers were petitioning the government to dig drains for them.

Most farmers who commented felt that drains generally were useful. This attitude was expressed by 93 percent of the farmers in Shamalon and 88 percent in Darweshan. Several farmers, however, expressed apprehension about the loss of farming land if an open drain were dug through their property. This problem is easy to understand when we consider the fact that many farms are already too small to produce more than a subsistence living. A drain 8 or 10 meters wide would take a substantial proportion of a man's 10-acre farm, a much greater share than would be taken if his farm were 100 or 150 acres. This would suggest the advisability of a careful study of the feasibility of tile drains in some areas.

There was also a wide variation in the maintenance being given to drains in various parts of the project. Some drains were being maintained by farmers; others, including all of the larger drains, by H. V. A. 's O&M section. Most of the drains looked as though they were being kept clean. In a few cases, however, weeds and tules were being allowed to clog the drains and render them less effective.

Roads

Roads were built by the construction company along all major canals, some of the larger laterals, and the outlet drains. These roads are very useful to farmers living in the area. According to statements from most farmers, however, present roads were adequate. Two-thirds of the farmers in Darweshan and five-sixths of those in Shamalon said they did not need more or better roads. Probably a major reason for this attitude is that the bulk of all produce is still transported on the backs of animals. However, as the country develops and more produce is hauled by wheeled vehicles, more and better roads will be essential.



Figure 14. --As the country develops, better roads will be needed. A modern road recently completed is contrasted with the centuries-old method of transporting goods and agricultural commodities.

Problems Recognized by Farmers

Many of the problems mentioned by farmers have already been covered in the sections on their opinions for lower production now and for less happiness and prosperity

now. Farmers were asked specifically about their problems only in the last three districts covered--Marja, Shamalon, and Darweshan. In all districts, however, problems were brought out in the course of the interviews. Different problems were emphasized in the different districts. Some of the problems farmers seemed most concerned about are listed below. These problems were recognized by most farmers affected. However, some farmers who had problems did not recognize them as such.

- (1) Poor land, lack of fertility with consequent low production, and low standard of living.
- (2) Salt, high water table, and need for drains.
- (3) Not enough water, particularly at the lower end of ditches of limited size where more land is now being farmed at the upper end.
- (4) Lack of capital to buy better oxen or other power and farm implements.
- (5) Weeds.
- (6) Inadequate farm size--not enough land.
- (7) Insect pests.
- (8) Increase in taxes.
- (9) Requirement to grow cotton.
- (10) Inadequate markets, low prices.

Methods of dealing with some of these problems will be discussed in the sections on Recapitulation of Problems and Recommendations.

Problems not Recognized by Farmers

Some of the most serious problems encountered by farmers were not recognized by them as such. Several of these are discussed below.

Capital Needs. One of the most important problems is the dire need for capital by most farmers, together with the extremely difficult credit situation. A government-sponsored agricultural bank makes loans to larger landowners who have adequate security. The smaller subsistence farmers, however--those with greatest need for credit--are unable to get it except from well-to-do landowners or merchants at exorbitant interest rates. These farmers do not recognize the need for a revamped credit system as a problem because they don't know how it might operate in solving their capital shortage problems.

Lack of Management Know-how is another serious problem not recognized by farmers. Good farmers who have farmed in the area for generations have learned many profitable ways of doing things. They still do some things, however, which are definitely not profitable. For example, because of their urgent need for feed for livestock especially in the spring, they cut alfalfa down close to the ground surface, sometimes even cutting the crown of the plant. Alfalfa is also often cut when it is too young--only 6 or 8 inches high. Both of these procedures greatly reduce the total production of alfalfa. Farmers throughout the Valley generally try to keep more livestock than the lands in their present condition will adequately carry. Good growth and gains cannot be put on because most of the feed produced is used for body maintenance--to keep the animals just above the starvation level. Many more total pounds of livestock could be produced if available feed were used on fewer animals.

Lack of Education and Basic Knowledge is another of the more serious handicaps not recognized by farmers. This is a broad problem and includes a lack of knowledge of higher producing crop varieties and livestock species, a lack of knowledge and use of the wheel as an aid in transporting farm products, a lack of knowledge of the profitability of commercial fertilizer application. Illiteracy accentuates many other problems and makes it difficult to teach better management and better production practices.



Figure 15. --A typical shallow drain associated with saline-alkali soils shows that the area needs better drainage to relieve water table.



Figure 16. --Alfalfa grows well in the Valley. Its growth should be encouraged to increase the livestock feed and help build better soils as a part of a good crop rotation. Care should be taken not to cut the alfalfa too close to the ground.

FISCAL CONSIDERATIONS

Financing the development of an irrigation project is not the same in all countries. In the United States, the Government recovers all construction costs chargeable to irrigation, without interest. These costs plus the annual charge for operating and maintaining the irrigation system are paid by the settler, usually over a period of 50 years. Government policy in Afghanistan has been that an irrigation project such as this in the Helmand Valley has certain intrinsic values to the nation as a whole by providing homes and means of a livelihood for a part of the population which had not enjoyed these things in the past. For this reason costs of dams, canals, drains, etc., are not recovered from settlers but are borne by the national government. This policy affects land values, settlement policy, taxation, and methods of government financing.

Land Values

Land has been farmed in this Valley for hundreds, perhaps thousands, of years. Before the dams and present canals and laterals were built, water was diverted from the river through canals built and maintained by the farmers. Some land also was irrigated from collection wells and intermittent flowing streams. Without water storage the agriculture was unstable, as the amount of water taken from the streams and rivers varied with seasons and the dry and wet cycle years.

Construction of the storage dams and diversion dams and of irrigation works to assure a more stable water supply has increased the value of land in the Valley. It is difficult to determine market value of lands because little land has been sold. To attempt to arrive at an equitable land value, farmers in the areas of Shamalon and Darweshan were asked the value of their farmland per jirib. There was a wide variation in estimated value, from a low of Afg 200 per jirib for one farm in Darweshan, to a high of Afg 20,000 per jirib on one farm in Shamalon. This means a range from about \$6 to \$600 per acre at the current rate of Afg 65 per dollar. This variation reflects differences in location and land quality as well as differences in farmers' ideas of land values. Neither of the extremes seems to be reasonable. It would be questionable if any irrigated land in the project would be worth only \$6 per acre. Also no land was producing enough to warrant a price of \$600 per acre. Farmers in Group I of Shamalon, the area nearest to Bost, indicated an average value of their land as Afg 6,635 per jirib, \$204 per acre. The average of the whole Shamalon area was computed to be Afg 3,541 per jirib or about \$109 per acre. In Darweshan, on the other hand, the average was reported as only Afg 754 per jirib or \$23 per acre. Location and greater distance from market undoubtedly has an influence on the value placed on the land in Darweshan. However, there was surely not this much difference in the actual value of the land in the two areas.

Construction costs for dams and irrigation works are several times as high as the value of land reported in Darweshan. Farmers probably have no idea of this high construction cost and therefore did not consider it when placing values on their lands. These farmers attitudes were very likely influenced by the policy of the government as explained above.

The current tax structure contains a token amount--from 1 to 2 Afg per jirib--for operation and maintenance. This is probably less than 2 percent of the actual cost of the

O&M function. Up to this time no attempt has been made to assess a realistic charge for operation and maintenance, although H. V. A. officials have indicated they recognize this is a legitimate charge and that eventually it will be assessed and collected.

Farm Costs and Returns

A basic part of any economic analysis is the determination of costs and returns. It was difficult to get accurate and full information on costs and returns in this study. Part of the data are relatively definite; others required judgement. All costs and returns are shown in Tables VIII and IX.

Table VIII
ESTIMATED ANNUAL FARM COSTS
By Districts--1963-1964

Item	Arghandab	Dund	Panjawai- Maiwand	Nod-i-Ali	Marja.	Shamalon	Darweshan
<u>Income:</u>	(Values in Afg)						
1. Gross revenue per farm*	15,119	18,243	13,379	3,940	7,325	21,934	27,473
<u>Costs:</u>							
2. Seed	521	570	936	753	644	885	1,962
3. Land tax	238	418	289	142	160	241	508
4. Livestock tax	16	12	13	16	19	23	22
5. Depreciation and death loss--oxen	287	203	264	241	337	444	383
6. Depreciation--donkey	88	74	67	61	73	83	101
7. Depreciation--camel	--	--	9	32	5	23	58
8. Depreciation and repair--equipment	187	187	187	187	187	187	187
9. Livestock feed	351	613	68	156	400	1,261	282
10. Interest on land at 3%	4,320	7,920	2,200	232	210	4,674	2,895
11. Interest on livestock at 5%	208	165	191	187	246	353	293
12. Interest on inventories at 5%	39	33	43	40	44	71	74
13. Operation and maintenance	984	1,804	1,517	2,015	1,560	2,860	8,320
14. Hired labor	3,024	4,255	2,770	0	732	4,387	5,230
15. Total of above costs	10,263	16,254	8,554	4,062	4,617	15,492	20,315
16. Net farm income	4,856	125	5,299	(122)	2,707	6,442	7,158
17. Minimum living cost	13,285	9,315	7,940	10,994	8,246	12,827	12,216
18. Income deficit	8,429	9,190	2,641	11,116	5,539	6,385	5,058
19. Jiribs of land per farm	24	44	37	31	24	44	128
20. Jiribs farmed per farm	17	24	24	20	22	33	71

*See Table IX.

Notes on Table VIII:

Line 1, Gross revenue per farm is a summary of revenue from each crop variety and each livestock product as detailed in Table IX.

Line 2, Seed cost was computed by using common seeding rates in the area and the same values per mun as used in revenue figures.

Lines 3 and 4, Land and livestock tax, were computed at the standard rates used throughout the country. These are shown on page 49.

Line 5, Depreciation and death loss--oxen. Each ox was considered to have a value of Afg 2,000, a period of use of 5 years, and a salvage value of Afg 750. The depreciation then was Afg 250 per year. Annual death loss was considered to be 20 percent. Thus, 20 percent of 2,000 or Afg 400, about two-thirds of which was salvageable, makes a death loss cost of Afg 133.

Line 6, Depreciation--donkey. Each donkey was considered to have a value of Afg 1,000, a period of use of 5 years, and a salvage value of Afg 200. Thus 1,000 minus 200 equals 800; 800 divided by 5 equals 160; Afg 160 is the annual depreciation.

Line 7, Depreciation--camel. Camels were valued at Afg 3,000, given a salvage value of 700, and a period of use of 10 years. Thus, depreciation was computed to be Afg 230 annually. Death loss was not considered as a cost for either donkeys or camels because part of these animals were females which produced offspring to replace any death loss that may have occurred. This increase was uncertain and was not considered as part of the farm revenue.

Line 8, Depreciation and repair of equipment. Farm equipment values were considered to be the same on all farms. An average value of Afg 350 was used. With an estimated life of 3 years, the annual depreciation would be Afg 117. Repair was considered as 20 percent of the value of the equipment or Afg 70, making a total cost of Afg 187.

Line 9, Livestock feed. Most farms were short on livestock feed. Little or none was produced for sale. All alfalfa and barley shown as revenue in Table IX was considered as livestock feed. Half of the corn produced was considered as livestock feed, and half as food for the family. Wheat straw, an important source of livestock feed, was used largely on the farm, although small amounts may have been sold. No accounting of straw was made on either the revenue or cost side.

Line 10, Interest on land. Value of land in two of the districts was based on average values as reported by farmers. In Darweshan it was Afg 754 per jirib, in Shamalon Afg 3,541. Settlers in Nod-i-Ali and Marja did not have deeds to their land. There, land was valued by H. V. A. at Afg 250 per jirib and charged at this rate to the settlers. This may have been a reasonable rate for undeveloped land but certainly would be only a small part of what the settler may sell his land for after he gets title to it. However, since this is the amount the settler owes on his land, it is the rate we used.

Farmers in the Arghandab River district were not asked about land values. It seemed reasonable to consider this fruit land near to Kandahar to be worth about as much as land in the area of Shamalon nearest to the city of Bost. Thus, Arghandab and Dund lands were valued at Afg 6,000 per jirib. Some of the lands in the grape vineyard area of Panjawai are quite valuable. Other lands in Maiwand, especially those a long way from water supply and markets, have a value more in line with the average reported in Darweshan. As a reasonable compromise we assigned these lands an average value of Afg 2,000 per jirib. Following is a recapitulation of land values per jirib used in computing interest costs.

Assumed Land Values per Jirib

Arghandab	Afg 6,000
Dund	Afg 6,000
Panjawai-Maiwand	Afg 2,000
Nod-i-Ali	Afg 250
Marja	Afg 250
Shamalon	Afg 3,541
Darweshan	Afg 754

Interest on land value was assumed at 3 percent. This may seem low. However, there is a certain pride in ownership of land in this country that make farmers hesitate to dispose of it even though the investment is earning little or nothing. Thus, 3 percent for land may not be out of line.

Lines 11 and 12, Interest on livestock and inventories at 5%. Inventory values of livestock and equipment were used. One-half the value of feed and seed inventory was considered because these items were probably on hand only about half of the year before they were used.

Line 13, Operation and maintenance. At present no charge is being made for operation and maintenance of the dams and irrigation and drainage systems or for replacement of machinery and equipment needed in this work. H. V. A. officials recognize that the government should not go on indefinitely providing this service. An equitable charge should be made. It will vary from one district to another and even within districts, depending on the extent of the government-constructed works that are being maintained. The annual budget for the O&M Department in recent years has been about Afg 10 million. If this were divided equally over 400,000 jiribs it would amount to Afg 25 per jirib. The H. V. A. O&M budget includes all labor, fuel, repairs, and other current operating expenses. It also includes purchase of a small amount of new equipment. However, it does not include an allowance for replacement of the major equipment. This would increase the cost considerably. Preliminary investigation has indicated that the charge might reasonably be expected to be about Afg 65 per jirib for the land served by government-constructed irrigation works--canals, laterals, and drains--and about Afg 17 per jirib for the areas benefiting only from the dams. The Helmand River districts were all considered at the Afg 65 rate. Since part of the land in the Arghandab River area was under government-constructed irrigation works and part was under private diversions and ditches, the O&M rate used was Afg 41--the average of 65 and 17.

Line 14, Hired labor. Data were not secured on hired labor costs. This figure varied considerably by district and by farm within each district. In few cases was it very high. Many farmers had tenants. As indicated elsewhere, one-fifth of the value of the crop was the common share paid where the tenant furnished only labor. It was also common practice for a landowner to hire men to help with wheat harvest. This was true in some cases even if he had a tenant. A few of these farmers may have paid more than one-fifth of their gross revenue for hired labor. Others had little or no hired labor. Women and children as well as men and boys helped with cotton picking. Usually family members picked the cotton although hired workers also picked small amounts. For lack of better information we assumed the hired labor was one-fifth of the gross farm revenue in all districts except Nod-i-Ali and Marja. In Marja, where settlers did most of the work, we considered hired labor to be one-tenth of the gross farm revenue. There was probably less hired labor in Nod-i-Ali than in Marja. Since there was no income left in Nod-i-Ali to pay labor, either operators or hired, we considered that there would be no hired labor here.

Line 15, Total costs. This figure represents all costs including hired labor.

Line 16, Net farm income. This is the return to family and operator--labor--as well as the operator's management. It is derived by subtracting all other costs (Line 15) from gross farm revenue (Line 1). It may be noted that costs exceeded gross farm income in Nod-i-Ali.

Line 17, Minimum living cost. In the summer of 1964 we made a detailed study of farm operations in Marja. Here we found that a farm family of 5.4 people required an

income of Afg 8, 246 for a minimum living. The living costs for other districts were based on the Marja figure. They are larger in most cases because of the larger families in these other districts.

Line 18, Income deficit. Line 17 shows the assumed minimum amount needed to support each family; Line 16 shows the amount available for this purpose. In each district there is a shortage, the amount needed being greater than the amount available. Line 18 shows this difference.

In most districts the minimum living-cost is two to three times as large as the amount available. The question might reasonably be asked how these farmers were getting along. The answer lies in several facts: The government at present is not requiring the payment of the O&M charge shown in Line 13; interest charges assumed on the farmer's investment in land, livestock, and equipment as part of the farm costs (Lines 10 and 11), are not actually paid and our study indicated that most farms are not earning this interest; many farms have an additional source of income from off-the-farm employment, as discussed elsewhere in this report.

All three of these items help account for the difference between needs and available farm income. The farms should produce enough to pay O&M charges. As short as capital is in this country, a man's investment in farm and equipment should surely be able to earn a reasonable amount of income. This is a legitimate cost and the farm should produce it. A farmer should not have to work away from his farm to earn enough income to support his family. The farm should be of a size and productive capacity so that it will produce a good living with reasonable application of labor and management skill. It should produce a surplus for the more diligent and intelligent farmers.

There are undoubtedly several reasons for low farm revenue in relation to costs. One of the most important is the low production of most crops per jirib and the low production of milk, eggs, and meat per unit of livestock. Low production is caused by many factors which are discussed elsewhere in this report.

The averages given in these figures are a little misleading since they do not show the range of farm size. Many farm units are too small. Another reason for low farm revenue in relation to costs is that only about two-thirds of the land is farmed each year. This is shown in Lines 19 and 20 of Table VIII. Also, relatively few farmers attempt to do very much double cropping.

Table IX presents gross revenue in Afg per farm. It gives detail by crop and livestock product and covers all production, whether sold or used at home. Wheat and barley are reported together in Shamalon and Darweshan. In Marja a single figure, Afg 557, represents other field crops than wheat and cotton. This is mostly alfalfa and clover, fed green or cut for hay, although it may also include a little corn, barley, and mung beans. Prices represent typical prices received by farmers at the time of the survey. As indicated elsewhere in this report, revenues from fruits, especially in the Kandahar area, may normally be higher than the figures shown because of the heavy frosts during the year of survey.

The number of each species of livestock on the farms were secured in the survey. However, we were not able to get detailed figures on production of livestock products. Values used in Table IX were derived by multiplying the numbers of each species by production factors which had been secured in a special study made in the summer of 1964.*

Table X presents a summary of gross farm revenue from crops and livestock and also shows outside income per farm. This is shown in Afg per jirib converted to dollars per acre. One of the major virtues of this table is to point out that low production can be overcome to some extent by larger acreages. For example, note a comparison between Darweshan with an average farmed area of 71 jiribs (35.5 acres) and Arghandab with an average farmed area of only 17 jiribs (8.5 acres). The gross farm revenue per jirib in Darweshan--Afg 387 (\$12 per acre)--is lowest of all districts except for the new settlement areas of Nod-i-Ali and Marja. The large acreage per farm, however, makes the

*See page 10, "Economic Analysis of Marja Farms, Helmand Valley, Afghanistan," by I. M. Stevens, et al, Helmand Valley Regional Development Project, November, 1964.

total gross revenue of the Darweshan higher per farm than any other district, more than Afg 27, 000 per jirib (\$432 per farm). In Arghandab, on the other hand, where gross revenue per jirib is highest--Afg 889 (\$27 per acre)--the small acreage makes the total gross revenue only Afg 15, 119. This is only a little more than half as much as Darweshan.

Table IX

ESTIMATED GROSS REVENUE PER FARM FROM CROPS AND LIVESTOCK
By District--1963-1964
(Values in Afg)

Crop	Value per mun	Arghandab	Dund	Panjawai-Maiwand	Nod-i-Ali	Marja	Shamalon	Darweshan
Wheat	15	3,195	10,980	9,975	1,712	3,438	11,220	19,470
Barley	10	70	77	40	12	--	--	--
Corn	9	513	--	--	6	--	729	36
Alfalfa and Clover hay	4	24	536	28	144	557*	896	264
Rice	15	--	--	--	180	--	9	--
Mung beans	10	50	--	--	59	--	240	50
Cotton	19	--	--	--	12	664	4,313	4,104
Grapes	12	1,392	1,020	36	101	--	468	564
Raisins	50	250	2,020	1,800	--	--	--	--
Pomegranates	6	2,130	36	--	--	--	24	--
Apples	30	--	210	--	--	742	--	--
Fruit	--	--	--	--	--	--	240	--
Fresh apricots	15	2,100	390	--	--	--	30	--
Dry apricots	30	2,040	1,110	--	--	--	--	--
Melons and squash	5	180	--	--	32	--	--	--
Vegetables	10	70	--	--	--	179	280	190
Potatoes	12	864	--	--	--	--	--	--
Subtotal, crops		12,878	16,379	11,879	2,258	5,580	18,449	24,678
Livestock	Value per head	Arghandab	Dund	Panjawai-Maiwand	Nod-i-Ali	Marja	Shamalon	Darweshan
Milk from cows	1,830	1,427	1,226	1,171	604	804	2,397	1,629
Calf from milk cows	280	218	188	179	92	123	367	249
Other cattle	320	256	214	214	86	100	266	202
Sheep and goats	250	75	58	145	635	453	190	450
Chickens	265	265	178	265	265	265	265	265
Subtotal, livestock		2,241	1,864	1,974	1,682	1,745	3,485	2,795
Total for crops and livestock		15,119	18,243	13,853	3,940	7,325	21,934	27,473

*Represents income from all field crops other than wheat and cotton in Marja.

Table X

GROSS REVENUE PER FARM FROM CROPS, LIVESTOCK, AND OUTSIDE SOURCES
By District--1963-1964

	Arghandab	Dund	Panjawai- Maiwand	Nod-i-Ali	Marja	Shamalon	Darweshan
<u>In Afg</u>							
Crops	12,878	16,379	11,878	2,258	5,580	18,449	24,678
Livestock	2,241	1,864	1,974	1,682	1,745	3,485	2,795
Outside sources	2,242	0	417	1,438	2,000	1,361	1,045
Total--all sources	17,361	18,243	14,270	5,378	9,325	23,295	28,518
Total farm (crops and livestock)	15,119	18,243	13,853	3,940	7,324	21,934	27,473
Jiribs farmed per farm	17	24	24	20	22	33	71
Farm revenue per jirib farmed	889	760	577	197	333	665	387

<u>In U. S. Dollars</u>							
Crops	198	252	183	35	86	284	380
Livestock	34	29	30	26	27	54	43
Outside sources	34	0	6	22	31	21	16
Total--all sources	267	281	219	83	144	359	439
Total farm (crops and livestock)	232	281	213	61	113	338	423
Acres farmed per farm	8.5	12	12	10	11	16.5	35.5
Farm revenue per acre farmed	27	23	18	6	10	22	12

Conversion rate: Afg 65 = \$U.S. 1.

Property Taxes

Taxes are assessed on lands and livestock but not on houses or personal property. The rates seem reasonable although they have increased in recent years and some land-owners complained--particularly of the increase. Tax rates on both land and livestock were uniform in the two provinces included in the study. Livestock taxes were as follows:

<u>Species</u>	<u>Afg per head</u>
Camels	15
Horses and mules	10
Cattle, calves, donkeys	5
Sheep and goats	2.25

Tax rates on land vary with its quality. There is also a small charge for operation and maintenance assessed along with the land tax. These rates begin at Afg 15 per jirib per year for lands planted to orchards and vineyards. This land is also assessed a fee of Afg 2 for O&M. The best quality land not in orchards or vineyards is assessed at Afg 9 per jirib per year, plus Afg 2 for O&M. Average quality land is Afg 7 tax plus 1.5 O&M, and poorest quality land is Afg 5 tax plus Afg 1 O&M.

If average farmland in Helmand Valley could be considered to be worth Afg 3,541 per jirib, as indicated by landowners in Shamalon, the tax levied would be between Afg 8.5 and 11, depending on whether the land was best or average quality. This tax rate would give a return of 0.24 to 0.30 percent, which is lower than even the lowest rates found in the United States. For the entire tax structure to be comparable, the rates for real estate taxes should be higher than in the United States, because United States farmers also pay income taxes, whereas Helmand Valley farmers do not.

Taxes have not been collected on new settlement properties of Nod-i-Ali and Marja. There is a high delinquency rate in the rest of the area, ranging from 25 to 35 percent each year. Taxes are payable in two installments, half each 6 months. If not paid when due, a 25-percent penalty is assessed. An additional 25 percent of the original assessment is added for each year the taxes remain unpaid.

Outside Income

Income per farm from outside sources in the different areas was as follows:

	<u>Afg</u>
Arghandab	2,742
Dund	0
Panjawai-Maiwand	117
Nod-i-Ali	1,919
Marja	2,000
Shamalon	1,313
Darweshan	1,045

These incomes are averages based on all farmers interviewed in each area. Actually, fewer than half the farmers received any outside income, but this varied by district. In Arghandab, for example, one-third of the farmers interviewed received some outside income. In Marja and Nod-i-Ali, the proportion rose to just about one-half. In Darweshan it dropped again to a little less than 30 percent and in Shamalon it was a little more than one-fifth.

When the average outside income was limited to only the farms that actually received some, the amount became much larger. These figures were as follows:

	<u>Afg</u>
Arghandab	8,533
Dund	0
Panjawai-Maiwand	1,350
Nod-i-Ali	4,091
Marja	3,980
Shamalon	5,767
Darweshan	3,592

Farm Indebtedness and Government Assistance

At the time Nod-i-Ali was settled each settler was given 30 jiribs of land, a house, an ox, a plow and certain other farm implements, some wheat for food, and enough seed for planting his first year's crop. A reasonable value was placed on each of these items, except for land which was valued at only about Afg 250 per jirib or \$U. S. 10 per acre at the conversion rate of Afg 50 per dollar. Following are the values placed on these items by H. V. A. :

	<u>Afg</u>
Land--30 jiribs at Afg 250	7,500
Building materials for house	5,000
One ox	2,000
Farm implements	300
Wheat for seed and food	1,000

An understanding was had with the settler that he would repay the government for the wheat after the first year's harvest. The balance of the amount, Afg 14,800, was to be repaid over a period of 20 years, without interest. This would amount to Afg 740 per year. Title to the land was not to pass to the settler until after he had been on the land 20 years and had repaid his loan to the government.

While crop yields the first year were better, generally, than they have been since, they were not as good as expected. For this reason the settlers were not required to pay back the seed that first year. Yields have dropped from year to year and extensions have been granted on the time when settlers would be expected to begin paying back the loan for capital items. To date no payments have been made or required. No taxes or charges for operation and maintenance of the irrigation system have been made.

Financial arrangements for Marja settlers were similar to those described in Nod-1-Ali except the payment was to be made in 17 years, after a 4-year grace period. Land quality and crop yields in Marja are somewhat better than in Nod-1-Ali, but no payments have been assessed for retirement of loans or for property taxes or water.

As a further aid to settlers, H. V. A. has provided opportunities for much needed employment. Some settlers have been employed by the building department, others in digging drains and maintaining drains, roadways, and ditchbanks, planting trees, etc. In addition, a number of settlers as well as farmers in other areas have found other sources of employment and activity whereby they could increase their income.

Loans from Private Sources

Settlers in Nod-1-Ali and Marja were fortunate to be able to get help from the government. The supplemental income from off-farm sources was very helpful to many farm families throughout the project. However, there were many farmers who had neither the time nor the opportunity to work at jobs that would provide extra income. Where production was very low it often became necessary for some of these farmers--especially tenants and smaller landowners--to obtain financing from private sources. Many loans were of the emergency type, such as wheat for food, made in the winter and expected to be paid at harvesttime. Farmers who had to follow this procedure were at a definite disadvantage. Usually there is wide seasonal fluctuation in the price of wheat. In recent years, winter prices have risen to between Afg 25 and 30 per mun. If a man needed to borrow wheat for his family at this price he would usually have to agree to repay the value of this wheat at harvesttime when wheat prices might be only one-half to one-third as high. This practice is known locally as "Salam" and is looked on with disfavor by Islam.*

"Garow" Activities

It is common practice in Helmand Valley for a landowner to raise money on his land through a special type of mortgage. This procedure, referred to as "garow," is designed to permit the landowner to raise fairly large sums of money in exchange for the use of his land. Usually the landowner will "garow" only a part of his land, and retain the remainder for his own farming operation. The man who gives him the money has full use of the land as long as the debt remains unpaid. At any time the landowner may redeem his land by paying the original value of the obligation. It is common for the "garow" agreement to continue for many years because the landowner is often unable to raise the money to pay it off. If the landowner dies, the "garow" passes to his heirs who have the same right of redeeming the land.

Two common reasons for a man to "garow" part of his land are to raise money to pay for a wife for his son or to make a pilgrimage to Mecca. If a man were not able to farm all his land efficiently because the area was too large, this procedure would allow him to raise capital to use in doing a more intensive job of farming the smaller acreage.

The amount of money paid for the "garow" will be determined by the principals' ideas of the market value of the land. The landowner will probably try to get as near the actual value of the land as possible, so that if he never is able to redeem the land, his loss will not be too great. The moneylender, on the other hand, will not wish to pay very near the actual value of the land because his tenure on it is so insecure.

*See Appendix I for further discussion on this subject.

Income to Helmand Valley Authority in Lieu of Taxes

It is not reasonable to expect to receive tax revenue from other parts of the economy or from other areas to run H. V. A. on a continuing basis. There has been a sizable deficit each year in H. V. A. 's operating budget. Income from taxes collected has been only a small part of the expenditures made.

The cotton program has been inaugurated to help cover this large deficit. Farmers are required to plant a certain part of their land in cotton. H. V. A. buys all of the seed cotton at a stipulated price which is well below the world market price. The cotton is ginned through the large new government-owned gin and sold either to a textile plant within the country or exported.

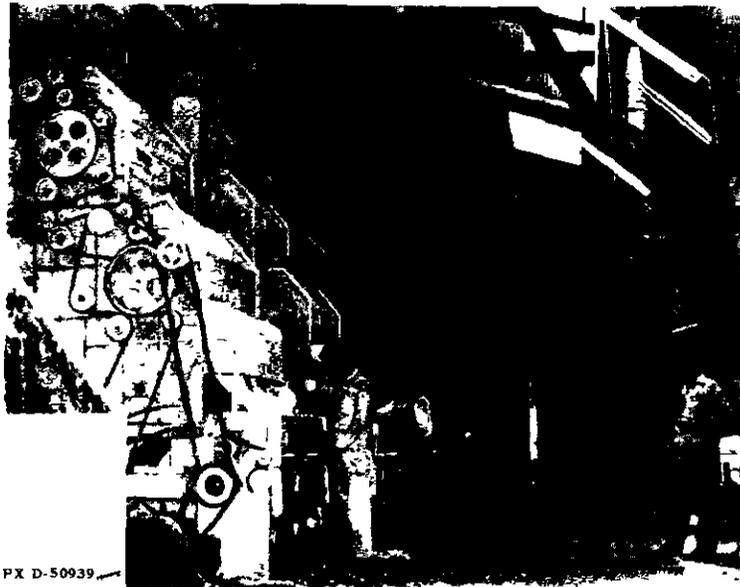


Figure 17. --A large new cotton gin in Bost is owned and operated by H. V. A. The cotton program has been a source of cash income to farmers in the Valley.

A government-owned and operated alabaster plant has been built in the Helmand Valley in recent years. This plant has been unprofitable to the government rather than being a source of income because it lacked a good outside market and a vigorous sales program. To date most of the products have been used in government-constructed buildings in Bost.

A mill for extracting oil from cottonseed and other oil crops is planned. If a good market can be found for the product and the plant can be operated profitably this should be a good source of income to the government.

Other plants and programs have also been discussed and studied by H. V. A. officials. These ideas include a pressed board factory, a sugar beet factory and livestock feeding program; a slaughterhouse and cold storage facility; a dairy program with a processing operation; and a jute or kenaf fiber and bag plant.

It is possible that the government could receive a good revenue from this program of requiring farmers to grow certain crops and sell them to the government at less than world market prices. Further income could come from government ownership and operation of all processing facilities. This program, however, would tend to keep prices to farmers at an artificially low level.

It would be preferable to encourage private enterprise rather than government ownership. Income to the government could come through a broader tax base established on these privately owned processing facilities. Farmers might be much happier and more willing to produce if they were paid full value for the products they raised. They would also be in a much better position to pay reasonable taxes, and a charge to cover the cost of operation and maintenance of the irrigation and drainage works.

RECAPITULATION OF PROBLEMS

Despite the efforts of many persons who have worked toward improvement of farming conditions in the Helmand Valley, there are persistent problems which need to be resolved. The investigations made by the author have provided an insight into a number of problem areas, and the remedies suggested herein (and in accompanying appendixes) appear to be the best routes of action in the circumstances prevailing here. The required action is spelled out in detail in order to provide maximum guidance.

Problem 1. --How to Increase Farm Income

Appendix I discusses problems of increasing the farm income in the Helmand Valley and presents some solutions. It stresses tackling first those programs that will give best results in relation to costs, particularly farm credit, farm size adjustments, and improved farming practices.

Problem 2. --Improving the Welfare and Productivity of the Kochis

The nomadic Kochis winter many thousands of sheep and goats in the Valley each year. The welfare of the Kochis is a serious problem, and their contribution to the economy needs to be improved. Appendix II contains specific recommendations of how the Kochis might be helped and better integrated into the economy.

Problem 3. --Improving the Economy of the Marja Farms

The establishment of a prosperous farming economy is faced with many problems--soils, drainage, inadequate farm size, poor farming practices, livestock diseases, weeds, poor equipment, etc. An analysis of these problems and some solutions are spelled out in Appendix III.

Problem 4. --Farms too Small to Furnish an Adequate Living

One outstanding result of the Marja study was learning that most present farm units were too small. Most farm units throughout the Marja district were about the same size regardless of land quality. The units that were much too small were those located on the poorer, marginal lands. Many farmers on these units were unable to produce even a subsistence living with their current program of crop production. Recommendations were concerned largely with a detailed description of how several of the poorer quality Marja farm units could be combined into a single pasture-livestock unit. A similar program for Nod-i-Ali is discussed further in these recommendations.

Table X and the accompanying discussion indicates that farmers in Darweshan were getting almost twice as much gross revenue as Arghandab farmers, even though revenue per jirib was less than half as much. This emphasizes the value of larger acreages, since the average Darweshan farmer was farming four times as much land as the average farmer in Arghandab.

It is an economic principle that increased revenue will be produced from additional increments of management, labor, capital, or land. Good farm management, which is the result of good farming experience and the application of approved farming practices, is often scarce in Helmand Valley. Labor in some areas is also considered to be short. There seems little question that the shortage of capital is critical over most of the project.



Figure 18. --Most farmers in the Valley were aware of the need and usefulness of farm drains. Drains such as this one dug by hand furnish much needed employment for farmers during seasons of slack farmwork.

None of these factors of production can be controlled by H. V. A. officials. The remaining factor, land--specifically the size of farm units on new settlement projects--is within the complete control of the government. New settlers are beset with enough problems--insufficient capital or credit, antiquated farming tools and often lack of experience, etc. --without being given the additional handicap of insufficient land.

A man can never get ahead if he is allowed only enough land to earn a bare subsistence living. If he can produce more than he needs for his family he will be happier. He will be able to accumulate some reserve for bad years. He will be able to utilize the capital to hire more labor where necessary and to buy more and better power and other farming tools and better seeds. These capital items can also be used as security for obtaining additional farm credit.

Small size farm units are not a problem peculiar to Helmand Valley. Other developing countries have also been faced with it. The United States in developing its western frontier found that it had made a mistake in the size of homesteads in arid zones, and made adjustments in its laws. The law in Afghanistan might need to be changed so that the size of farm unit can be adjusted to the productive capacity of the land and so that the farm unit will be able to provide substantial production over that required for subsistence of the farm operator and his family. There is no inconsistency in advocating both improved soil fertility and larger farm units. There is need to provide farm products for sale to consumers as well as to improve living standards on the farm. Farm size needs to be varied according to land quality because Class 1 and 2 lands lend themselves to intensive farming, double cropping, and long-season crops, while Class 3 and 4 lands are only adapted to extensive usage--hay and pasture crops with limited acreages of grain, cotton, or other row crops. Farms not only need to be larger, they also need to be more productive in order to provide more than mere subsistence.

Problem 5. --Making Nod-1-Ali a Successful Project

Throughout this report the poor condition of Nod-1-Ali has been emphasized. Results of this study confirm with figures what was already generally known. Yields are extremely low. Many farms have been abandoned. A large number of people have been forced to find employment off their farms. Close to half the income to people living in Nod-1-Ali comes from outside employment. Health conditions of the people generally seem to be fairly good and the birth rate is considerably higher than the death rate so population is increasing. The trend of production per acre is down. Thus, the overall situation seems to be getting worse rather than better.

The writers hoped to make a detailed economic study of Nod-i-Ali, but with the press of other assignments, this was not possible. However, enough data were secured on which to base sound recommendations.

The estimated cost of installing drains is \$300 per acre. Although repayment of installation costs may not be required, the benefits derived should equal the costs if the investment is to be justified. The annual economic cost of this investment would be \$12.79 (amortized over 50 years at 3-1/2 percent), exclusive of operation and maintenance.

In the Nod-i-Ali farming area the gross revenue is only \$6 per acre now (Table X), and farm expenses exceed revenues. In Arghandab, the best farming area in the Valley, the gross revenue is \$27 (Table X) and the net income is \$8.80 (derived from Table VIII). Only a rough calculation is needed to show that gross farm revenue would have to be increased by \$40 to \$50 to produce the additional net return to justify the \$300 drainage cost:

$$\frac{\$12.79 \text{ amortization plus } \$2 \text{ O\&M cost}}{\frac{\$8.80 \text{ net income}}{\$27 \text{ gross revenue}}} = \$45.38$$

The prospect of the farmers achieving this increase does not appear to be good and other alternatives should be considered. Three other alternatives remain. One is to do nothing; let the situation remain as it is now. This is unacceptable because conditions do not remain constant. They are bad now and continuing to deteriorate. Without substantial help from the government many people will suffer greatly. This would be costly and unsatisfactory. A second alternative is to abandon the project, help the settler to move to other areas and charge off as a complete loss all that has been spent on the project. This is not a satisfactory solution because of the problem of finding other places for all of the settlers. Also, the political repercussions of admitting complete failure is not savory.

The third and recommended alternative is to make a pasture-livestock project out of this area. There may be limited small areas of adequately drained land which could remain in regular crop farming. If this were done, units of cropland should probably be increased in size to 40 jiribs. For the remainder of the area the units should be combined into 100-, 150- or 200-jirib units. The best livestock men--those who have livestock or can get livestock or credit to buy it--should be chosen. The rest of the displaced settlers would be released to other employment or to return to the areas whence they came. The better farmers--those who had worked hardest and made the best success--should be settled in other developing areas of Marja, Darweshan, or South Tarnak, etc.

This pasture-livestock program would work like that suggested for Marja. Details are presented in Appendix III.

In many respects conditions in Nod-i-Ali are similar to those in Marja. Settlers are largely of Kochi origin. Soils are shallow and of poor quality, high in salt in many places and in need of drainage. Lands in Nod-i-Ali are generally of poorer quality than those in Marja. For these reasons the great bulk of Nod-i-Ali should be converted into a pasture-livestock program whereas most of Marja is still recommended for crop farming.

As indicated previously, it was not possible to make a detailed economic study of Nod-i-Ali. It is not known how these soils compare with the marginal soils of Marja where the pasture-livestock program has been recommended. Probably the same size pasture units would be needed in Nod-i-Ali as in Marja.

We recommend that a pilot project be inaugurated immediately in Nod-i-Ali which would help determine the proper size of pasture unit. An area of about 2,000 jiribs (1,000 acres) should be chosen for this project. About 66 settlers are now living in this area. If 13 good livestock men could be found among them, these should be chosen. If livestock men of ability cannot be found among the settlers, then other Kochi stockmen, perhaps men who have wintered in the Valley, should be offered the farms. All settlers not chosen for the livestock program should be assisted in finding other employment. The better farmers among them should be settled on economic size units in other areas.

All boundary tree rows and ditches that cut up these 66 farm units should be removed. The land should be divided into five 200-jirib units, four 150-jirib units, and four 100-jirib units. In this pilot project, H. V. A. should do what leveling is necessary so that each farm can be irrigated in large fields by the wild flooding method, or where suitable,

by the border dike method. Laterals and field ditches should be enlarged and new ones made that will make it possible to handle large heads--up to 3 or 4 cubic feet per second of water. Turnout headgate structures should be built for each farm. Field waste ditches should be built, but no drains. Dirt moving and other construction work should be kept to a minimum. All handwork required in land preparation and seeding should be done by the livestock settlers chosen for the project.

Each farm should be irrigated by the new farm operator using large heads of water and canvas check dams. H. V. A. should give individual, on-the-ground instruction in proper methods of irrigation. As soon as the fields are dry enough, H. V. A. should plow, harrow, and float the land. H. V. A. should also have on hand an adequate supply of adaptable pasture grass or grass and legume mixture to seed the entire area. Reed's Canary grass and Coastal Bermuda grass should be investigated. H. V. A. should assume responsibility for helping the farmer to establish stands of best-suited pasture grasses. If possible, H. V. A. should drill this seed into the land. If not, hand-seeders should be provided and each man should spread the seed on his own farm. It should then be covered with a spike-tooth harrow. Afterwards, the fields should be corrugated with the slope of the land with a homemade log or pole corrugator. All these land preparation and seeding operations should be performed by H. V. A. with mechanized equipment where possible.

From this point forward the farm should be turned over to the farmer. He should irrigate his land as often as necessary, with close checking and advice the first season from competent H. V. A. Extension men. He should have livestock available to begin grazing his land on a rotation basis as soon as the grass is high enough to graze without harm. Livestock should not be put on these pastures when they are too wet. This is especially true when the seeding is new.

Three of the five 200-jirib units should be used for breeding ewe flocks and two for beef cattle (cow-calf) operations. The 150-jirib units should be used for wether lamb flock (purchase and sale) operations and the 100-jirib units for dairy cattle operations. Details of how to set up these different livestock operations, together with complete suggested budgets, are presented in Appendix III.

This pilot project should produce several worthwhile results. H. V. A. should keep accurate records on costs of preparing the land and seed used so that proper charges can be made to the landowners. Only the costs of plowing, land preparation, and seeding should be charged immediately. The larger costs of land leveling and lateral and headgate construction should be capitalized and charged to the landowners over a period of several years so payments will not be burdensome. Another value of the pilot project will be a comparison of the success of the different enterprises and a determination as to whether the units were large enough to carry the livestock. Also, it will be possible to determine whether the number of livestock suggested is enough to make a reasonable living for the stockman. All problems encountered can be noted so that they may be avoided when the full project is inaugurated. After two or three seasons' operation H. V. A. should be able to determine if it is feasible to go ahead with the full project.

Problem 6.--Achieving a Proper Rate of Stocking on Pastures

H. V. A. officials, as well as stockmen, should realize that it is important to keep livestock in good condition. A given amount of feed will produce more pounds of beef (or lamb or mutton) if it is fed to just enough stock so that all animals can put on good gains than it will if fed to so many animals that each is kept on only a maintenance ration. The reason for this is that the first feed an animal eats is used for body maintenance. Good growth and gains are possible only if there is a supply of feed over and above that needed for this maintenance. If the pasture is kept completely stocked so that each animal has enough feed only to sustain life, there will be none left for growth and fattening. It would be better to reduce the number of stock so that only part of the feed is used for body maintenance; the rest, then, could be used for gains.

This general principle should apply throughout the project. Lands now are severely overstocked; livestock generally are kept in very poor condition. This is not economical. Most feed is being used to maintain animals at very low rates of nutrition. Little is left to put on growth or gains or for energy to pull plows, although many farmers do take special care of their oxen and give them extra feed to maintain health and vigor during plowing season. Probably the main reason that Helmand Valley farmers overstock the

land is that most of the grazing is done on public or government land and along canals and ditchbanks or river bottoms where there are no restrictions. Since he does not own the land, the stockman is not concerned about its care and maintenance. Each man tries to get as much as he possibly can from it. Results are severe overstocking which is detrimental to the livestock as well as the land.

Besides the loss to society from using most livestock feed for maintenance rather than gains, there are other serious consequences of overstocking. Weather and feed conditions



Figure 19. --Most livestock in Helmand Valley are in poor condition. Lands are overstocked, resulting in less total production of beef or lamb for use or sale.



Figure 20. --The results of a careful livestock breeding program and an improved irrigated pasture program can be combined to improve agricultural productivity and income.

vary widely from year to year. If ranges are kept fully stocked during normal years, heavy death loss invariably occurs during drought or severe cold. When livestock are kept at near starvation levels on overgrazed lands, a marked increase in parasitism and disease occurs. Death loss is much heavier under these conditions than if the animals are kept growing and vigorous.

Improved lands can keep more livestock than unimproved lands. If pastures are well taken care of and fertilized, much more feed and feed of higher nutritional value will be produced and more livestock can be carried. Until the lands can be improved livestock numbers should be kept down. In this way more pounds can be produced for home use and sale.

In view of this, H. V. A. should study ways and means of regulating the rate of grazing on government lands. Perhaps the issuing of grazing permits and other grazing control methods would be advisable.

Problem 7.--Credit Reform

An adequate credit system is one of the greatest needs of farmers in Helmand Valley today. Two types of credit are needed. One is the credit needed for present purposes--wheat for food and other consumption items, as well as seed and simple farm implements, etc. This is needed widely by most farmers throughout the Valley. The other type is credit that will be needed to inaugurate improved farming practices--chiefly for fertilizer, improved seed varieties, and purchase of better farming equipment. Neither of these credit problems can be adequately solved without a complete revamping or reform of the present credit system. Credit from established banks today does not reach most of the people who so badly need it. When these people obtain credit, it is from the only source available to them--well-to-do landowners or merchants. Interest rates on loans from these sources are exorbitant.

If funds were generally available for farmers to buy oxen or other power and proper farming tools and equipment, production could be increased greatly, it is estimated in many cases by as much as 50 percent.

Many difficult problems are associated with the inauguration and administration of a credit program. Some of these problems are as follows:

(1) Few people, in the H. V. A. organization or elsewhere, have had any experience in administering farm credit.

(2) Some developing countries have set up successful cooperative credit programs. In Afghanistan at the present time, however, it would be difficult if not impossible to establish this type of program because: (a) The small farmer who needs financing so badly has no money to put into a rural credit cooperative; (b) the man who has funds is not willing to put it into a cooperative because he is doing much better with the present system, often making upwards of 100 percent on his loans; and (c) there are no adequate laws under which cooperatives can be organized and operated. (This problem is not insolvable. The Government could set up a credit institution and furnish most of the capital to get it started. Patrons could build equity in such an institution over a period of years and eventually take it over and operate it as their own association.)

(3) Credit was extended by H. V. A. to settlers in Marja and Nad-i-Ali several years ago with the understanding that it would be paid back over a period of years. At this time none of the loans have been repaid and apparently little effort has been made to collect them. Most farmers, even those in other areas of the Valley, have heard about this unsuccessful settler-credit program. This precedent may make it difficult to set up a sound loan program.

(4) To be successful, any credit program inaugurated in the Helmand Valley must be closely supervised. There is an extreme shortage of men who are qualified or could be trained to properly supervise a sound credit program.

Despite these problems, however, we feel that the urgency of credit reform justifies the spending of every effort to solve the problems and find a source of funds to set up a sound credit program. Appendix I presents further ideas on credit.

Production Credit

A production credit program in Helmand Valley might be inaugurated with a revolving fund of 24 million afghanis. This would initially provide an average loan of Afg 8,000 for 3,000 farmers. There are many more farmers than this in Helmand Valley but it is estimated that only this number might qualify for loans the first year. The program might be extended later. It would be a Herculean task, however, to administer this many loans for the first few years. By the time the staff of supervisors were trained so they could handle an expanded program, the first loans should be paid off. As the initial loans were repaid, funds would then become available for another group of farmers. There is a question of how many farmers could qualify for loans the first year or two--also, how much the number might increase in the future.

It is very important that the first loans under the program be sound and properly supervised so that they would set the pace for future loans.

Loans should be made available to tenants as well as landowners. The tenant applicant should be closely checked. He could not be expected to repay a loan if he were getting only the customary one-fifth or even one-fourth of the income from the land he was farming. Loans to tenants for the most part would be made so they could buy oxen or other power, an improved plow, and other simple farm equipment, tools, and seed. If the tenant furnishes the power, seed, and labor, he should get at least three-fourths of the production. The landowner who furnishes only the land should get one-fourth. This method of dividing production into four parts, one for the furnisher of each factor--land, labor, seed, and power--rather than five, should be used throughout the Helmand Valley where the government is furnishing the water. At some future time, when the landowner begins paying a reasonable charge for operation and maintenance, he should receive compensation for this in the sharecrop arrangement. Loans should be made only to the best tenants, men who are good farmers with good background and experience. The tenant needs to be on good land that will produce well and should have a lease agreement with the landowner so that he can stay on the land for at least 3 years.

Loans should be made only to those tenants who will receive a minimum of three-fourths of the production from the farm. A disservice is performed if a loan is made to a man who does not have a good chance of paying it back.

The same care should be taken in making loans to landowners. If they receive a production credit loan, they should supply the land, power, and seed and receive at least three-fourths of the crop production. Loans can be made to landowners who farm the land themselves and to those who have tenants. If the landowner has considerable land and must depend on tenants to do most of his work, the loan officer should assure himself that the tenants are good farmers and if possible that they will stay at least 3 years. The same conditions of good land and good cultural practices should be observed as when making a loan to a tenant.

Whether to landowner or tenant, the loans will likely be made for about the same purposes--to buy oxen, farming equipment, and seed. Good, strong, young oxen should be bought; also, good equipment and high quality seed. Care must be taken that too high a price is not paid. To assure that the money is spent for the purpose for which it was borrowed it will be necessary for the loan agency to work closely with the farmer. Any of several different methods could be used, e. g., giving the borrower a certificate that could be used only to buy the specific items; or buying the items for him. Either of these methods has its problems. Trial and error might need to be used to determine the better one.

Production loans for power, seed, and equipment should be set up for as short a period as possible. Most production loans should be paid out in 3 years, with the interest and one-third of the principal being paid each year. This would make for a higher payment the first year and lower payments each succeeding year, as interest would be due only on the unpaid balance. However, this is desirable because the items purchased are more valuable when they are new. Payment should be required at the time crops are harvested and sold, rather than at the end of the year. This method has the advantage of reducing the interest due as well as making it easier for the farmer to pay--at the time he has money. If it becomes necessary, the loan agent should be given the authority to take the part of the crop necessary to pay the obligation.

Experience has shown that small loans have a much higher percentage administrative cost than large loans. It is recommended that H. V. A. set up their loan program with 15-percent annual interest on the unpaid balance, reduced proportionately when paid in less than a year.

The following tabulation shows an example of how a tenant or landowner farming 32 jiribs of land might pay off a loan of 6,820 afghanis in 3 years:

House, orchard, garden (for home use)	2 jiribs
Alfalfa and clover (for livestock)	5 jiribs
Wheat	20 jiribs
Cotton	<u>5 jiribs</u>
Total farm land	32 jiribs

Use of loan:

Wheat seed--20 jiribs x 3 muns = 60 muns x Afg 17 = .	Afg 1,020
Oxen--2 @ Afg 2,500.	Afg 5,000
Farm equipment.	Afg 600
Hand tools	Afg <u>200</u>
Total	Afg 6,820
Payment first year (int. @ 15% = 1,023)	Afg 2,273 = 3,296
Balance	Afg 4,547
Payment second year (int. @ 15% = 682)	Afg 2,273 = 2,955
Balance	Afg 2,274
Payment third year (int. @ 15% = 341)	Afg 2,274 = 2,615
Balance	Afg 0

Revenue:

20 jiribs wheat x 50 muns	1,000 Muns
Less: pay to tenant.	250
Pay for harvesting	60
To save for seed	60
Year's food for family	<u>262</u> 632 Muns
Wheat to sell	368 x 17 = Afg 6,256
Cotton to sell	200 x 20 = Afg 4,000

Expense:

Land tax 255, livestock tax 20	Afg 275
O&M charge 32 jiribs x 65	Afg 2,080
Loan payment--principal and interest (1st year) .	Afg <u>3,296</u> Afg 5,351
Balance for family living	<u>1/Afg 4,605</u>

1/This amount (Afg 4,605) is in addition to the value of 262 muns of wheat which were allowed for use of the family.

Consumer Credit

The man without land or capital is at a real disadvantage in the Helmand Valley. He gets only one-fifth of the crops he produces. This seems a very small amount, especially when yields are so low. However, his disadvantage is compounded by the relationship that exists between him and his landlord and also between him and other large landowners and merchants who have money to loan.

With his small income, when the sharecrop farmer needs wheat for his family to eat, he borrows it during the winter when prices are high. He is required to pay it back at harvest time when prices are low--often only one-half or one-third what they were at the time he borrowed. This means he may have to pay back two or three times as much wheat as he borrowed. This practice is referred to as "salam." It often takes all or most of the tenant's share of the crop to pay his debts, so he is short of wheat for his year's needs. This method of credit keeps him eternally in debt to the landowner. The 200- or 300-percent annual interest rate that he pays might be considered to be twice that high, since the borrower usually has the loan for only half a year.

Thousands of small farmers throughout the Valley are in this predicament. It would be a great help to them if a source of reasonable credit could be made available.

A successful credit-wheat program supported by government funds might be set up as follows:

At harvest time a tenant who owed a large part of his wheat crop to a private lender would apply to the government for a loan so that he could pay his debt. Rather than giving him the money, the loan agency would give him the wheat and charge it at market price. Close supervision would assure that he used the wheat to pay his loan. In this way the farmer could save his own wheat for his needs during the ensuing year. The government should buy the wheat for this sort of lending at harvest time when prices are low and give it to the borrower then, rather than waiting to purchase it several months later when prices are high.

The loan agency must, of course, have some security before making loans to these tenants. Therefore, the applicant should be required to have his loan secured by a landowner who will agree to pay if he defaults. The landowner who guarantees these loans will usually be the landlord of the applicant.

Although the tenant will be in a better financial position with this type of loan, it will always be difficult for him to pay his debt. One way that might help him would be for him to borrow more wheat, for example, twice as much as actually needed to pay his old "salam" obligation. This wheat bought at harvest when prices were low could be held for several months and sold again when prices were high. The wheat should be stored at the home of the man who had pledged security for the loan. Ordinarily, winter prices are double the prices at harvest. If this were true, the borrower might receive almost enough when the wheat was sold to pay his entire loan.

It was suggested in the preceding paragraphs that the production credit program for farmers in the Helmand Valley might require 24 million afghanis. A program to provide consumer credit for farmers would probably require another Afg 24 million--an average loan of Afg 4,000 to an estimated 6,000 farmers.

A recent study of tenants in Shamalon and Darweshan showed that 88 percent of them obtained loans of either wheat or cash during the year. In most cases they borrowed from their landlords. Many of these loans were on a "salam" basis, whereby the tenant paid back two or three times as much as he borrowed.

In Darweshan, 80 percent of the farmers borrowed either wheat or cash, with a few more borrowing cash than wheat. Sixty percent of the wheat borrowers had to pay back more than they borrowed; 40 percent paid back the same amount. One man said he paid back five times as much as he borrowed; two others, only one and one-half times as much. The average amount paid back was 263 percent of the amount borrowed. Thus, interest rates could be considered to vary from 50 to 400 percent with an average of 163 percent.

Those who borrowed cash usually paid their loans in wheat at harvesttime. During the year of survey, wheat was selling at about 12 afghanis per mun at this season. Those who delivered wheat to pay their loans received from 5 to 10 afghanis per mun. Thus, the cash loans were costing from 20 to 120 percent, with an average of 67. These average rates--67 percent for cash loans and 163 percent for wheat loans--were costs for only the period the farmer had the loan, around 6 months, usually.

By instituting the suggested credit program, the saving of the excessively high interest payments would not only make more income available for the tenant's production purposes

but it would also improve his standard of living. In addition it would release capital for production investment which landowners and merchants have been loaning to farmers on a private basis. The competition provided by a government-sponsored credit organization should also force private interest rates lower.

If possible, the present agricultural credit bank should be expanded to take care of both of these special programs of production and consumer credit. It may be desirable to set up a branch in Kandahar and another in Bost to supervise these loans. Both programs should be under the immediate supervision of a competent credit manager. He should be a man with much experience in the field. A trained district supervisor should have charge of the program in each district. Both credit managers and district supervisors would have to depend on and work closely with Extension agents, subdistrict agents, and village-level workers. This would be especially true during the first year or two until more men could be trained. Intensive short-term training courses will be necessary for all who work in the program, if it is to be successful.

It should be emphasized that there are many difficult problems associated with a wide-scale credit program. The ideal method for developing a sound program probably would be a slow, step-by-step method, whereby a large corps of college-trained men could eventually be used. However, this method might require many years before the program could get off the ground. Since capital is so critical, we feel it is essential that a program of credit reform be inaugurated as soon as possible and that training be done and problems be solved as the program proceeds.

Total capital required to inaugurate both of these credit programs would amount to Afg 48 million--24 million for production credit and 24 million for consumer credit.

In an earlier report (see Appendix I) it was suggested that a law be passed which would make illegal the charging of unfair interest rates. If this were done, many landowners and other moneylenders would have funds to invest elsewhere. This fact might encourage the government to sponsor a credit cooperative in which these private investors could be encouraged to buy stock. As more and more private capital was invested, the government could withdraw its capital. Within a few years the institution could become a full-fledged cooperative with only government backing.

Problem 8.--Adoption of New and Improved Farming Practices

There are only two ways to increase agricultural production in the Helmand Valley. One is to bring more land into cultivation; the other to increase the per acre yield on land now being farmed. The first alternative offers some opportunities, but the cost might be considerably greater. All nations of the world which have achieved a high rate of agricultural production have done so mostly by the latter method, that is, increasing per acre yields. This means increasing production of livestock products--meat, wool, milk, and eggs--per acre, as well as by increasing crop production per acre. This is the most promising way of achieving increased production in the Helmand Valley.

The way to increase this per acre output is through improved technology, such as the use of fertilizers, improved seeds, plant protection, disease control, drainage where necessary, weed control, and improved cultural practices. To secure adoption of new and improved practices requires that they be brought to the attention of farmers and demonstrated where they can see the results. Such work is the job of the Agricultural Extension Service. This work should be intensified and its level raised so that better trained men are available.

The efforts of American Extension Advisers should be toward training of the higher level Extension workers who in turn would train the subdistrict agents and village-level workers. They would bring the program to the farmers.

Problem 9.--Low Soil Fertility

Obviously, not all of the improved practices mentioned above can be tackled at once. As soon as possible the Extension Service should undertake them and inform the farmer of their value. Each farmer then could adopt any program or practice which he feels would be to his advantage. It would seem desirable for H. V. A. to concentrate on one major program at a time, although care should be taken that this effort is not done at the expense of worthwhile complementary programs.



Figure 21. --Improved livestock breeds, such as Brown Swiss cows, will do much to increase production in the Valley.



Figure 22. --Improved farming practices and equipment can do much to increase production in Helmand Valley. The small moldboard plow can replace the native plow and be handled adequately with native animal power.

Lack of soil fertility was mentioned many times by farmers throughout the project as a major problem. Observation confirmed this as a fact. The importance of soil fertility and how to deal with this problem will be discussed in this recommendation.

Benz and Holmgren^{1/} suggested it would be possible to get as much increase in production from double cropping a given area of land as it would to bring the same acreage of new land into cultivation. They laid great stress on the value of getting two crops in 1 year from each acre of land.

The growing season is long enough, weather conditions are favorable, and adapted crop varieties are available so that double cropping can be successful in Helmand Valley.

^{1/}Op. cit.

Farmers know this and many of them even have labor and capital enough to grow two crops. However, a relatively small part of the land is double cropped. Our study indicates from 0 to 10 percent in the different districts.

The Ministry of Agriculture representative in Kandamar said he thought double cropping in his area had declined in recent years. The reason given was that more water was available so that farmers were now farming more acres of land. This, he indicated, had



Figure 23. --Training of Agricultural Extension men is basic to an improved extension program in Helmand Valley. American Extension advisers should train higher level Extension workers. These men, then, would train the subdistrict agents and village-level workers.

happened since the building of the Arghandab Dam and irrigation works in the area. Productivity of the land was going down because only the same amount of animal manure was available and it was not enough to keep all the land cultivated. Therefore, some farmers

who had double cropped before were now cropping only once so their land could rest for a few months each year.

As indicated in Table V, farmers said the major reason they did not grow more double crops was that the land lacked fertility. Lack of fertility was reiterated repeatedly by farmers in all districts as one of their major problems. This was emphasized by the fact that not only was there little double cropping, but nearly one-third of all farmland was left idle each year--this despite the fact that farmers badly need more income.

As one further evidence of the problem of low soil fertility we observed that in Nod-i-Ali there was an extremely wide variation in yield per jirib of most farms and the small plots of land surrounding the houses in the villages. No figures are available to compare the yields in these two situations. Visual observation, however, indicates average production in the small village plots are often many times--perhaps as much as 5 to 10 times--as large as average production on the farms. A number of factors contribute to this great difference, one of the most important of which is the greater fertility of the small plots of land. Each farmer keeps his livestock near his house in the village rather than on his farm. Some fertility value as well as considerable organic matter in the form of animal and human excreta are incorporated into the soil.

We described earlier the harvesting of khaseel, a rank-growing green grain forage on plots of land near the buildings. This is a common practice throughout the Helmand Valley. As indicated, yields are much higher on these plots than on surrounding farmlands. Reasons for this higher yield are undoubtedly the same as those given for the similar situation in Nod-i-Ali--largely a matter of soil fertility.

If this soil fertility problem could be solved, many farmers would begin growing a second crop and production in the Valley would increase greatly. To be effective, part of the double crops should be soil-building varieties.

We recommend H. V. A. make an all-out effort to help Helmand Valley farmers to increase the fertility of their soils. The Agricultural Extension Service will have to take leadership. The first job will be to convince all Extension workers of the value and importance of the program. Following are suggestions to implement this program:

A. Animal Manure. Farmers should be encouraged to conserve and use all manure on farmland. None should be burned, but this may pose another problem--an alternative fuel for home use. Kochis who winter in the Valley should be encouraged to pen their livestock near the farms at night. All of the manure produced should be used on the land. An increase in livestock feeding programs should be encouraged. If the proposed sugar beet factory with its associated livestock feeding program is inaugurated, this will help greatly with the soil fertility problem.

B. Green Manure. A legume such as alfalfa or clover should be included in a definite crop rotation and part of it plowed under as a green manure crop each year. A moldboard plow or heavy disc which can turn the forage under so it can be incorporated into the soil should be used.

C. Commercial Fertilizer. All farmers should be taught and shown the values of commercial fertilizer. Further fertilizer trials should be run both on the experimental farm and in field trials throughout the area where results can be observed by farmers. If these prove successful, H. V. A. 's purchase program should be expanded. Farmers should be able to buy their fertilizer on credit. Purchase through H. V. A. with a withholding of payment from cotton receipts is a good plan. H. V. A. should sell the fertilizer to farmers at cost. If the sugar beet factory is built and operated by a private company as we recommend, it should handle the commercial fertilizer program. This would include the purchase of the fertilizer, the furnishing of credit to farmers, the distribution of the product to the farmers, and the instruction to them on how to apply it.

RECOMMENDATIONS

The following recommendations should be implemented by the Helmand Valley Authority by means discussed in the text of this report and in the Appendixes:

1. Enable farmers to obtain larger farms.
2. Convert irrigated lands which are infeasible and uneconomic to drain into irrigated pasture areas.
3. Regulate the stocking of pasture areas so as to avoid overgrazing.
4. Institute credit programs for farmers and tenants.
5. Intensify efforts aimed at adoption of sound farming practices.
6. Improve the rights, welfare, and productivity of the Kochis, so as to increase their contribution to the national economy.

APPENDIX I

HOW TO INCREASE PRODUCTION AND INCOME

FROM FARMS IN THE HELMAND VALLEY

April 1964

By

Ira M. Stevens, Agricultural Economist
U. S. Bureau of Reclamation
Helmand Valley Project
Lashkar Gah, Afghanistan

HOW TO INCREASE PRODUCTION AND INCOME FROM FARMS IN THE HELMAND VALLEY

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U. S. Bureau of Reclamation
April 1964

Farm production and income in the Helmand Valley is low. In comparison with Bureau of Reclamation projects in the United States, wheat production per acre in the Valley is about one-fourth, cotton production about one-fifth and other yields correspondingly low. Wool production per head in Afghanistan is between one-third and one-half that found in the United States. Prices for agricultural products are also low relative to those in the States.

How to increase production and income has been a subject for discussion in many high level meetings and among foreign and Afghan technicians for many years. It has been discussed in numerous reports written over the past decade.

For the most part, the suggestions have been associated with the discipline of the man making them. This is natural. Each man attempts to compare the situation as he observes it here with that of his own knowledge based on background, experience and training.

The soils man, for example, would point out the deficiencies of soils in the area--how they had been farmed for thousands of years without adequate return of organic matter and soil nutrients. He could make a real case for adding of supplemental fertilizer and organic matter in the form of green and animal manure. The agronomist, on the other hand, might stress the control of weeds, crop rotation, good seedbed preparation, etc. The experiment station man would probably emphasize the introduction of higher producing varieties, strains and livestock breeds. And so it would go on down the line--the drainage man stressing the necessity of proper drain location and depth and leaching of salts from the soil; the irrigation man showing how proper water application and control was related to high production; the land settlement man showing the importance of recruiting new farmers with some knowledge of farming, good health, and a desire to be successful. Land settlement specialists might also show the inequity of present land ownership patterns in some areas of short labor supply where several thousand jiribs are owned by one man, and how production could be increased if land were in smaller ownership blocks and farmed more intensively. Extension men would stress the importance of getting information to farmers through well-planned demonstrations, strategically located. Entomologists would show the necessity for constant vigilance in controlling insects and the devastating results that come in some years. Veterinarians and livestock men would point out the importance of livestock to the overall economy of the area. They would show how better management practices and disease control might save many thousands of animals each year and thus greatly increase production and income. Technicians who had observed the development of farming in neighboring countries in recent years might stress the inevitability of tractors and farm machinery coming to this country in the near future. They would emphasize how the wide-scale use of machinery could increase production. Other observers might show the inadequacy of the present credit system and the necessity for its revamping in order to help encourage farmers to buy machinery.

Some men with practical farming experience might praise the virtues of a specific crop such as sugar beets. They might show how just the by-products from sugar beets could equal in feed value the production of almost any other feed crop. Thus the entire value of the major product, sugar, would be over and above that of almost any other crop.

A very strong point could be made by marketing specialists of the necessity of developing markets along with increased production. Better markets would not necessarily increase production except as the higher price might encourage more farmers to put more effort into the raising of their crops and livestock. However, certainly the higher prices found in the better markets would increase the income of farmers who had the product to sell. In an advanced farm economy it is felt by some authorities that a farmer's income depends as much on a good job of marketing as it does on a good job of production.

In contrast to the specialists of the different disciplines mentioned above, the agricultural economist must cut across all lines. He recognizes with these specialists that there are many ways to reach the goal of increased production and income. However, he also recognizes that they are not all equally efficient. Some ways will increase production and income more than other ways. The economist must try to determine the returns in relation to the costs so that the most efficient methods can be recommended for use first. For convenience in this discussion, each of the things that might be done to increase production--weed control, fertilizer application, use of better adapted varieties, installation of adequate drainage system etc.--will be referred to as "innovations."

Two questions should be considered. (1) A determination of the most efficient method of making each of the innovations. (2) Comparison of the net returns that might be expected from the innovations made by these most efficient methods.

As an example of question (1), consider weed control. Weeds may be controlled through application of more capital in different forms or through more labor. Capital can be applied by use of chemical sprays or by more thorough plowing--more animal power so the field could be gone over more times with present equipment, or the same number of times with improved equipment; or the use of power machinery. The latter method--plowing with tractors--has other benefits besides weed control. These benefits must also be considered in evaluating this method. Effective weed control could also be attained if the capital expenditures were replaced by intensive applications of hand labor. The problem is to determine which is the most efficient and practical way to control weeds considering costs and returns.

Another example is the installation of an adequate drainage system. Can drains be dug more efficiently by hand labor or machinery? Studies of costs of the two methods will provide the answer. Likewise, studies may be made to determine the most efficient and practical method of making each of the other innovations.

After finding these answers to question (1), the answers to question (2) require comparing the net returns that might be expected from the innovations made by these most efficient methods. The answers to this question would indicate which innovation should be tackled first and priorities of the others. Conceivably there are some very worthwhile innovations which would increase production and income considerably with the expenditure of little money. Obviously these should receive first consideration. Several of these innovations might be made simply by executive decree or passing of a law.

As one example, capital is very short in the agricultural enterprise, yet there are many landowners who are relatively well-to-do. They do not invest their money for capital goods--oxen, tractors, or other equipment--because for centuries, perhaps, it had been a custom as well as very profitable for them to loan money or wheat to farmers in the area. The wheat, or money to buy it, is usually loaned in the winter when the price is high (Afg 25 to 30 per mun in 1964) with the agreement that it be paid back at harvest-time at a specified price, (e. g., Afg 8 per mun) or at market price, which may not be very much higher. This practice is referred to as "salam." If a law were passed and enforced which would make "salam" illegal* many landowners and other moneylenders would have funds to invest elsewhere. They should be able to find a good investment in increasing the capital structure in the farming enterprise. More money could buy more animal power, or more tractors and other machinery and equipment, more fertilizer, more spray, more adequate drainage, more water control structures, more and better seed, etc., any of which should help increase the production of their land.

If a law of this kind were passed there would have to be simultaneously a government-sponsored or cooperative credit source made available to the farmers who have depended on this private source of credit. This credit program might be patterned after some of the government-backed credit institutions in the United States. Of course there would be considerable cost to this program at the outset--the cost of the money for loaning and personnel to operate the system. However, if it were set up on a sound basis and administered right it could be paid out and eventually become self-sufficient with little or

*The Holy Koran forbids the charging of usury. Perhaps some Moslems do not consider the practice of "salam" as charging of interest or usury. If this is so, an educational program along this line may help convince them of the necessity of abiding by the law after it is passed.

no loss to the government. Charging of a fair rate of interest to the farmers would release great quantities of money that had formerly gone to private moneylenders. Many of these funds should also become available for capital investments by the farmers.

We have suggested a means by which one of the important factors of production, capital, could be made more available for investing in farming enterprises simply by passing of a law which would make "salam" illegal. In a number of the surrounding countries another factor of production, land, has played an important role in the country's development. A land reform program is badly needed in this country. This also could be accomplished by executive decree. Great benefits would accrue to individual farmers who were fortunate enough to participate in the program. This program could be worked closely with that of the land settlement department. Many of the larger blocks of farmland in the Helmand Valley are now under private control or there is a question of ownership. At present, most of these large blocks are inadequately farmed. If they were divided up and made into economic size farming units, many good experienced farmers from other parts of Afghanistan who are now farming uneconomic size units would be attracted to come and settle. Production and income from these new farm units undoubtedly would increase. In this case, a third factor of production, labor, and a fourth, management, would be made available and utilized. Again the benefits appear to be great while the cost could be kept very low. In the case of the land reform program, much land could be made available for settlement simply by (1) examination of the records to determine ownership; (2) trading water rights for land; (3) paying a small sum for land in questionable ownership. For the land settlement program, costs could be kept to a minimum. With good land and well chosen settlers, it should not be necessary to heavily subsidize them.

All the suggestions for improving production and income as given in the forepart of this paper, could be tied to one or another of the four factors of production--land, labor, capital, and management. This does not mean that all innovations could be made simply by passing laws that would release more of each of these factors. There is evidence, however, that substantial increases in production and income will follow additional incremental applications of each of these factors.

Studies made in the Helmand Valley during the past few months have verified these statements. Significant wheat yield increases were shown by (1) an increase in capital as evidenced by farmers who had more ox power available; (2) an increase in labor application as indicated by farmers living on their farms rather than in the village; (3) an increase in managerial ability as evidenced by farming experience before coming to the project; and (4) an increase in land quality as evidenced by land classification studies in the various areas.

After putting into effect all the innovations that can be attained by executive decree or with relatively small cost, there are some further innovations that can be adopted with smaller expenditures than would be required with certain others. This can be seen even without detailed studies.

For example, the cost of getting better crop varieties and livestock breeds or strains adopted should be less than the cost of heavy commercial fertilizer application. Some information from the research station is already available on new and improved or disease-resistant varieties and additional information is being provided each year.

Two items of cost might be considered in connection with this innovation. One is the cost of developing and testing the improved or disease-resistant variety at the experiment station. These research costs, however, are usually considered as part of a long-range scientific development program, carried at government expense for the benefit of all people and therefore not chargeable to one specific project. The other cost should not be great. It is the cost of the Extension Service in getting the improved varieties adopted. In recent years, most of the Extension workers' efforts in the Helmand Valley have been concerned with policing the cotton program. This could be changed so that the men could perform the activities their agency was set up to perform. The total cost to H. V. A. would be no greater; there would only be the change of emphasis. The cotton program might suffer temporarily. However, if the government could continue to increase the price of cotton until it was in line with wheat or help to control the wide price fluctuations in wheat to keep it in line with cotton there should be little need for an enforcement program.

Getting the majority of farmers to plant adopted varieties and use better livestock strains--those that yield higher and are more resistant to diseases and insects--would have a real economic benefit. There is a wide difference in the production per unit of improved strains. Witness the tremendous increase in corn production per acre in the United States through use of hybrids and in milk production per cow through use of proven sires and artificial insemination. Millions of dollars have been saved annually by use of rust-resistant wheat and disease-resistant varieties of other crops. These same benefits are available to farmers in this country with relatively small cost.

My own feeling, as I have contacted hundreds of farmers in the Valley over the past year, is that the low value of labor in relation to capital and lack of an adequate credit system are at the root of many of the agricultural problems in this country. Because capital is expensive, labor is used instead, and labor is inefficient, especially when it has antiquated tools to work with. Labor is also short in some areas of the Valley.

In considering relations between land, labor, and capital in the United States, it would be unthinkable that the labor of raising a crop would be considered equal only to the value of the seed, or to the power to plow the land, or to the water, or to the interest on land investment. Yet this division is commonly used in Afghanistan, one-fifth of the crop going to the supplier of each--land, labor, seed, ox power and equipment, and water.

The man without land and capital is at a real disadvantage in this country. He gets only one-fifth of the crop he produces. This seems a very small amount, especially when yields are so low. However, his disadvantage is compounded by the relationship existing between him and his more prosperous fellows--merchants or larger landowners--who have money to loan.

With his small income, the sharecrop farmer needs wheat for his family to eat, so borrows it during the winter when prices are high. He is required to pay it back at harvest time when prices are only half or one-third what they were at the time he borrowed. Thus he is paying at least 100 percent interest, or since he had the loan only 6 months, it amounts to 200 percent. Most farmers do not recognize this as a problem, perhaps because they are not aware there are any possibilities of changing the situation.

Many leaders recognize a lack of capital to buy machinery and equipment, etc., as the major problem of agricultural development in this country. However, it is tied very closely with another age-old problem of the customs of the people and their antiquated credit system, whereby the rich get richer and the poor get poorer. These two problems must be considered together.

Following are specific recommendations:

1. Study again the credit system of this country and establish as soon as possible a sound cooperative credit program with government sponsorship. The system should be set up on a true cooperative basis and designed to retire the government capital as soon as feasible.
2. Enact a law to make illegal the practice of "salam." In this practice, a man borrows a commodity such as wheat at an artificially high price and must pay it back at a very low price. To be useful the law would have to be strictly enforced.
3. Set up a sound land reform program for Helmand Valley. This would involve, first, a determination of land ownership and water rights for all farmland. Since the government does not intend to amortize construction costs of the irrigation system, the next best program is to carry on the present H. V. A. plans for trading permanent water rights for land. In this trading, it should be recognized that construction costs per jirib are usually considerably greater than the value of the land before the irrigation system was built. Land in questionable ownership should be put into private hands as soon as possible. If the farmer who claims it needs the land to make an economic size unit, it should be given to him. In cases where the questionable ownership land is claimed by large landowners, H. V. A. should acquire it by payment of a reasonable fee. All government-owned land, then, should be divided into economic size farm units and allotted to well chosen settlers as soon as possible.

4. Make a concerted effort to get all favorable research results adopted by farmers at an early date. This should include imported varieties tested and found adaptable as well as those developed here. It should also include livestock breeds and strains as well as crop varieties. H. V. A. Agricultural Administration and the Experiment Station and Extension Service will need to work closely together on this program. Some progress is being made in this field but more can be done.

Certain large privately owned farms--both livestock and crop--should be designated as seed-producing farms. Their purpose would be to increase the improved seeds and livestock sires more quickly. H. V. A. should place the seed and livestock with qualified farmers and agree to buy all seed and sires produced under specified conditions at specified premium prices. As these seeds and sires become available in quantity, H. V. A. should trade them to farmers, pound for pound, for their present unimproved varieties. If it becomes necessary to get the job done this trading could become a compulsory program. Of course the unimproved varieties acquired by H. V. A. would be disposed of for immediate consumption.

5. Make use of better farming practices. Again, this is being done to some extent but the program could be expanded. One good example is to introduce the small moldboard plow that can be handled with present ox power. In many areas of the Valley, weeds are the greatest single deterrent to increased production. Thorough plowing and clean cultivation are among the best methods of weed control. This small moldboard plow can be of great help in controlling weeds.

Most soils of the Valley are woefully lacking in organic matter. In some cases weed material, grain stubble, or a crop of alfalfa is available on the land to be plowed. It is impossible to do a good job of turning under any of this material with the present stick plow. The moldboard plow, however, if used right can be very effective in turning under green manure. In addition to these uses the plow can help make a much better seedbed. It can also save hand labor in a number of other ways such as making ditches, border dikes, and ridges for planting cotton and other crops, and plowing a furrow to plant potatoes, followed by another to cover them.

There is no question that power machinery will eventually be used on much of the land in the Helmand Valley. When it comes, it will be a great boon to increased production. The shortage of capital, however, may delay the extensive use of machinery for a number of years. In the meantime the small ox-drawn moldboard plow and other improved equipment can be of great help in increasing production.

6. Develop those areas first which have greatest potential of paying out. To do this, a planning group composed of a program planning chief, a drainage specialist, a soils specialist, an agronomist, a marketing specialist, and an agricultural economist should make studies and recommend development priorities. Their work should be done well in advance of construction and land settlement. A lack of capital to go into the farming enterprise was shown to be one of the greatest deterrents to increased production at the farm level. So, also, a lack of capital prevents the overall development of the Valley as fast as leaders would like. This makes it especially important that a complete job of planning be done so that the limited funds will be spent most efficiently. The planning should have a long-range aspect as well as the immediate future. It should work closely with the Ministry of Planning in Kabul. The studies should consider possible export and domestic markets, crops and livestock to be raised, processing of farm products and other industrial development, as well as the drainage, soils, and cost-benefit studies which would point out development priorities.

APPENDIX II

KOCHI LIVESTOCK OPERATIONS IN THE HELMAND VALLEY

Helmand Valley, Afghanistan

May 1964

By

Ira M. Stevens, Agricultural Economist
U. S. Bureau of Reclamation

Helmand Valley Regional Development Project
Lashkar Gah, Afghanistan

KOCHI LIVESTOCK OPERATIONS IN THE HELMAND VALLEY, AFGHANISTAN

By

Ira M. Stevens
May 1964

All people are interested in the activities of the nomads. Known as Kochis in Afghanistan, they form a large and important part of the economy. Numbers have been variously estimated at from one-fifth to one-third of the population, from about 2-1/2 to 4 million people. The vast majority of the land area in Afghanistan is desert, semiarid, or mountainous, not suitable for farming. A limited amount of vegetation grows over most of the area. Most of this land has value, however, only as it is grazed by livestock. Because of the sparseness of the vegetation, the aridity, and the terrain, sheep and goats make better use of this land than cattle or other livestock. The United States, Australia, Argentina, and other countries have conditions similar to this, where the land is also utilized by livestock. But the owners are ranchers living at a permanent base of operation, where winterfeed is often produced and from which hired shepherds are sent out to take care of the flocks. Not so in Afghanistan. Here in the cradle of civilization, men live and travel with their flocks. It has always been so and perhaps will continue.

Permanent residents see the Kochis in the Valley for a few months in the winter. They get acquainted with some of them and perhaps do some trading with them. Then comes the warmer weather, the green feed, and the Kochis move out to the north. As the season progresses, spring into summer and fall, the weather gets colder and the Kochis begin coming back. In a few weeks most of those we knew last winter are back with their black tents set up in about the same places. Where have they been? How do they live? How far do they travel in a day? What are their problems? These and other questions come into our minds. The uncertainty of the answers and the mystery of it all makes us want to learn more. This inquisitiveness held the interest of the writer. He also felt that the Kochi operations had a definite economic impact on the agriculture of the Valley.

With the help and encouragement of Leonard Hudson, USAID Livestock Advisor in the Valley, we developed a comprehensive questionnaire and went out to talk with these people. Wayne L. Rollins, D. V. M., of the Wyoming Team in Kabul, was in the Valley during the first few days and was helpful in conducting some of the first interviews. Because of the language barrier, interpreters were used. Moh'd Doud Senzai, a senior student at Kabul University, Faculty of Agriculture, worked through most of the interviews. Khan Mohammad of H. V. A. Agriculture, working as an Agricultural Economics Trainee, counterpart with the writer, helped with the rest. Both of these men took a real interest in the work and were very helpful in making contacts and getting information.

Interviews were conducted over a period of about a month, during February 1964. Contacts were made providing detailed information on operations of 15 stockmen and general information on operations of 15 camps. This may not be enough to draw conclusions that would surely be representative of all Kochis wintering in the Valley. However, we feel most of the data collected were accurate for the camps visited. The report should be useful in indicating management practices and operations.

Eleven of the 15 men interviewed ran both sheep and goats; 3 kept only sheep; 1 just goats. Of those that had both sheep and goats, the goats averaged about one-fifth of the total flock although it varied between one-tenth and two-fifths. Mohair was sold only by the man who ran all goats. Apparently goats were kept by most stockmen so they could have a small mohair supply to use at home, largely for weaving into material for tents.

All but 1 of the 15 families had camels. Most of them also had donkeys, from one to three head each. The number of camels per family ranged from 2 to 12, with an average of 5. A total of 74 camels were owned by the 15 families of 78 adults, making an average of nearly 1 camel per adult. The larger families were not necessarily the ones with the most camels. The number seemed to be more closely associated with the number of sheep and goats, with the larger flockowners having the most camels. No cattle and only 3 horses were reported among the 15 families.

The families ranged in size from 5 to 15 members with an average of 8. The ratio of children to adults was 2 to 3; of females to males, 6 to 7. Six different tribes were represented--Ishaqzai, Achakzai, Nurzai, Alikozai, Barakzai and Amronkhail. The number of families in the camps visited ranged from 4 to 32 with an average of 15. The total number of people in the camps was estimated at 40 to 210, with an average of 95.

All except two of the families interviewed spent their summers in a mountain area referred to as Siaband, almost due north of Lashkar Gah. The other two spend their summers in Rosgon, also in the mountains, but east of the Siaband area. The area of Chakhchoran was also mentioned as a summer stop for some of these people.

Ten of the men interviewed indicated they spent 3 or 4 months in the Helmand Valley. Four said they were here 5, 6, or 7 months; one said he was here only 2 months. Their time in the mountains in the summer was about the same as in the Valley. Most of the Kochis were on the trail coming from the mountains to the Valley for 1 to 1-1/2 months and the same time going from the Valley to the mountains. Four spent as long on the trail as they did in their summer and winter ranges. Some of these people keep their camp in one location in the Valley during the winter and move their sheep on the desert wherever necessary to find feed; others move their camps a number of times during the winter. Many of them also move frequently to different locations on their summer range.

The operations of the Kochis interviewed were quite similar. Generally they raised their own rams which they put in the breeding herd at about 2 years of age. They usually use these rams for only 2 years because beyond this they would be mating with their own daughters. Religion rather than genetics is given as the main reason for avoiding excessive inbreeding. The rams run with the ewes most of the year without danger of breeding as the ewes do not come into heat during the hotter part of the summer. In the late summer, just before the nights in the mountains begin to get cool, stockmen separate their rams from the flock and keep them separate for about 2 months. During this period, the rams receive special supplemental feed preparatory to the breeding season. The latter part of September they turn their rams with the ewes. Over a period of about 40 days, most of the ewes will be bred. The rams are left with the ewes from this time until the next July.

Lambing starts about February 20 and is usually pretty well completed by the end of March. By the time they start moving out towards their summer range, lambing is almost over. The last lambs will be born on the trail. If the year is bad and the feed poor, they may begin moving out earlier. In this event most of the lambs will be born on the trail.

Shearing is done after lambing, often immediately following, but sometimes a month or even two later. Frequently sheep are sheared at Nouzad in the foothills, about halfway to the Siaband. In some cases, however, they are sheared before leaving the Valley or after arriving at Siaband. Wool is sold to merchants, usually from the wool factory in Kandahar or their representatives. These merchants may be at Girishk, often at Nouzad or in Siaband when the wool is shorn there. The merchants do not have camels but hire someone to haul the wool out of the areas where trucks cannot come. Frequently the Kochis sell their wool a month or so before shearing and get most of the money at the time of sale. In this way the merchants tie the wool up. They also buy it from Afg 10 to 20 per mun less than the market price at the time they receive the wool. (One mun equals 10 pounds.) All men who have wool in one camp usually sell at the same time for the same price to a single buyer.

Average wool production was reported as about 3-1/3 pow per head. Mohair production averaged just less than 1 pow. (One pow equals 15/16 of 1 pound.) As indicated previously, all the mohair was used at home except by the man who ran all goats. Most of the wool was sold, but in some cases small amounts were also used at home.

Several unusual practices according to Western standards were found. With only 2 exceptions, Kochi stockmen said they used only 1 ram per 100 ewes. Some said 1 ram could breed as many as 200 ewes. Sheepmen from the range area of the United States consider 3 rams per 100 ewes as the number necessary to insure a good lamb crop. Fewer rams may be necessary in this country, however, because of the custom of running sheep in smaller flocks and keeping closer watch on them.

An average of about 70 percent lamb crop was found among the stockmen interviewed. Yearlings never lamb. There seems to be a wide variation in number of lambs born, depending largely on feed conditions. Few ewes bear twins. This, however, is also associated with feed conditions, with a larger proportion of twins when feed is good.

Kochi stockmen take lambs from their mothers at birth and keep them separate continuously. They keep the small lambs in the tents or at camp and allow them to nurse only twice a day--in the morning and evening. If feed is good and the ewe's milkflow is good, they give the lambs only half the milk; women and girls milk the rest and keep it for family use. If feed conditions are bad, lambs may get all the milk for the first thirty days or so. Even in these conditions lambs are kept separate from their mothers, except for the periods twice a day when they are allowed to nurse. After a few days or a week, when the lambs are old enough to begin picking green grass or weeds, children take them out in small groups a short distance from camp. With the short milk supply these lambs learn to graze at an early age. Usually lambs are weaned at about 3 months of age. By this time they are strong enough to get along entirely on forage. Ordinarily the Kochis stopped milking also at this time. However, a few continued to milk a month or so after lambs were weaned.

With this small lamb crop and the fairly heavy death loss it is common practice to keep all ewe lambs for replacement. No one reported selling any ewe lambs. All stockmen said they castrated their male lambs, usually at about 3 months of age. Most men indicated they left their ewes in the breeding herd until they were 7 or 8 years old.

Income was largely from sheep and lambs sold. Wool sales amounted to less than one-fifth the income from sheep sales. Stockmen were asked the number of sheep butchered and used by the family. This varied considerably from one family to another. Variation was due mostly to the amount of sickness among the flock. The Kochis interviewed butchered relatively few healthy, fat sheep because there were usually fairly large numbers of the other kind. It is common practice not to let any sheep die if it can be salvaged. Before the animal draws his last breath, his throat is cut, he is dressed out, and the meat is used for food. In computing the total value of sheep used, we assigned a value of about half that of a healthy sheep to those that were salvaged in this manner. On this basis the value of sheep used at home was approximately half the value of sheep sold.

The Kochis receive a large part of their living from sheep and goat milk and milk products. While a considerable part of the milk is used fresh or as curd or yoghurt, much of it is also processed into ghee and krut. Ghee is a butterlike substance made from milk fat. Krut is a high protein food made from the remaining milk solids. This latter process involves boiling the skim milk or buttermilk to evaporate most of the water. By processing the milk into ghee and krut, it can be stored and used throughout the year. This is good because sheep and goats have a relatively short lactation period. One stockman indicated they milked their sheep and goats only about 30 days, another nearly 180 days. The average was about 90 days. Average production per head per day for sheep and goats considered together was about .8 pow. For goats alone, it was about 1.4 pow. Throughout the milking season each family produced an average of nearly 4,000 pow of milk. The bulk of it was used at home in either fresh or processed form. The value of the milk and milk products used at home was over half the value of sheep and lambs used at home. In addition, about half the families sold some ghee; two also sold some krut. These were usually the larger producers and the sales were mostly of milk products over and above that needed by the family. Other stockmen sold these products because the family needed money.

Two stockmen also received income from sale of camels, each selling one for about Afg 2,000.

Death loss of sheep and goats was heavy among most of the stockmen interviewed. It varied from 15 to 50 percent with some unusual conditions where the entire flock was wiped out by disease or cold weather and shortage of feed. The average annual loss per family was about 25 to 30 percent. Some men were very much concerned about the heavy death loss; others seemed to take the attitude that Allah was responsible and that little could be done. They had been losing sheep in large numbers throughout their lifetime, as had their fathers and grandfathers before them. These stockmen accepted this heavy loss as a matter of course.

It was impossible to determine the exact cause of all death loss. This was due partially to a lack of communication through interpreters and partially to a lack of understanding of the local names these people used for their diseases. Frequently mentioned was a disease they referred to as kalak or kalakan. This is a disease affecting the liver, perhaps simply liver fluke. Another name sometimes used for liver disease was buzmargin; a third term was zerburzi. Rikhak is a severe diarrhea, usually affecting the smaller animals. Most stockmen mentioned it. Gardagul and garg were both mentioned frequently. The former seems to be a disease resulting from plant poisoning; the latter apparently is scabies. There may have been some foot-and-mouth disease. A local term, tabak, was used to indicate this condition. Also there were diseases known locally as Kawai, Tak, and Serishak. It is not certain which of these diseases is pneumonia. Just cold weather and poor feed or starvation undoubtedly caused heavy death loss at times. In local areas, abortion took a heavy toll of unborn lambs.

Stockmen were asked about their cash expenditures for food, clothing, livestock feed, and other items. About two-thirds of the total expenditures was for family living and only one-third for livestock feed, medicine, etc. Of the family expenses nearly 75 percent was for wheat purchases. Another 20 percent was for cloth for clothing and the remaining 5 or 6 percent for other items such as rice, tea, sugar, salt, and medicine. Four of the 15 families bought no tea or sugar; only 5 bought more than Afg 100 worth of sugar and only 4 as much as Afg 100 worth of tea. All families bought salt, spending from Afg 50 to 300 each. This included salt for livestock as well as for family use. Six bought some medicine costing less than Afg 200 each with the exception of one family where the man was hospitalized in Kandahar. His expense for medicine and hospitalization was Afg 1,200.

Three items stand out in the purchases for livestock feed and supplies. The largest was for barley and corn with all except three buying some. All reported buying wheat straw. This was used largely for camels but was also fed to sheep by some stockmen. Nine of the 15 men interviewed bought wheat pasture for supplemental winter grazing. Some of this green feed was also cut and hauled for camels, donkeys, rams and sick sheep not able to graze with the rest of the flock. Only half of the stockmen reported medicine purchase for livestock. This was small, varying from Afg 30 to 500 per family.

One stockman had a different operation from all others. In addition to sales of sheep he had raised from birth, he bought lambs weighing 30 to 40 pounds, kept them for 4 or 5 months, and sold them again in the fall. He had been doing this for 5 or 6 years and apparently was showing a good profit.

There was a wide variation in the price of wheat. Part of it was bought in the winter in the Helmand Valley at a price usually more than Afg 20 per mun. The wheat bought in the mountains was at a much lower price, usually Afg 10 to 12 per mun. This variation was due more to the time of year the wheat was bought than to the area.

Only limited merchant activities were found. This was surprising because many of us have had the idea that a large portion of the Kochis' income was from merchandising activities. With the differential in prices of wheat in the summer mountain area at harvest-time and the Helmand Valley in the winter, it would seem reasonable for the Kochis to haul wheat from the mountains to the Valley. This was done, however, by only one man. He had four camels and made three trips to Siaband during the season. It required 10 days to travel from the Valley to Siaband and 12 days to return with his load. He could carry 40 to 50 muns per camel. Thus, he hauled 500 or 600 muns in the three trips. This was more than his family's requirements while he was in the Valley. He should have made a good profit on the wheat he sold.

Another man reported taking tobacco from the Valley area and selling it in the mountains. His return cargo was also wheat. Two stockmen bought cloth in the Kandahar Bazaar and sold it in Siaband. They paid Afg 4,000 for the cloth and sold it for Afg 6,000 making a gross profit of Afg 2,000. These men also reported transporting ghee from Siaband to the Helmand Valley. They paid Afg 150 per mun for the ghee in Siaband and sold it for Afg 200 in the Valley, making a gross profit of Afg 50 per mun. All Kochis interviewed said they did not go into Pakistan.

There was a real problem of getting accurate information on the numbers of livestock on hand and income from sales. Despite our care in trying to assure the Kochis that their

individual operations would not be revealed, they continued to be suspicious. It seemed impossible to convince them that we had no connection with tax assessors or collectors.

Total income reported was a little less than half the total expenses. We have assumed that the error was largely in the income figure due to the tendency to understate income and inventory because of tax considerations. Also the large items of expense, wheat and cloth, representing over 70 percent of the total expenditures, were in line with what is known to be reasonable. Neither did the other expense items appear to be out of line. For these reasons, we have assumed that this total expense figure is reasonably accurate and have adjusted the income figures and corresponding inventory numbers to coincide.

The value of products used at home was Afg 8,000 per family. Expenditures for family purchases and livestock feed, etc., were nearly Afg 13,000. For practical purposes, this latter figure might be considered as cash income because cash expenditures (and savings of which there was little evidence) in the long run must equal cash income. Total income--cash income plus value of home-used products--was about Afg 21,000.

Adjusted inventory number of sheep and goats was 158 head per family, of which about 80 percent were sheep and 20 percent goats. At a value of Afg 300 for the sheep and Afg 200 for the goats, the total investment per family would be Afg 44,000. Another Afg 15,000 value would be considered for five camels at Afg 3,000 each and Afg 400 for one donkey. Thus, the total livestock investment would be Afg 59,400.

Interest on this investment at 6 percent would be nearly Afg 3,600. It is reasonable to consider this amount as attributable to capital investment. The balance of the income, Afg 17,400, then, would be from the labor of the stockman and his family, and the man's management. This amounts to nearly Afg 1,500 per month which seems reasonable when compared with efforts in other agricultural fields.

Livestock expense per family was about Afg 4,300. This was largely feed--corn and barley, green wheat pasture, wheat straw, and a little hay. For the 158 sheep and goats, it amounted to Afg 27 per head.

The total income of Afg 21,000 amounted to Afg 133 per head.

The final question in each of the interviews concerned problems of the Kochi livestock producers. These problems were recorded as reported by the stockmen. We observed additional definite problems although they were not recognized as such by the Kochis. Nine men said their poverty, not having enough money to buy food for their families and feed for their livestock, was a major problem. Disease and death loss was also reported by five stockmen as a major problem. Although not mentioned specifically by the others, this was certainly a problem of all stockmen interviewed. Whenever death loss reaches an average of 25 to 30 percent of the entire flock, it should be real cause for concern. Perhaps many men did not recognize this as a serious problem because they were accustomed to heavy death loss and their own mortality rate was so high.

Another problem, complained about bitterly by a number of the stockmen, was the high tax rate and especially the fact that many of them had to pay taxes several times; some as many as six or eight times per year. Until we began interviewing the Kochi stockmen, we had heard only the other side of the story. Many people in Afghanistan, government officials and others, had indicated it was difficult to catch up with the Kochis to collect taxes because of their continual moving. The stockmen interviewed, however, indicated that often a man representing himself as a government official would come to collect taxes from them. He would be accompanied by a soldier so they would have no alternative but to pay the tax. Later another man, also presumably from the government, would come again and ask for the taxes. When informed that they had already paid, this second man would say that the first one was not a true representative of the government and the Kochis had made a mistake by paying the tax to him. The second man would also be accompanied by a soldier and would insist on collecting the taxes. Since most camps had no people who could read or write, there was no way for them to know which of the two was the actual representative of the government. We assume both of these could have been legitimate tax collectors but from different provinces or at least from different hockimettes. As the Kochis would move to another place in the Valley, often they would have to pay taxes again, then again perhaps on the trail, and another time or so in their

summer range. One man complained that he had to pay taxes on sheep even though he had sold all of them. Another said that of every Afg 3,000 his group paid, 1,000 went to the government and 2,000 to the "Middlemen"--those involved in various stages of tax collection.

When questioned, these people admitted the tax rates charged at the different places were different. This would suggest an attempt by each hockimette or province to collect their proportional share of the tax, depending on the length of time the Kochis were in their area. We suggest a more efficient way of collecting taxes might be to do it once per year and prorate it to the different provinces depending on the length of stay. In this way the overhead of collecting would be reduced considerably and the Kochis would be much happier.

Shortage of feed, particularly in the winter range area was frequently mentioned as a major problem. Some men said there was plenty of feed in the summer range but that it was very short in the Valley. Three stockmen complained of having to pay a fee to landowners in Siaband for grazing the land surrounding their farming land. These landowners admitted they did not own the grazing land, but even so they were able to collect a fee from the Kochis for using this land.

One stockman mentioned loss from wolves and thievery as a severe problem. He said in some cases the thieves would come in the daytime when the flock was isolated from the rest of the camp and take sheep at gunpoint. Another man suggested as a problem the fact that they received no help from the government. They had been coming to the Valley for a number of years and had observed the help the government had given to the farmers in the area. He even indicated he and his group would like to become farmers so they could get this government help.

Following are some of the problems we observed, although the Kochis did not seem to recognize them as problems.

1. A very small lamb crop. This could be improved by feeding the ewes better at breeding time, perhaps using more rams, and trying to keep better control of disease. By selection, the Kochis could keep more ewes that had raised twin lambs and thus build up the number of twins in their flocks.

2. Low wool production. A program of selection and breeding should easily double wool production per head in a few years.

3. Marketing of their products, particularly wool. Processors and handlers often make more money on the wool than the producers themselves. The government has a virtual monopoly on the purchase of wool in Afghanistan. Lambs and sheep, on the other hand, are sold on a completely free and competitive market. Perhaps this is one reason income from wool was only about one-fifth of the income from lamb and sheep sales.

CONCLUSIONS AND RECOMMENDATIONS

Following the time-honored profession of livestock production, the Kochis use the vast stretches of mountain and desert ranges that would otherwise be wasted and from them produce valuable economic goods. The Kochis represent a sizable proportion of the population of Afghanistan. The contribution of these people to the economy of the country has been great; their potential contribution is even greater. In order to reach this potential, however, they need help. In the past they have received little or no help from the government. The rationale for providing this help need not be strictly humanitarian; nor need it be that the Kochis have earned a right to it through their contributions to the economy. Rather it should be that returns to the country in terms of increased productivity would in the long run be greater than costs of providing the help.

Following are Specific Recommendations

1. Accelerate the providing of schooling for Kochi children. This program could be started in the area where they spend their winters and continue for perhaps just the

2, 3, or 4 months they were there. At the outset it will be necessary to recruit teachers from outside. As soon as possible, however, it would be desirable to train teachers from among the Kochis themselves. When Kochi teachers become available or before if possible, the teaching period should be extended beyond the winter months. This would work best if the teacher were a member of the camp and traveling with the group anyway.

2. Provide more adequate health facilities and instruction. This might include such things as vaccinations and antibiotics, instruction on sanitation, training of the Kochi women in midwifery. A small beginning has been made in the field of health and sanitation but much more needs to be done.

3. Recognizing that the Kochis do not have a permanent place of residence, change the laws of the country if necessary to allow them adequate representation in the provincial and national governments. Make them full-fledged, responsible citizens, subject to all the laws of the country such as service in the military, and also recipients of all the benefits.

4. Utilize part of the tax money collected from the Kochis to train competent veterinarians. In exchange for this training, require the veterinarians to go among the Kochis for a period of 5 years and diagnose the major diseases, determine best methods of control and teach these to the stockmen. The veterinarian should receive a reasonable salary as a livestock specialist on the Agricultural Extension Service staff. In addition to the work of disease diagnosis and control, he could teach the stockmen the value of more and better feed for their livestock and other good livestock management practices. After the Kochis had had this service for 5 years, the veterinarian aspect of it should be discontinued on a free basis and the veterinarians left on their own. They should be encouraged to stay with the Kochi people and charge whatever fees they feel they are able to get for their services. The livestock aspect of the service should be continued as a regular feature of the Extension program.

5. It will require several years to train enough veterinarians so that they can make a real contribution to the livestock health program of the Kochis. For this reason the program should be started immediately. In the meantime, it would be desirable to recruit a number of good vocational agricultural graduates and give them a short period of intensive training in vaccination and disease diagnosis. These men could be assigned to the regular Extension Service staff and fill in until the trained veterinarians became available. They could carry on such programs as spraying and dipping. Dipping vats should be built at strategic locations throughout the areas where the Kochis operate. The government might help with the financing. Pills for liver fluke and other common diseases should be made available and the livestock specialist should demonstrate how to use them.

6. A few of the Kochis are beginning to get radios. This could be an excellent teaching aid if the government would sponsor a program at regular intervals directed to these people. Because of illiteracy, written leaflets or posters, etc., are useless. Because of long distances and constant moving, personal contact is difficult and expensive. The radio could become an excellent medium for bringing educational material to these people if the programs were well planned and executed. Programs on livestock disease diagnosis and control, prices and market information, improved livestock management practices, health and sanitation, and other worthwhile items could be used. If these received wide acceptance and proved successful, the programs could be expanded to include general educational material for children and adults. For the program to be most successful there should be at least one good radio in each camp. This may be one of the real problems--informing the Kochis of this new program and encouraging those that do not have a radio to get one and keep batteries, etc., so that it will continue to operate.

7. The quality of wool and lambs could and should be improved. The government might designate certain large privately owned farms in the irrigated sections as ram-producing farms. Their purpose would be to increase the improved quality rams more quickly. The government should place the sheep with these qualified producers and agree to buy all desirable rams at specified premium prices. These rams then should be traded to the stockmen, pound for pound, for their present unimproved rams. If it becomes necessary to get the job done, this trading could be

made compulsory. Of course, the unimproved rams acquired by the government would be castrated or disposed of for immediate slaughter.

Another way to improve sheep and wool quality is to carry on a culling program wherein the poor-producing females are taken from the flock. At present, however, this would be less desirable than the ram program because of the heavy death loss among all flocks, which dictates the practice of keeping all female lambs and retaining all ewes in the flock as long as they continue to produce. Also, since the ram is half the flock, the ram selection program would get the job done much faster.

8. In some areas of Afghanistan there is a fairly well developed carpet industry. In much of the rest of the country the bulk of the wool is shipped out in the raw form. We suggest a detailed study of the feasibility of a carpet or rug making industry in areas where it has not been developed. If it appears feasible, encourage its establishment. Prices to producers should, thereby, be improved considerably.

9. A problem emphasized by a number of the stockmen was the shortage of winterfeed, particularly grazing land in the Valley. There seems to be an overbalance of summer range in relation to winter range. The winter ranges always seem to be fully stocked and when a drought comes death loss is heavy. As improved management practices help increase lamb crops and cut death loss from disease the winter feed from rangeland pasture will become even shorter. We recommend the best way to solve this problem and increase total livestock production is to make better use of irrigated lands for producing supplemental winterfeed. Legume forage--alfalfa and clover--as well as wheat pasture, would work well in this program. Some corn, barley, and high protein supplements could be fed but we would emphasize the irrigated pasture program at first. There is a shortage of mechanized harvesting equipment and machinery costs are high. Also in certain parts of the Valley there is a shortage of labor. It makes good sense under these circumstances to emphasize a program where the livestock do the work of harvesting the crop.

The financial arrangement between the Kochis and the farmers could take one of several different forms.

(1) The stockman could buy the pasture outright and pay a reasonable fee so that each would make a profit on the operation.

(2) Because of a shortage of money the stockman might agree to give the farmer a specified number of sheep in payment for the pasture.

(3) A contractual arrangement could be made between the two whereby each would share in the net profit from the enterprise in proportion to his contribution, considering livestock investment, labor, value of feed, and other costs.

10. The present survey was undertaken as a quick attempt to find some of the problems and management practices of the Kochis wintering in Helmand Valley. Only 15 camps were visited. This study does not purport to give an exhaustive treatment of the activities of Kochis throughout the country or even all wintering in the Valley. Considering the importance of the Kochi livestock operations to the entire economy, we recommend that a detailed study be made including a representative sample of all Kochi operations in the country. From this study could come comprehensive recommendations that would help government officials and others to develop sound programs that would benefit these people and help integrate them into this developing economy.

APPENDIX III

PROBLEMS OF THE MARJA PROJECT

AND RECOMMENDATIONS

1964

by

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PROBLEMS OF THE MARJA PROJECT AND RECOMMENDATIONS

1. Jiribs Per Farm for Crop Farming:

Our study showed that 20, 30, and 34 jiribs of land were necessary to make a subsistence living on Rank 1, 2, and 3 land, respectively. We feel, however, that neither H. V. A. 's nor the settlers' best interests will be served by allowing only enough land to produce a subsistence living. Therefore, as an initial adjustment, we recommend settlers who are dependent on oxen power on Rank 1 quality land be given 25 jiribs; on Rank 2 land we recommend 35 jiribs; and Rank 3 land 40 jiribs.

To handle these larger acreages the farmer will need to adopt improved methods of farming. More power will be needed. The larger farms will require two oxen. The farmer's time will be more fully employed throughout the year. In addition he may need some help from members of his family. If no help is available he will need to include in his rotation a larger proportion of alfalfa and a smaller proportion of intensive crops which require large amounts of labor.

There may be a tendency for farmers to let some land lay fallow each year. This should be discouraged. To insure a good living with some surplus for reinvestment, all land should be farmed each year and as much as possible should be double cropped. More double cropping can be done as farming methods are improved and more labor and/or capital become available.

The following table shows (a) the Bureau of Reclamation reconnaissance land classification, (b) the original MKA land classification, (c) the land ranks used in this study, (d) the number of jiribs needed in each land rank to produce a subsistence living, and (e) the number of jiribs we recommend per farm.

Bu Rec Recon. Classification	MKA classification	Rank (used in this study)	Jiribs needed for subsistence	Jiribs we Recommend
2 & 3	2, 3	1	20	25
2 & 3	4, 5	2	30	35
4R, 4P	2, 3	3	34	40

The number of jiribs we have recommended in each land rank is only 5 or 6 more jiribs than the number determined as necessary to produce a subsistence living. This may seem too small an increase if we consider the desirability of a surplus that could be used for investment capital, for bad years, and to pay an O&M charge. However, income is based on yields and production as reported by Marja farmers. If the farmers erred it was very likely on the side of reporting too low yields. Prices used were average farm prices found at the time of interview or lower if the price seemed to be inflated. Thus, we have been conservative in computing income per farm. Also, actual yields are very low in relation to their potential. It is reasonable to expect that farmers will begin using better cultural methods and management practices. This should come perhaps slowly but naturally in response to more cash crops and higher prices, a better organized and more effective extension service and completion of the drainage program.

We recommend that this number of jiribs--25, 35, and 40 for Ranks 1, 2, and 3 land--be allotted to all new settlers and that adjustment on this basis be made in all present farms.

A number of settlers complained that the new open drains were taking sizable portions of their farm land. It has been estimated that the open drains that are and will be constructed in Marja may take as much as 10 percent of the land out of production. Some farms may lose more than this, some less. In addition, another 2 to 5 percent might be lost in irrigation ditches, tree rows on farm borderlines, etc. We recommend that all farms be rechecked for actual irrigable area and that this amount be used when adjustments are made; also, that net irrigable area be considered in new farm allocations.

It would be relatively simple to adjust present farm size. On Rank 1 land, three 20-jirib farms could be combined into two farms with a gross of 30 jiribs each. If as much as 15 percent of this land were utilized in drains, irrigation ditches, etc., this would

leave a net of about 25 jiribs of farmland, the amount recommended. In the same manner, two 20-jirib farms on Rank 2 land could be combined to make one farm with a net of about 35 jiribs farmland. It might require the combination of a 20- and a 25-jirib farm on Rank 3 land to make the net of 40 jiribs of farmland recommended.

In making their original distribution of land to settlers in Marja, the H. V. A. Agriculture Department used the land classification of MKA. Where more than one land class was found in an area to be included in one farm the lands were converted to a common base on the ratio of 4 for Class 2, 5 for Class 3, and 6 for Class 4, since 20 jiribs of Class 2 land was considered equal in productive capacity to 25 jiribs of Class 3 or 30 jiribs of Class 4.

We recommend the same system be used in allocating lands to new farmers where more than one land rank is found in an area to be included in one farm. The ratio for Ranks 1, 2, and 3 lands is 5, 7, and 8, since the productive capacity of a 25-jirib farm on Rank 1 land would be about the same as a 35-jirib farm on Rank 2 land or a 40-jirib farm on Rank 3 land.

2. Pasture-livestock Programs:

Land of lower quality--Ranks 4, 5, and 6--should not be used for regular crop farming. Rank 6 and Rank 5 lands lie in the area found to be nonirrigable by the Bureau of Reclamation land classification and drainage investigations. We recommend that these lands not be considered in either a woodlot or a pasture-livestock program. They are underlain with seriously drainage deficient subsoils and substrata. The drainage aquifers are generally tight with slow permeability of 0.0-1.5 meters per day. Drainage barriers of compacted gravelly silty clay loam, caliche, or conglomerate occur within 1.25 meters of the ground surface. For verification, refer to maps "Permeability and Drainage Layout," and "Depth to Drainage Barrier" in report entitled Marja Irrigation Drainage and Settlement Project by the Helmand Valley Delegation to the International Irrigation and Drainage Conference, New Delhi, India, March 1964. To sustain a pasture economy, farm drains in the neighborhood of a 50-meter spacing would be required. This in turn would increase the cost of developing these lands by at least \$75 per jirib. The number of jiribs necessary for an economic pasture-livestock unit is too large to justify the spending of money necessary to drain these lands. Our study shows an average of over 150 jiribs needed for each man on a pasture-livestock enterprise. With this drainage cost of \$75 per jirib, the expenditure for each settler would amount to \$11,250 or over half a million afghanis at the official rate of Afg 45 per dollar. This is clearly much too high for a livestock farm with a gross annual income potential of only Afg 19,000 to 27,000. (See farm budgets on following pages.)

The better land, Rank 4 of this study, is suitable for a woodlot or a pasture-livestock program. Possibly some of the Rank 5 lands, where irrigation works are already completed, could be included with the Rank 4 lands in these programs. However, our study indicates that these lands cannot bear extensive development expenditures. It may be necessary in some cases to do a little leveling, laying out of larger fields, and enlarging of ditches so that these lands can be farmed and irrigated more efficiently. But care must be taken to not spend too much. If the necessary development costs for these lands is more than a modest amount, the lands should be abandoned. In considering these lower quality lands it must be remembered that they are submarginal and cannot be used profitably for crop farming. There is the choice of leaving the lands idle with no production income or finding an alternative use. The alternatives suggested require what may seem to be large amounts of land for each settler. However, our studies indicate these amounts are necessary to make an economic unit. If smaller amounts are given him the settler will probably find after a few years of discouragement that he cannot make a living so will abandon his farm.

Our recommendations for the use of this lower quality land are not specific but we present five alternatives. Four are pasture-livestock enterprises; the other a woodlot enterprise. Each has its advantages and problems. It was difficult to secure adequate figures on which to base recommendations. However, the best we were able to find have been used. The livestock alternatives include an enterprise on each of the following: (a) a breeding flock of sheep where lambs are raised and sold; (b) a program of buying and selling wether lambs; (c) a breeding beef cattle herd, selling calves; and (d) a dairy cattle program. A farm budget for each of these enterprises will be presented showing

jiribs required and necessary investments, incomes, and costs. These budgets will be followed by a discussion of the various enterprises.

a. Pasture-Breeding Sheep Flock

This enterprise would require 200 jiribs of land for each family. We assume the same size family as presently found in Marja--5.4 people. Following is the farm budget for this enterprise:

<u>Inventory:</u>	<u>Afg</u>
85 mature ewes at Afg 350	29,750
25 yearling ewes at Afg 300.	7,500
<u>1 ram</u>	<u>500</u>
111	
Total livestock investment	37,750

<u>Production and Income:</u>	<u>Afg</u>	<u>Afg</u>
60 lambs born (70 percent lamb crop)		
51 lambs live (15 percent death loss)		
25 lambs (all ewe lambs) kept for replacement		
26 lambs to sell: 60 pounds each x Afg 5 = Afg 300/head	7,800	
9 cull ewes to sell: 100 pounds each x Afg 4.5 = Afg 450/head	4,050	
16 ewes and yearlings to salvage before death at Afg 225	3,600	
Wool from 111 sheep at 3.3 pow x Afg 6.7 per pow	2,454	
Wool from 25 lambs at 2 pow x Afg 6.7 per pow	335	
720 muns milk from 60 ewes milked 120 days at 1 pow/head		
96 muns used at home as fluid milk at Afg 10 per mun.	960	
624 muns to be processed into ghee and krut at 5 percent yield		
31 muns ghee at Afg 200 and 31 muns krut at Afg 50.	7,750	
Fruits and vegetables produced on the farm	625	27,574

<u>Farm Operating Expense:</u>		
Pasture seed: 200 jiribs x 1 mun x Afg 30 ÷ 5 years.	1,200	
Taxes: 200 jiribs x Afg 6 and 111 sheep x Afg 2.25	1,450	
Plowing of 40 jiribs each year x Afg 50	2,000	
Salt: 36.5 muns x Afg 5.	182	
Shearing: 135 head x Afg 2	270	
Interest on livestock investment: Afg 37,750 x 5 percent	1,887	
O&M charge: 200 jiribs x Afg 25.	5,000	11,989
Net farm income		15,585
Net income per jirib: Afg 78		

<u>Family Living Expense:</u>		
Wheat: 262 muns x Afg 15.	3,930	
Meat: 6 sheep salvaged x Afg 225	1,350	
Milk used in fluid form: 96 muns x Afg 10	960	
Ghee used at home: 10 muns x Afg 200	2,000	
Krut used at home: 10 muns x Afg 50.	500	
Fruits and vegetables produced on the farm	625	
Sugar 150; salt 50; tea 75; medicine 25	300	
Clothing: 5.4 people x Afg 250.	1,350	11,015
Balance		4,570

b. Pasture-Wether Lamb Flock (Purchase and Sale)

Wether lambs would be bought in the winter, carried over through spring and summer and sold in late fall. This enterprise would require 150 jiribs of land.

<u>Inventory:</u> (Average weight about 40 pow)	<u>Afg</u>	<u>Afg</u>
110 wether lambs at Afg 240	26,400	
1 milk cow	<u>1,500</u>	
Total livestock investment	27,900	

Production and Income:

110 lambs bought, 15 percent death loss		
94 lambs to sell at 90 pow x Afg 5 = Afg 450/head	42,300	
16 lambs salvaged at half value = Afg 225/head	3,600	
Wool from 110 wether lambs: 3 pow x Afg 6.7 per pow	2,211	
Milk, meat, eggs, chickens produced on farm	1,396	
Fruits and vegetables produced on farm	<u>625</u>	
Total income	50,132	
Less purchase of 110 wether lambs	<u>26,400</u>	23,732

Farm Operating Expense:

Pasture seed: 150 jiribs x 1 mun x Afg 30 ÷ 5 years	900	
Taxes: 150 jiribs x Afg 6, 110 sheep x Afg 2.25,		
1 milk cow x Afg 5	1,153	
Plowing: 30 jiribs each year x Afg 50.	1,500	
Salt: 36.5 muns x Afg 5	182	
Shearing: 110 head x Afg 2.	220	
Interest on Afg 27,900 investment at 5 percent	1,395	
O&M charge: 150 jiribs at Afg 25.	<u>3,750</u>	9,100
Net farm income.		14,632
Net income per jirib: Afg 97		

Family Living Expense:

Wheat: 262 muns x Afg 15	3,930	
Meat: 5 lambs salvaged x Afg 225	1,125	
Milk, beef (calf), eggs, chickens produced on the farm	1,396	
Fruits and vegetables produced on the farm	625	
Sugar 150; salt 50; tea 75; medicine 25	300	
Clothing: Afg 250 x 5.4 people	<u>1,350</u>	8,726
Balance.		5,906

c. Pasture-Beef Cattle (Cow and Calf Operation)

This enterprise would require 200 jiribs of land for each family.

Inventory:

22 cows at Afg 1,500	33,000	
1 bull at Afg 3,000	3,000	
5 yearling heifers at Afg 1,000	5,000	
1 milk cow at Afg 1,500.	<u>1,500</u>	
Total livestock investment	42,500	

Production and Income:

18 calves born (80 percent calf crop)		
7 calves for death loss and replacement of cow herd		
11 calves to sell at 1 year 300 pounds/head x Afg 3.3	10,890	
3 cull cows to sell at 700 pounds/head x Afg 3.	6,300	
2 cows salvaged before death loss x Afg 1,500	3,000	
Milk, meat (dairy calf), eggs, and chickens produced.	1,396	
Fruits and vegetables produced on farm	<u>625</u>	22,211

<u>Farm Operating Expense:</u>	<u>Afg</u>	<u>Afg</u>
Pasture seed: 200 jiribs x 1 mun x Afg 30 ÷ 5 years	1, 200	
Taxes: 200 jiribs x Afg 6 and 38 cattle x Afg 5	1, 390	
Plowing: 40 jiribs x Afg 50.	2, 000	
Salt: 28.5 muns x Afg 5	143	
Interest on 42, 500 investment at 5 percent	2, 125	
O&M charge: 200 jiribs x Afg 25	5, 000	11, 858
Net farm income		10, 353
Net income per jirib Afg 52		

<u>Family Living Expense:</u>		
Wheat: 262 muns x Afg 15	3, 930	
Milk, dairy calf, eggs, chickens produced on farm	1, 396	
Meat from one-half cow salvaged	750	
Fruits and vegetables produced on the farm	625	
Sugar 150; salt 50; tea 75; medicine 25.	300	
Clothing: Afg 250 x 5.4 people	1, 350	8, 351
Balance		2, 002

d. Pasture-Dairy Cattle

This enterprise, similar in many respects to the beef cattle enterprise, would require 100 jiribs of land for each family.

Inventory:

9 cows at Afg 2, 000	18, 000
2 yearling heifer at Afg 1, 000	2, 000
Total livestock investment	20, 000

Production and Income:

7 calves born (80 percent calf crop)		
7 cows produce 1, 830 pows milk per head x Afg 1 per pow . . .	12, 810	
2 calves for replacement		
5 calves to sell at 175 pounds x Afg 3 = Afg 525/head	2, 625	
1 cull cow to sell at 700 pounds x Afg 2.5	1, 750	
1 cow salvaged before death loss	1, 200	
Eggs and chickens produced on farm.	500	
Fruits and vegetables produced on farm	625	19, 510

Farm Operating Expense:

Pasture seed: 100 jiribs x 1 mun x Afg 30 ÷ 5 years	600	
Taxes: 100 jiribs x Afg 6 and 18 cattle x Afg 5	690	
Plowing: 20 jiribs x Afg 50.	1, 000	
Dairy equipment depreciation: Afg 500 ÷ 2 years.	250	
Salt: 14.2 muns x Afg 5	71	
Interest on 20, 000 investment at 5 percent	1, 000	
O&M cost: 100 jiribs at Afg 25	2, 500	6, 111
Net farm income		13, 399
Net income per jirib: Afg 135		

Family Living Expense:

Wheat: 262 muns x Afg 15	3, 930
Eggs and chickens produced on farm.	500
Fruits and vegetables produced on the farm	625

Family Living Expense--Continued:

	<u>Afg</u>	<u>Afg</u>
Milk from 1 cow used by the family	1, 830	
Meat, from one-half cow salvaged.	600	
Sugar 150; salt 50; tea 75; medicine 25.	300	
Clothing: Afg 250 x 5. 4 people	<u>1, 350</u>	<u>9, 135</u>
Balance		4, 264

Numerous problems are associated with the inauguration of a livestock and pasture program on individual farms in the Helmand Valley, not the least of which is convincing H. V. A. officials that much larger farms are essential for settlers on the poorer lands. In administering the Homestead Act in the United States, it was found by trial and error that it takes much larger acreages in some areas to make an economic unit than in other areas. In the rich corn-belt area in the mid-19th century a man could make a good living for his family with less than 100 acres. He would starve to death, however, with six times this much land in the arid plains and mountain area on land that was suitable only for livestock grazing. Twice the Homestead Act was amended to give the settlers larger tracts of land, but not without many good, honest, hard-working men losing their savings and going bankrupt on inefficient sized units. Settlement agencies from other developing countries have been faced with the same problem.* It has been common experience to allocate land in too small amounts with consequent problems. This study was undertaken and these recommendations have been made in hopes they could be used by H. V. A. as a guide in allocating land to settlers.

One of the major problems associated with a livestock enterprise of any kind is the source of capital. The alternatives suggested require from 20,000 to 42,000 afghanis to get started. Most settlers who might wish to come to the project would probably not have this much cash available. It may be possible, by careful selection however, to recruit settlers with livestock experience who also had enough capital to get started in an enterprise of this kind. If a source of credit were available the settler may be able to borrow a substantial part of the money necessary to get started. In all of the budgets we have allowed an expense item of interest on investment. This is computed at the rate of 5 percent on the entire investment in livestock. If the settler has his own capital, this amount can be used for further investment, saving, family living, or any other purpose. If he must borrow the money, the amount can be used to pay the interest. In most of the budgets there is a sufficient balance after allowing a reasonable amount for family living to amortize a loan of half the capital in 5 years or the entire amount in less than 10 years.

All the budgets also include an expense item to cover an operation and maintenance assessment. This amounts to Afg 5,000 on a 200-jirib unit. Until the time that H. V. A. begins making this assessment, this amount could also be used to amortize a loan.

If no private credit source is available, it may be necessary for the government to help in the financing of a livestock enterprise. If settlers could be found who had some capital the government could advance the balance and contract with them to pay the money back in a reasonable period of time. To assure collection, the contract could be drawn up so the settler would be required to deliver enough cattle, sheep, or wool to pay the loan obligation before he sold any of the product. With this arrangement, H. V. A. would need to supervise the loans closely. If this were done by a qualified livestock technician it could also be very helpful to the settler in solving his management problems.

In a limited number of cases where unusually good men were available but without capital, it may be sound economics for H. V. A. to finance the entire amount. This may seem like a costly program for the government but it may be less expensive in the long run than subsidizing farmers indefinitely on uneconomic units.

Another expense H. V. A. will have to assume if this pasture-livestock program is inaugurated is the leveling of the land and laying out of large fields and ditches so that they can be irrigated efficiently. The Afghan farmer has been accustomed to irrigating small fields with the border or small basin system. Under this arrangement each man has been able to irrigate only about 50 jiribs. With proper field layout, perhaps some leveling where necessary, and canvas dams, it will be possible for one man to irrigate the entire pasture of 100, 150, or even 200 jiribs without difficulty.

*Eicner, Carl K., and Lawrence, W. Witt, "Agriculture in Economic Development," McGraw-Hill Book Company, New York (1964) p. 306.

The laying out of large fields will also make the farming of this land much easier. The first year it would be desirable for H. V. A. to plow and plant the alfalfa and pasture, with what help the settler was able to give. Thereafter, the farmer could take care of the pasture himself. For best results the pasture sod should be broken up and replanted about every 5 years. This means the plowing and replanting of about one-fifth of the land each year. This should be started about the third year. For the 200-jirib pasture, 40 jiribs should be broken up each year; for the 150- and 100-jirib pastures, it should be 30 and 20 jiribs, respectively.

It will be noted the farm budget makes no allowance for the owning of oxen. It seemed more economical to replace oxen with sheep or cattle that would produce products directly for sale.

There are three alternatives the farmer may use to get his pastureland plowed. (1) A number of farmers in the area already own tractors and plows. This number should increase in the future. The farmer might be able to have his land plowed on a custom basis by private tractor owners. Some custom work is now being done. The rate in Marja now is Afg 50 per jirib. (2) If this pasture-livestock program gets underway on a fairly wide basis, H. V. A. might wish to do custom work for farmers. The charge should be kept down to a reasonable figure, but be high enough to cover direct operating costs plus tractor depreciation. (3) The settler might choose to go in with several of his neighbors and form a cooperative to buy a tractor. There would undoubtedly be many problems connected with establishing of cooperatives especially in this country with little experience and background in the movement. However, many developing countries have found cooperatives a real help to farmers. Credit associations have been especially helpful and as mentioned previously, credit to farmers is one of the major problems in a program of this kind. We recommend further study be undertaken as soon as possible on cooperatives with the objective of finding ways and means of establishing them.

Now we will discuss some of the advantages and problems associated with each of the enterprises covered in the budgets. One of the sheep enterprises may be the most reasonable of the livestock programs suggested. Next to chicken, mutton is the most desirable meat produced in Afghanistan. Many times more sheep than cattle are grown in this country. Hence, people are much more accustomed to eating mutton. This may make the marketing problem easier. Mutton is generally of much higher quality than beef. A number of Marja settlers, formerly Kochi stockmen, are now raising sheep on their own farms and other lands in the area. They know the business thoroughly and most of them would be happy if they could continue. Stockmen who already have a band of sheep and habitually winter in the Valley might be recruited to settle on these larger farms adapted to irrigated pasture and livestock production. This would solve the problem of capital needed to get started into the enterprise.

A number of settlers in Marja, those with Kochi backgrounds, are now involved with enterprises similar to the alternative b., "Pasture-Wether Sheep Flock." Two major differences are evident. Since these settlers do not have enough land, they have to rent the pasture from H. V. A. and/or other farmers. Also due to a lack of capital, most of these settlers work together with a village chief or other leader who has capital. The leader puts up the money to buy the sheep. The settler furnishes the labor and management, and any profits after sale of the sheep are divided equally. To help in solving the capital problem, this same arrangement might be encouraged under the proposed sheep enterprise or the government might put up the money and share with the settler in the profit.

There is likely to be less of a marketing problem with sheep--whether a ewes and lamb flock or wether lambs--than with beef cattle or dairy, because there is already an established market for mutton, ghee, and krut. More work might have to be done to find adequate markets for the cattle and dairy products.

A very serious problem with sheep and cattle on irrigated pasture in this area is liver fluke infestation. Therefore, an animal health program should be inaugurated by H. V. A. concurrently with the introduction of the pasture-livestock program. The livestock specialist assigned to work with this program need not necessarily be a veterinarian, but should be a man with good background and training who would teach the stockmen fluke control, vaccination and dipping, and the solution to other health problems.

Another problem encountered with the cattle enterprises, might be a source of good quality cattle. By starting out with the best native stock available and using good bulls, perhaps with the help of H. V. A., the quality could be greatly improved over a period of years.

Marketing may be a more difficult problem. These pasture enterprises would not be designed to fatten cattle. However, the animals should come off grass-fat and a good quality. As demand for better quality and fatter beef develops, it may be found profitable for other settlers on the better lands to buy these smaller grass cattle and feed them with concentrates for a period. It would be necessary to investigate the market in Kabul. Possibly a market might be found among the foreign community for better quality cattle that could be produced in the Valley. Another market possibility is to grow out the steer calves and sell them in the Valley for draft animals. We suggest marketing studies be undertaken to help find outlets where all of these livestock or livestock products can be sold at a profit.

At first glance the dairy enterprise seems much more attractive than the beef enterprise. Only half the land is required, less than half the investment is necessary, and more profit after family living expenses are indicated. However, before many settlers are set up with a dairy enterprise careful investigation should be made of the market potential and the expense of processing milk and getting it to the consumer. There is the real problem of sanitation to prevent undulant fever, tuberculosis, and other diseases spread through milk; also the problem of keeping the milk sweet between the farm and the plant, especially if it is to be sold fresh. There is the expense of picking up the milk morning and night or if only once a day the problem of keeping the milk cool at the farm.

If a market cannot be found for all the milk on a fluid basis and processing must be done there is the question of price. Certainly less profit could be expected if the milk had to be made into butter, powder, or ice cream, etc. The price used in this study-- Afg 1 per pow--is the estimated price a plant could pay for milk used in fluid form. Possibly the price would be a little higher for fluid milk. However, the fluid market is quite uncertain and the price for manufacturing milk would probably be lower.

If marketing and sanitation problems can be solved, this dairy enterprise might be worth considering for a considerable portion of the marginal lands of the Helmand Valley. Production per cow is low but is based on the average production found in Marja. Few if any of the cows received supplemental feed. Production could be stepped up greatly through improved breeding, feeding, and care.

There will be less of a problem of financing the dairy enterprise than the beef enterprise because of the smaller investment required. Certainly men with experience should be sought if this enterprise is used. Perhaps these will be harder to find than men with experience raising cattle for slaughter, and experienced cattlemen are much scarcer than experienced sheepmen.

We recommend that H. V. A. try some pilot projects of pasture and livestock as soon as possible. It would be well to try them primarily on Rank 4 lands with some also on Rank 5 lands. We feel it desirable to initiate the sheep projects first--both the wether lamb purchase-sale program and the ewe-lamb breeding flock program.

Several farms could be laid out into large fields with 150 jiribs for the wether lambs and 200 jiribs for the breeding flock. These fields should be leveled some where necessary and the ditches and field laterals enlarged to facilitate flood-type irrigation. The fields should then be planted to adapted pasture grasses. The settler should be recruited beforehand so he could help with seeding of the pasture and take over on the irrigating.

It might be desirable in this pilot experiment to choose settlers from among Kochi stockmen. We suggest selecting them from among people already here on the project, living with relatives and waiting to be assigned farms. This procedure would have the advantage of getting men with some irrigation experience. Settlers who had sheep or could get capital or credit to buy sheep should be chosen.

After a year or two of observing the success or failure and problems of these stockmen, H. V. A. should be in position to determine if the program should be continued, expanded, or terminated, and the problems that may be encountered.

3. Woodlots:

We have not had the opportunity to make an economic appraisal of the possibilities of a woodlot program. It may be that some of the land in Marja not suited to pasture and livestock production could be used for growing trees. Trees might be grown for fuel or for poles, logs, lumber, or even pressed boards for building construction. As noted on the first page of this report, H. V. A. is considering an extensive woodlot program on the poorer lands in Marja. Again, we would caution against the spending of too much per jirib on these poor lands.

Several observations may be appropriate in connection with establishing and operating a tree farm. The mechanized farm was set up several years ago as a demonstration that farming with machinery in the Helmand Valley is feasible. This has been demonstrated and much good has come from the farm. People have been trained in tractor and machinery operation. The land farmed has been built up through construction of drains, rotation, and the turning under of clover and green manure crops. Some of the tractors have been sold to farmers in the Valley. Now the plan of H. V. A. is to begin dividing the land of the mechanized farm into economic size family units and making it available to farmers. Thus the original plan of government officials who envisioned the land development program in the Helmand Valley is being implemented by bringing more settlers into the Valley.

The woodlot program could serve a purpose similar to that of the mechanized farm. For the first few years it would not be possible for a family to make a living from a woodlot enterprise because the trees would not be large enough to market and there would be no sawmill or other plants to handle the trees. It is necessary to have a supply of trees before the mills can be operated. For this reason the best answer is for H. V. A. to plant and take care of the trees until they get to be marketable size and the mills are built. Thereafter, the purposes of the original planners would be better served if the woodlot area were divided into economic family size units and allocated to settlers. The size of unit need not be determined at this time, but when the trees are marketable size and the price the mills can pay is determined, it will be a relatively simple matter to determine the size of farm unit needed to support a family.

4. Water Table, Salt, and Drainage:

High water table, salt and problems of drainage were found over most of the project. Settlers stressed this problem more than any other. Much progress has been made on digging drains in some areas but other areas are still badly in need of drain construction. We recommend the program of drain construction be speeded up with concentration on areas of the better land and higher production potential.

5. Weeds:

Weeds, such as canal thorn, Bermuda grass, nut grass, bindweed and dodder, are another bad problem over most of the Marja farming area. Observations of the farmland during our field interviews bore out the severity of the problem. In some areas it contributed more to low yields than high water table, salt, and poor drainage. Several factors contribute to the severity of the weed problem in the Helmand Valley. (1) The inadequacy of the stick plow to cut the roots and turn under the weeds. (2) The lack of mechanical cultivators of any kind to cultivate between the rows. (3) High cost of chemical weed sprays. (4) The attitude of farmers about weeds.

Officials of H. V. A. are aware of the weed problem to some extent and they have begun to work toward some solutions. However, considering the very high cost of weeds in terms of lower crop yields, we recommend a concerted effort be put forth to solve the weed problem. Specifically we recommend the following:

a. Moldboard plow. H. V. A. Extension should expand its efforts to get farmers to use the small moldboard plow. A good start has been made here but more work needs to be done. Extension should assign a man to work full time on this project. His job would be to get the plow in use throughout the Valley as soon as possible. It would include demonstrations, making sure the plows were available, finding the best source of new plows and parts, working with farmers through Extension agents to help solve any problems that might arise in connection with the use of the plow. Deep

plowing, at the right time, of land irrigated to bring up the weeds should help in their control as well as add needed organic matter to the soil.

If farmers were slow to begin using the plow, an incentive paid with P. L. 480 funds could be adopted. Progress with this program to date, however, indicates the incentive might not be needed. Some of the funds might be used to help subsidize the purchase of new plows and parts, and paying of the special supervisor.

b. Row crops--mechanical cultivation. During 1964 H. V. A. has sold 10 tractors to farmers in the Helmand Valley. Other farmers have bought tractors on their own. Good use is being made of these tractors for plowing and discing of land. This helps in the control of weeds. However, discing and plowing are not always done in the best manner and at the right time for best weed control. Little use is being made of the tractors to cultivate crops and control weeds.

We recommend that H. V. A. through its mechanized farm program, do a better job of planting row crops with machinery and demonstrating proper methods of cultivation. Demonstrations should be conducted which will compare yields with good weed control and no weed control. As tractors and machinery come into greater use, representatives from the manufacturer should teach tractor owner how to plant crops in rows and cultivate to keep weeds down. H. V. A. should push the sale of tractors fully equipped with planters and cultivators to landowners. They should stress to farmers the importance of using their machinery for cultivating as well as plowing.

The use of a dozen or so tractors will do relatively little to solve the overall weed problem in the Helmand Valley. However, if those who farm with tractors do a good job of weed control and their yields are greatly improved, more farmers will be encouraged to buy tractors and eventually they could be a great aid in controlling weeds.

c. Growing of rice. H. V. A. has had a policy of not allowing farmers to grow rice in Marja. This may have been a good policy for several reasons. Rice requires much water. The laterals and ditches over the project are designed to apply adequate amounts of water for ordinary crops--wheat, cotton, alfalfa, etc., but are not always large enough to supply the amount needed for a crop of rice. Also, farmers' waste water is carried off in the drains. The extra amount of water required for rice production might overtax the drains. Where adequate drains have not been constructed, there is the problem of rising water tables that would inevitably arise with rice growing. Also, valuable soil nutrients might be leached out in the irrigation water, and rice paddies make an excellent breeding area for the malaria mosquito. These are the major arguments against the growing of rice and they seem quite convincing.

However, many of the settlers expressed to us their desire to grow rice. They felt this culture would be helpful to them in controlling weeds, especially camel thorn. Rice is a good substitute for wheat in the diet. It is usually higher in price and the yields of rice grown in the area have been higher generally, than wheat. In addition to its value in weed control, rice has a real value as a crop for leaching soils affected by excess soluble salts. It is the most practical method because a crop can be produced while the soil is being leached. This can be done, however, only in areas where an adequate drainage system is established. There are large areas in Marja, Nad-i-Ali and other sections of the Valley where soluble salts on the ground surface and in the root zone of the plants are a very serious problem. Some of these areas now have adequate drainage; others may have when presently planned drain construction work is completed.

We feel it would be a mistake to allow settlers to grow rice indiscriminately throughout the project. However, there are some areas where drainage and soil conditions are such that rice could be grown profitably and, with certain controls, without harm to the land or the drainage system. In addition there are other areas where leachable soluble salts are a limiting factor to better crop production. It is strongly recommended, therefore, that H. V. A. carefully consider these land areas and the drainage situation and allow farmers in the favorable areas to include a specified amount of rice in rotation with their other crops.

d. Hand labor to control weeds. Hand labor can be very effective in the control of weeds, whether used in conjunction with mechanical cultivation and effective plowing or not. A good stand of alfalfa is quite effective in choking out weeds. As indicated,

rice is also an effective control device. If alfalfa and rice are grown in rotation with other crops, weeds should be less of a problem. Besides actual hoeing and pulling of weeds, hand labor would include the burning of ditchbanks, tree lines, or farm boundary lines. Farmers should be taught the various hand methods for controlling weeds, their effectiveness, and the necessity of cutting camel thorn and other tap root weeds below the crown so there would be less chance of their coming up again. Also, they should be taught the importance of cutting before the weeds make seed.

e. Chemical sprays. Even though chemical weed sprays have been found to be expensive, this increasingly popular method of weed control should not be disregarded. We recommend that H. V. A. continually investigate the possibilities of this method. New sprays are being developed every year. High transportation cost is largely responsible for the high costs of chemical sprays. Importing of the chemical in more concentrated form would save transportation costs. This should be thoroughly investigated. Also, we should not lose sight of the possibilities of finding a source of chemicals in this country from which chemical sprays can be made.

f. Farmers' attitude about weeds. Most farmers undoubtedly realize that weeds are damaging their crops. However, the full economic effect of the weed problem is probably not clear to them. Farmers' need for the vegetation as feed or fuel and their tendency to regard every plant as having value may combine to prevent them from doing an effective job of weed control, especially when the weeds are small, relatively harmless and more easily controlled.

We recommend that H. V. A. use every reasonable means to show farmers the harmful effects of weeds and encourage them to do whatever is necessary to keep weeds out of their fields. Demonstrations showing a comparison of yields in weed-infested and clean fields should be most effective. Movies or slides, and talks showing costs of weeds in terms of reduced yields and practical methods of control should be helpful. Prizes for the cleanest fields might be considered. If each farm would maintain a woodlot as originally planned, there would be less desire to keep the weeds for fuel.

6. Lack of Experience:

The lack of experience in farming in the Marja area was found to be an important factor. A considerable portion of the settlers came from different parts of the country where they had some experiences in irrigation and farming, but the bulk of these settlers are from nomadic tribes. Some of the settlers from the nomadic tribes told us they had some farming experience before coming to Marja, which is possible. However, their experience on the whole must have been very limited. We found 34 percent of the settlers who had some experience in farming and 66 percent, including the nomads, whose farming experience was none or very limited. The first group came from areas where the soils were fertile, but they are still facing problems like proper irrigation methods, crop rotation, and use of commercial fertilizer. The second group, who are largely from nomadic tribes, find it very difficult to adjust themselves to this new way of life.

We recommend that H. V. A. through their Extension Service, provide the best possible advice and help to all farmers. A training program for Extension personnel should be conducted frequently so that the agents will always be able to give practical help to the farmers. It would be well if the agents were able to actually demonstrate and show farmers what to do and how to do it. This should help bridge the gap while the settlers were gaining experience.

If some of the alternatives presented at the beginning of these recommendations are implemented where settlers are given larger tracts of land to use for livestock enterprises, the selecting of nomadic people for these farms would take advantage of their livestock experience.