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POSSIBLE INNOVATIONS FOR TEACHING

FARM MANAGEMENT IN IRAN

by

Mehdi-Khosroshahin

A report submitted in partial fulfillment
of the requirements for the degree

of

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in

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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
LIST OF TABLES	v
LIST OF FIGURES	vi
INTRODUCTION	1
OBJECTIVES	4
TEACHING INNOVATIONS	5
STRUCTURE OF AGRICULTURE IN IRAN	8
AGRICULTURAL POLICY IN IRAN	11
Utilization of land	11
Marketing	13
Agricultural credit	13
AGRICULTURAL PRODUCTION INPUT	15
Irrigation	15
Fertilizer and insecticides	15
Farm mechanization	15
Farm wages	16
PRESENT SITUATION OF FARM MANAGEMENT TEACHING IN IRAN	17
Tehran University	20
University of Ahwaz	22
University of Hamadan	22
PRESENT SITUATION OF FARM MANAGEMENT IN THE UNITED STATES	24
Content of farm management textbooks	25
Farm management as a decision-making science	26
Basic economic principles in farm management	28
Behavior of average product	28
The law of diminishing physical return	29
Three stages of production function	29
Opportunity cost	31
Product-product relationship	32
Budgeting	35

TABLE OF CONTENTS (Continued)

	Page
Linear programming	35
INNOVATION OF FARM MANAGEMENT TEACHING IN IRAN	37
Choice of enterprise	43
Machinery management	43
Labor management	43
Farm planning and budgeting	44
Research and analysis	44
Farm business survey	44
Farm business analysis	44
SUMMARY AND CONCLUSIONS	46
LITERATURE CITED	48

LIST OF TABLES

Table	Page
1. Total funds for agriculture during the five-year plan (1973-1978) (in million dollars). (Figures in dollars calculated at current exchange rate. Slight discrepancy in total from rounding off numbers will be noted.)	12
2. Sale of tractors by government and imports	16
3. Numbers of students graduated in 1972-1973 in different agricultural fields	19

LIST OF FIGURES

Figure	Page
1. Stages of diminishing physical output	30
2. Product-product relationship	34

INTRODUCTION

Throughout the history of mankind, agriculture has always been the main element of interest. The early Romans recorded a number of facts in relation to farming and cultivation. Arthur Young, a famous writer about the 19th Century British farming states, "The magic of ownership turns sand to gold." [1, p. 1]

There are hundreds of papers concerning farm practices, methods of cultivation, and innovation of farm practices which might be quoted from agricultural history, but farm management as a field of study developed during the 20th Century and the importance of farm management as an applied and pure science has been recognized in this century (1).

There is good evidence that the importance of farm management has not been fully recognized in the curricula of Iranian colleges and universities. There are some misunderstandings about what really farm management is in less developed countries. Some people believe farm management is the farmer art or daily job and some think it is another name for agricultural economics. Even when production is for home use, the principles of decision-making about what to produce, how much to produce, and what methods to use are applicable in large and small scale farms. Indeed, there should be some modification in teaching farm management according to the needs, cultural, institutional pattern of Iran.

A glance at the catalogues of some of the agricultural colleges of Iran shows that farm management has not been taken seriously and

is not in accord with the needs of the country. With rapid technological changes and some modernization of cultivation in Iran, new and complex problems arise for small as well as large farms.

A major problem in implementing farm management principles is the relative illiteracy of farmers in general. Even in a country like the United States in which the population has a high degree of literacy, farmers have traditionally been slow to recognize some of the advantages which could be had by new management innovation. When 85 percent of Iranian farmers are illiterate, they usually have no choice except to depend on the government to obtain all information and new materials which could help them adopt new methods for cultivation and other aspects of agriculture.

The potential for increases in agricultural production in Iran are great. Natural resources are plentiful. Within the past few decades, Iran has been able to capitalize on their petroleum resources. Given this new source of wealth, great possibilities for modern technologies have been created. However, agricultural production has not increased in proportion to the population increase. Importation of agricultural commodities has increased. Many new concepts are being implemented. Some of the innovations are pole concepts, cooperatives, foreign investments, which to this point have not been effective partly because of their newness, and partly because of ineffectiveness of the bureaucracy handling them. All the new agricultural concepts are designed to make agriculture more efficient.

If self sufficiency and increasing food production economically and technically is the main objective of government, it is necessary

to improve efficiency in the use of farm resources. This is not possible unless new knowledge of agriculture is provided to farmers through training in farm management as well as the agronomic and livestock husbandry sciences. If farmers make the right kind of decision at the proper time, with guidance of farm managers, the economy of Iran would also change. With good planning and cooperation between government agencies, Iran could become self-sufficient in food production. One key to creating this self sufficiency is more effective farm management and a key to better farm management would improve the quantity and quality of farm management teaching in the colleges and universities of Iran.

OBJECTIVES

The objectives of this study are: 1) to point out teaching innovation, 2) to show structure of agriculture in Iran, 3) to analyze the present situation of farm management teaching in Iran, and 4) to show the present situation of farm management teaching in the United States.

The general purpose of this paper is to analyze how teaching of farm management could be changed according to the traditional, cultural, educational economic development which is taking place in Iran. By improving the quality of farm management teaching efficiency, production of agriculture can be increased in Iran.

TEACHING INNOVATIONS

Considering innovation¹ as something different, there are several types of innovation one could use. Some innovations may be new, but some also may just be different applications of knowledge.

Considering teaching innovation, there are a number of ways in which instruction could be changed to enhance the learning process: arranging for visiting lecturers, presentation of papers by students, teaching by games and simulation. The latter will be greatly enhanced by the use of computers.

From the point of view of this paper, teaching innovation should accomplish one or more of the following objectives:

1. Develop and maintain the interest of the learner.
2. Prepare background information for students.
3. Development of understanding of technical information and skills of students.
4. Aid students to synthesize understanding of subject matter.
5. Stimulate students to apply facts and information for problem solving.
6. To help students in independent research for new knowledge (2).

Teachers of farm management are limited in learning resources. There are just a few teaching methods which are available to the teachers of developed and less developed countries. They are:

¹Webster's Dictionary defines innovation as something that deviates from established doctrine or practices, something that differs from existing forms.

1. Lecturing.
2. Problem solving.
3. Demonstration.
4. Panel.
5. Guided discussion.
6. Field trip (tour of villages in less developed countries).
7. Farm management of games and simulation.
8. Computer as a source of farm management tool (3).

Experience shows that teaching effectiveness will greatly increase if we use the above methods in combination with each other. For example, in farm management a lecture can be used with combination of problem solving. In a country like Iran where most of the students are from big cities, and have never been on a farm, to have the students acquaint themselves with problems of the farmers will be of great help. The instructor can use this tool effectively by asking the students to make a brief summary of their observations, listing problems faced by farmers and posing possible solutions to the problems which they have listed. This method can be of great help for future farm managers as well as a source of ideas for research for faculty members.

In general, a farm management instructor should be able to train students such that student would be able to use the training and learning in a farm operation. There is a long list of teaching abilities which has been prepared and proposed by a southern regional conference at Tulsa, Oklahoma.

Indeed, students should experience some of these abilities in a farm management course before leaving the college. From this list has

been chosen the following which are most important:

1. Selection and utilization of most efficient and economical methods in farm enterprises including crops and livestock production.
2. Combination of farm enterprises in such a way which yields maximum returns.
3. Selection of farm practices according to the organization of farm.
4. Maximum utilization of factors of production.
5. Management of farm business which could provide economic security of farms.
6. Production adjustments on the future condition with fixed situations between the supply of crop and livestock raised in the community (4).

Farm management is an academic subject, but is very practical in its use. This fact gives many possibilities for innovation in the college. The teacher of a farm management course is in the highly desirable position of being able to stimulate interest in the subject by presenting practical problems for which students can develop solutions.

STRUCTURE OF AGRICULTURE IN IRAN

The farming pattern which is developing in Iran is diverse. However, for all these farming patterns, the tendency is to reach a high scale of operation. The main goal in the Iran agricultural system is to increase agricultural productivity by mechanization and efficient use of resources. Agricultural credit, research and extension services are still in a developing stage in Iran.

Commercial farming, which excludes subsistence farms, is one of the sections which the government is very interested in expanding. Commercial farming includes progressive Iranian mechanized farms. These commercial farms are able to undertake modern technology for agricultural production--most are grain and livestock farms.

Commercial farming includes foreign investment in farming of several thousand hectares which are highly mechanized in the State of Khuzestan, located in the southern part of Iran, is well-known for this kind of development.

Meat and dairy processing plants of different sizes are emerging as a solution to Iran's needs for animal protein. Some of these are organized by government or with government aid. There are also some private companies for milk, meat, and poultry production.

Farm production cooperatives are small groups of local farmers who exchange their land titles for a share of government assistance. Profit of each individual farmer is determined by the number of days work plus a share in the cooperative profits.

These cooperatives bring several farms into one large scale mechanized farm with technical aid from government. Each member of the cooperative holds his own title to land and benefits from his own land and labor. There were about 80 such cooperatives in 1974 (5).

There are still about 2.5 million subsistence farms which do not belong to any one of the above mentioned cooperatives (6). Their production is just a little more than self-sufficiency. Because of inefficiencies due to the widely scattered villiages, the "pole concept" has emerged.

Pole concept, which is a consolidation of villages into a town, is a new innovation. There has been attempts to develop areas with good soil and water resources into "poles." Until 1974, 20 "pole" areas were investigated to find out what they could produce most efficiently. The government's goal is to provide all facilities and services as these agricultural poles develop. In the meantime, the government's intention in the long-run is to reorganize the entire rural sector by consolidating villages into large population centers or "poles." The main purpose is to reduce the migration of farmers from villages to the cities. For this purpose the government has provided some elementary schools and employment opportunities in rural areas. These consolidated (pole) villages will have shopping centers, small banks, small factories, primary and possibly secondary schools. Achieving such reorganization takes a long time and is impossible for villages which are very isolated.

Nomadic tribesmen without a fixed home have grazing areas and seasonal migration routes that are well-known and recognized. Ministry

of agriculture and natural resources estimate there are about 120,000 tribes. The government is very interested in reducing the nomadic nature of these tribes so that increased production can take place over time.

Specialized agricultural production organizations have a role in guiding policy and development in Iran. They are under the direction of the Ministry of Agriculture and Natural Resources. They are as follows:

1. Company of oil seed cultivation.
2. Plant protection organization.
3. Cotton organization.
4. Seed and plant improvement organization.
5. Institute of sugar beets.
6. Animal husbandry organization.
7. Forest and pasture organization.
8. Agricultural and machinery organization.
9. Veterinary organization.

AGRICULTURAL POLICY IN IRAN

Agricultural policy in Iran is based on planning which is under the direction of government organization for planning. The five-year plan started in 1973 and extended through 1978.

The plan organization reports an allocation for the five-year plan for agricultural development is 5323.4 million dollars (see Table 1).

Agricultural policy and programs are directed by the Ministry of Agriculture and Natural Resources and the Ministry of Cooperative and Rural Affairs. Under the direction of the plan organization is the pricing of livestock and all crops. Administration of extension and research activities is a responsibility of the Ministry of Agriculture and Natural Resources.

The welfare of farmers who became landowners through the land reform is the responsibility of the Ministry of Cooperation and Rural Affairs. The ministry has the task of raising the productivity and improvement of the living standards of the rural population. According to the plan organization, per capita income in Iran is estimated to be 200 dollars per year.

Utilization of land

Consolidation of land for efficient and economic cooperative units should not be less than 20 small farms by the end of the five-year plan. By the end of the five-year plan, the objective of the government is to have 12 percent of the cropland in the farm cooperations, 8 percent in the large agribusinesses, 30 percent in various types of

Table 1. Total funds for agriculture during the five-year plan (1973-1978) (in million dollars). (Figures in dollars calculated at current exchange rate. Slight discrepancy in total from rounding off numbers will be noted.)

Budget area	Current funds	Development funds	Total funds
Conservation and exploitation of natural resources	122.3	341.9	464.2
Agro-industry and agricultural development projects	96.5	452.7	549.2
Improvement and increase of agricultural products	85.0	383.3	468.3
Improvement and increase of livestock products	104.5	516.1	620.6
Agricultural and livestock services	171.5	508.9	680.4
Market regulation of agricultural products	93.1	307.9	401.0
Agricultural and livestock loans	3.6	1,012.7	1,016.3
Expansion of cooperatives and agricultural corporations	187.3	513.0	700.3
Land reform	43.2	34.6	778.0
Research and surveys	64.1	158.5	222.6
Administrative services	76.4	46.1	122.5
Total	1,047.6	4,275.8	5,323.4

Source: Iran's Export Development Targets, Planometrics and General Economy Bureau, December 1975.

commercial farms and 50 percent in individual farms (7). Apparently the plan organization failed to achieve the objective because agricultural imports have increased tremendously.

Marketing

The objective is to provide guaranteed prices, subsidies, and an adequate facility to encourage production and guarantee the farmer about 20 to 25 percent return on investment and operating costs.

Improvement of port facilities, roads, transportation, storage and processing is another objective of the government of Iran. Government agencies are becoming more and more involved in the distribution of food. The Ministry of Commerce has the authority to sign long-term agreements with foreign and domestic agricultural producers, foreign handlers of wheat, rice, meat, eggs, milk, butter, cheese, tea, and sugar plus some imported fruits and vegetables.

The Iranian government is involved in organizing stores all over the country. These government stores and some private markets are more and more buying from foreign companies. The objective is to control inflation and reduce the profits of the middlemen.

Agricultural credit

In recent years the Iranian government has increased its availability of funds thru its banks for rural development, but credit is not available at the proper time and the Bureaucracy prevents the farmer from getting the loans from the government bank. Farmers, therefore, have no alternative except to obtain funds at high interest rates from the private sector.

The Agricultural Development Bank of Iran provides low interest credit for agriculture projects. The most important source of credit to cooperative and small farmers in agriculture is the Agricultural Bank of Iran which is owned by the government and cooperative unions. Rural cooperatives also provide credit to small farmers, and act as a channel for the Bank of Iran.

AGRICULTURAL PRODUCTION INPUT

Irrigation

Throughout the history of Iran, water has always been vital to agricultural production. The average rainfall in the southwest Caspian area is about 50 inches and a little less in Gorgan and Azarbyjan areas, but many of the agricultural areas receive only 10-12 inches or less (8). In some years low rainfall caused a great reduction in crop production and loss of livestock. This is the reason Iran is drilling more wells and building reservoirs in order to increase and stabilize production. At present there are 12 reservoirs completed and seven more are under construction (9).

Fertilizer and insecticides

The use of fertilizer has increased in recent years. The soil institute of Tehran has a soils laboratory and is providing guidance on application of fertilizer and testing the soil for farmers, but it is not very effective. Pesticides and herbicides are limited. There is some claim that Iran should be able to produce its own pesticides and fertilizer requirement from petrochemicals sometime in the future.

Farm mechanization

Mechanization is mostly used on the newly irrigated lands of the state of Khuzestan and some of the large wheat farms in the northern part of Iran. Rice growing is also mostly mechanized in the northern part of Iran using motorized tillers, compact threshers and a few combines.

Plants are now assembling Romanian tractors in Tabriz and John Deere tractors in Arak. Table 2 shows the number of tractors sold by the government and imported from 1971-1975.

Table 2. Sale of tractors by government and imports

Year	Number sold by government	Number imported	Total
1971-1972	2477	2,890	5,367
1972-1973	5787	2,125	7,912
1973-1974	4781	9,348	14,129
1974-1975	7564	48,180	55,744

Source: Ministry of Agriculture of Iran.

Farm wages

There is a minimum wage for labor. Daily farm wages vary from 2 dollars to 5 dollars depending on the region of the country. Tractor drivers and other skilled workers earn about twice this amount. Job opportunities in factories are causing wage increases on farms and this has led to severe labor shortages in farming regions. There is also much greater shortage of tractor operators and mechanics than laborers. Government is establishing some vocational schools for this purpose.

PRESENT SITUATION OF FARM MANAGEMENT TEACHING IN IRAN

The first agricultural school in Iran was established in 1901, near Tehran. This school, with a five-year program, was organized with European teachers. The objective was to train technicians for agriculture. The school operated for seven years. In 1919 another school of agriculture was established, known as the "School for the Farmer." In 1922 another school was established near Tehran, and in 1923 became a secondary agricultural school having two years of classroom instruction and one year of practical farm work. In 1932 another secondary agricultural school was established in the south of Tehran. Karadj Agricultural School was established in 1938 for training of agricultural technicians and in 1956 became a college of agriculture at the University of Tehran (10).

Higher education in agriculture is a four-year program and leads to a B.S. degree. The curriculum of the agriculture course at the College of Agriculture in Karadj, Tehran University, which is the leading institution for higher education in Iran, operates under the semester and credit system. In the first two years, in the program at Karadj, the main subjects in addition to special courses offered in ten departments were: Irrigation, Plant Protection, Animal Husbandry, General Agriculture, Agricultural Economics and Rural Sociology, Agricultural Machinery, Agronomy, Horticulture, Soil Science, and Vocational Agriculture. The M.S. degree was offered in all departments and a Ph.D. only in Plant Protection. Recently

the Department of Agricultural Education and Extension was added to the College of Agriculture. The teaching methods consist of lectures with demonstrations, laboratory exercises and field work. In addition, there are scientific tours to the different parts of the country. The number of staff at Karadj and Pahlavi is adequate. A number of the staff have taken post-graduate work in foreign countries.

According to one estimate, in the next five years Iran will need 60,000 agricultural specialists for transforming the country's traditional farming system into an advanced agricultural system. Authorities believe that some shortages of 30,000 farm managers is the greatest barrier for rapid development and modernization of agriculture. These experts are needed by the public and private sector (11).

There are seven agricultural colleges and every year the total number of graduates is almost 1000 students (See Table 3). In addition, several thousands of Iranian students study agriculture in the United States, Europe, and some Asian countries. The universities which have agricultural colleges are as follows:

1. University of Tehran
2. University of Tabriz
3. University of Pahlavi
4. College of Agriculture of Hamadan
5. College of Agriculture of Rezie
6. College of Agriculture of Zanjan
7. University of Ahwaz

The teaching of farm management is quite typical in all of the Universities of Iran. Three universities will be described as examples.

Table 3. Numbers of students graduated in 1972-1973 in different agricultural fields

Major	2-year College			B.S.			M.S.			Ph.D.			Total		
	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl	Total
Total	461	57	518	369	44	413	17	1	18	28	21	49	875	123	998
Soil and water	217	42	259	63	10	73	6	-	6				286	52	338
Irrigation	-	-	-	78	4	82	2	-	2				80	4	84
Agronomy				7	-	7							7	-	7
Horticulture				12	2	14	1	-	1				13	2	15
Animal husbandry				35	5	40							35	5	40
Veterinary Science	50	-	50							28	21	49	78	21	99
Plant breeding	50	7	57	36	6	42	6	1	7				92	14	106
Nutrition and food science				3	-	3							3	-	3
General agriculture	24	-	24	28	-	28							52	-	52
Plant protection	42	-	42	29	4	33	2	-	2				73	4	77
Natural resources	67	-	67	25	3	28							92	3	95
Others	11	8	19	53	10	63							64	18	82

Source: Statistics of Higher Education of Iran, March 1974, Tehran, Iran. p. 195.

Tehran University

The Department of Agricultural Economics and Rural Sociology at Tehran University offers farm management with a two-hour lecture per week, plus two or three optional field trips during one semester. It is believed that the only textbook used for farm management in Iran has been written by Dr. Abozia. The contents of the book are a combination of farm management methods in Europe and the United States. This textbook, which was published by the Tehran University Press in 1952 does not provide enough information for Iran's needs. With his retirement in 1965, his book ceased to be used.

From 1966 to 1972, teaching of farm management was limited to the following material which was published in mimeographed form. The following materials roughly show the outline:

1. Management and its meaning
2. Characteristics of farm managers
3. Functional and elementary management problems
4. Crop and rotation systems
5. Livestock management
6. Relationship between input-output of dairy and beef production
7. Budgeting and planning

As the outline shows, these materials are selected from an old edition of some of the American textbooks. The material listed above does not deal with procedures which could be used for farm management in Iran except some basic principles in farm management which are applicable.

Another book prepared by W. A. Yang and translated by this author was used. Dr. Yang is a management specialist of the Food and Agriculture Organization of the United Nations (FAO). Following its first publication in 1958, it was again published in 1962, 1965, 1968, and 1971, respectively. The first edition of this book was published in three languages: English, French, and Spanish. This book has also been translated into Chinese, Japanese, Korean and Turkish (12).

The content of this book is research oriented and introduces farm management investigation to the agricultural teachers, extension workers and for the people who are concerned with the improvement of farm productivity and efficiency in their countries. In Iran, like many other less developed countries, there are few farm management specialists, and in most cases farm management problems are solved by people who are not well-trained in this field. The faculty of the Agricultural Economics Department of the College of Agriculture believe the use of Yang's book can be of great help to future farm managers.

The content of the book includes: farm business survey, farm bookkeeping and financial accounting, farm business analysis, cost and enterprise studies, farm planning and budgeting, linear programming, farm work efficiency studies, estimating machinery costs and planning for efficient use, cost/beneficial appraisal of agriculture and farm projects, and finally land and tenure problems.

The entire book was translated and will be published by Tehran University Press. For teaching purposes, in the mimeographed form, the chapter which deals with linear programming was omitted. In

addition, the chapter on bookkeeping and financial accounting was completely revised. Some material about different methods of bookkeeping on a farm level and different methods of finding depreciation was added.

University of Ahwaz

Ahwaz Agricultural College is located in the state of Khuzestan in the southern part of Iran. Since the problems of Khuzestan are completely different from the rest of the country, the curriculum has been oriented to serve the needs of arid and semiarid irrigated agriculture.

Up to late 1968, the Agricultural Economics Department at Ahwaz offered a course in the principles of farm management in English with two-hour lectures and two-hour lab work per week. The course deals with the application of the principles of agricultural economics, types of farming, use of land, selection of agricultural enterprises, crop rotation, combination of livestock and crop enterprises (13).

University of Hamadan

Hamadan Agricultural College is located in the city of Hamadan. Dr. Grimshaw has taught farm management for one semester. The lecture was given in English and simultaneously translated to Farsi. The course deals with decision-making processes, success of the farm manager problem faced by a manager, production function, diminishing return, tools of decision making, budget preparation, risk and uncertainty, factors of production, and finally application to the situation in Iran which concerns the touring of villages and acquainting students

with the problems of cooperative and individual farmers. The above lecture material has been translated to Farsi and is taught by an Iranian instructor. The material was taken from a textbook by N. Emery Castle, Manning H. Becker, and Frederick J. Smith, Farm Business Management, 2nd edition.

PRESENT SITUATION OF FARM MANAGEMENT IN THE UNITED STATES

Farming in the United States has been very successful and its methods can be used as a model by other countries who are interested in increasing their own production.

Historically, farm management is an applied science that has progressed rapidly in the United States. Since 1910, the field of farm management in college teaching, research, and extension work has been recognized and it has developed rapidly.

World War I caused the number of college students to decrease and research and extension work of farm management collapsed. At the end of World War I, the office of farm management in the United States Department of Agriculture was reorganized. During World War II, effort of farm management activity was reduced and their work and energies were directed into the war (14).

The first farm management textbook was written by Fred W. Card of Rhode Island College of Agriculture in 1907. This book discussed fundamental principles of farm management, but because of the lack of research data, it was not able to present a solution to the farm problems of that period. Following that, G. F. Warren from Cornell, published a textbook with the same title. This book was based upon data from a farm management survey in 1907-1908.

In 1914, Boss, of Minnesota, published a book with the title, "Farm Management." The contents of the book were based on cost accounting surveys. This book was not written for the purpose of

college teaching, but it was used for a number of years as an elementary course for farm management students.

These textbooks were the only available sources for colleges and schools of agriculture. Research was continued and new sources made available for farmers and students. Several bulletins were published by the USDA, which could be used for the solution of farm management problems. These bulletins provided new material to the writers of textbooks. Since 1920, a great number of textbooks have been published (15).

Content of farm management textbooks

Elementary farm management textbooks serve as a source of knowledge to students from sophomore to the senior years. In some universities a basic course in General Economics, particularly micro-economics are prerequisites for farm management. The purpose of the prerequisite is to give students a better understanding of subject matter, but the contents of the textbooks shows even when students do not have enough background in economic principles, they will be able to understand the subject matter. In the past, farm management courses were combined with farm accounting and record keeping. Recently these two subject matters are separated as two different courses. This procedure gives adequate time to the instructor to teach farm management in detail.

A brief review of farm management textbooks reveal the basic concepts of all of them are almost the same. The purpose of teaching farm management is to provide the framework for extension programs of adult education, county extension agents, the soil conservation

planner, the county banker, persons who are engaged in making recommendations and future farmers.

In most of the agricultural colleges of universities, farm management courses are offered with five-hours lecture in the quarter-year credit systems. Most of the relevant textbooks deal with:

1. Farm management as a decision maker
2. Application of economic principles to the farm management
3. Farm management information
4. Planning and budgeting
5. Planning and selection of livestock management
6. Planning the kinds and amount of crops to produce
7. Management of labor
8. Management of machinery
9. Computer as a farm management tool
10. Farm buildings
11. Size of farm and enterprise
12. Adjusting to risk and uncertainty
13. Farm leases and rental arrangement
14. Farm buying
15. Farm credit

Some of these topics will be discussed in more detail later on.

Farm management as a decision-making science

Discussions of farm management as a decision-making process, makes it desirable to define farm management from the viewpoint of several

authors. In defining farm management, Heady and Jensen point out that "farm management is a sub-division of economics which considers the allocation of limited resources within the individual farm, is a science of choice and decision-making" (16).

W. A. Yang, farm management specialist of FAO, who has prepared his textbook for less developed countries defines "farm management as a science which deals with proper combination and operation of production factors including land, labor, capital, and choice of crop and livestock enterprises to bring about a maximum and continuous return to most elementary operation units of farming" (17).

With this background, decision-making is the inescapable responsibility of every farmer interested in the profitability of his farm. A good decision-maker has either educational background or a number of years of experience, or both.

Therefore, decision-making is the heart of farm management. Success in farming is measured by the ability of the farmer to make the right decision at the proper time. These managerial decisions are common to all situations and can be identified as follows:

1. Observation and formulating objectives.
2. Analysis and understanding of different alternatives.
3. Decision-making and determination of possible results.
4. Action
5. Acceptance of all consequences
6. Continuation of evaluation (18).

Basic economic principles in farm management

Economic principles are used very extensively in decision-making. They can be applied to all phases of farming including crop production, livestock productions, application of economic principles, concern maximizing profit or minimizing loss for specific production situations. The principles of economics which are covered in farm management textbooks include production function analysis, law of diminishing return, opportunity cost and product-product relationship.

Production function is the relationship between the set of inputs and set of outputs per period of time. It is generally expressed in the form of a single output function

$$q = f (X_1, X_2 \dots X_n),$$

where q is an output and X's are inputs. This formula shows the maximum amount of output from different amounts of inputs when other inputs are constant.

Average product and marginal product can be calculated when the production function is known. Average product of an input is total yield divided by the amount of input used to produce particular amount of yield. Marginal product is changed in quantity from a unit change in input, when all other inputs are kept constant.

Behavior of average product

When MP is more than average product, average product is increasing. When MP is less than average product, the average product is decreasing. When AP is at a maximum, $MP = AP$, i.e., slope of AP = 0 at the maximum point.

The law of diminishing physical return

This law has frequently been used and misinterpreted. Richard H. Left points out, "If the input of one resource is increased by equal increments per unit of time while the quantities of other inputs are held constant, there will be some point beyond which the marginal physical product of the variable resource will decrease" (19). This law is based solely on experiment and observations rather than theory. The assumption is fixed technology, but by changing the level of technology, the law cannot predict the production units of inputs. When all inputs increase proportionately, the law of marginal return holds (20).

Three stages of production function

Figure 1 can be divided into three stages. Stage 1 is the position from the origin to the point where the average product intersects with marginal product, average production is at the maximum point and it is equal with the marginal product. This stage is not for maximum net return or maximum loss. In this stage the use of variable input is on a very low level and increases in variable inputs lead to larger increases in the total product. In addition, marginal products of input is negative in Stage I. Thus, the farmer should never operate in stage I, but he should have an understanding of how to increase his production to the end of this stage.

Stage III is the portion where marginal product of variable input is zero and eventually leads to negative marginal products. The farmer should not operate in this range, because total production is less than

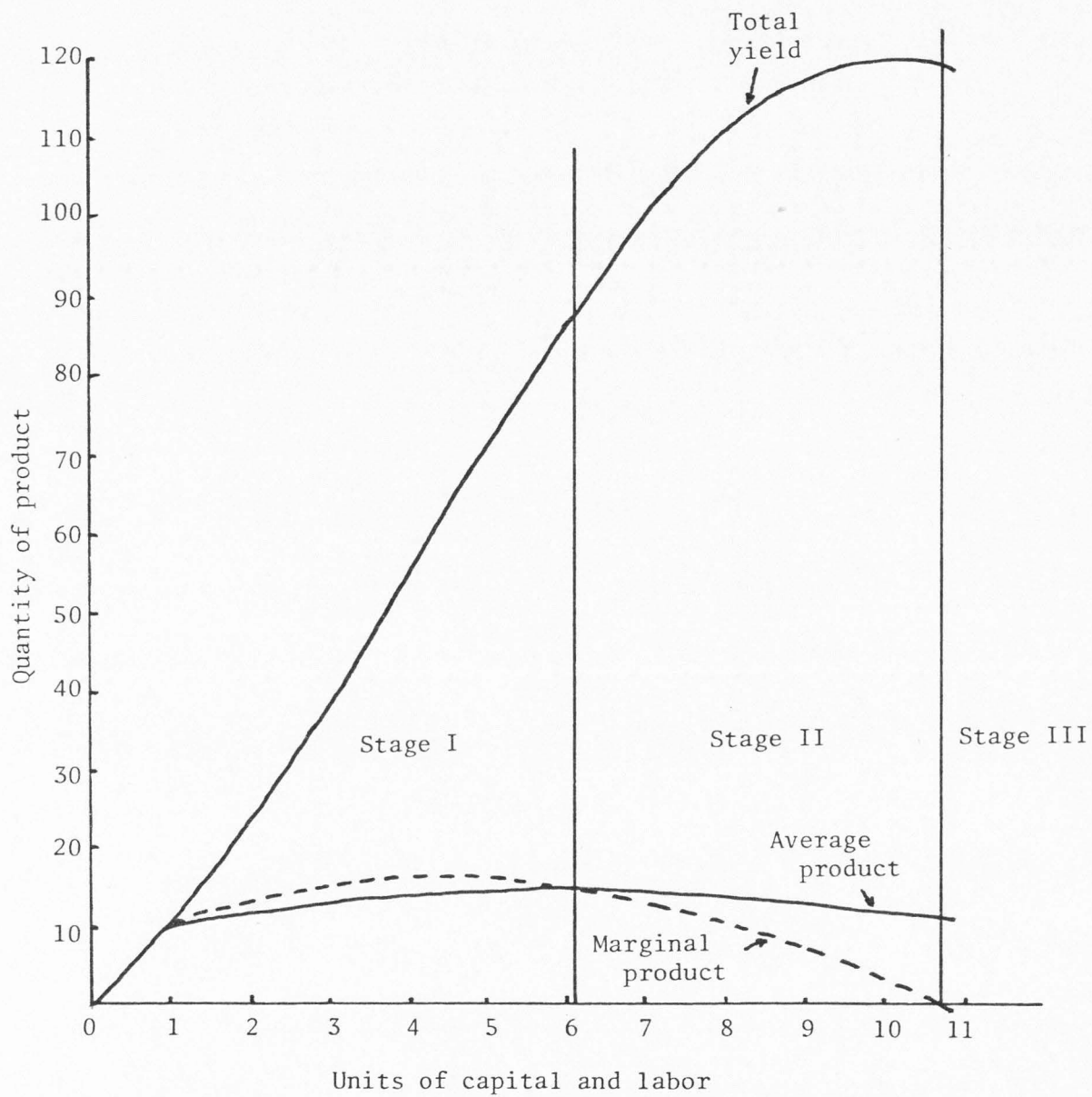


Figure 1. Stages of diminishing physical output.

it could be. In Stage III combination of variable input with fixed input is too large, i.e., the ratio of fixed input to variable input is too small.

The greatest net return or least loss is in Stage II. This is the decision-making area but the most profitable point in Stage II will not be revealed if we do not know the cost of various inputs and price of output.

To find out specifically where to produce in Stage II for maximum profit, we have to consider various inputs and yields. Maximization of net return will be where the marginal cost is equal to the marginal return. If the marginal return is above the marginal cost, addition of variable inputs should be continued until the marginal return is equal to the marginal cost. When marginal return becomes equal to marginal cost, the last two units show equal net return. However, we have gone as far as maximizing the total net return. In other words, optimum points could be revealed by calculating the income for each unit of that input that capital and labor provides.

With limited resources and availability of several alternatives for utilization, questions of utilization of variable resources emerges but the principles of equimarginal returns says allocation of variable inputs for several alternatives should be such that the marginal return becomes equal in all uses.

Opportunity cost

Opportunity cost is the yield that a resource would earn in its best alternative use. For example, the cost of an acre of land in wheat

is the amount it will return in another crop such as barley. If all agricultural land were the same in fertility, location and in all other aspects, the question of opportunity cost could never come up (21).

The concept of fixed cost and variable cost are important in farm management. Fixed costs cannot be affected by a decision of the farm operator and do not change with variations in outputs. But with more production, they decrease per unit of output up to a certain point. Variable costs are affected by the decision of a farm operator and change with the level of production. Without production, there would be no variable costs. Examples of variable costs are seed, fertilizer, insecticide, etc. When such expenses are committed, they become a fixed cost for a specific production period. For decision making, only variable costs are important, because as long as an operator has not applied them they are still variable.

Product-product relationship

The farm manager is always faced with the problem of a combination of enterprises for the greatest profit. Product-product relationship analysis is another relationship which is very useful in achieving right decisions. The relationships are complementary, supplementary, competitive and antagonistic.

A competitive relationship is the most important since it represents the decision-making area. It shows a situation where enterprises compete with each other for the use of resources. When resources are limited, it is then that the farm operator is confronted with this difficulty. Competing products are those that increase in one product and cause a decrease in another product. For instance, if farmers use

all their land for alfalfa, they must sacrifice other crops. For determination of the exact combination of competitive products, three points should be taken into consideration: a) the amount of one product substitute for another product, b) the price of the product, c) the cost of producing the products.

Complementary product-product relationships are when two products are considered and an increase in one product results in an increase in the other product. Honeybee and alfalfa is a good example. Alfalfa production not only increases honey production but also increases the production of alfalfa. Complementary products are never complementary in all possible combinations. Complementary products always end at some point with competitive situations.

Supplementary relationships are when an increase of one product does not cause either a gain or a loss in another product. A few dairy cows might be a supplementary on some farms. In other words, supplementary relationships do not compete but add directly to the yield of the other. Prices of one product do not effect the price of another product in true supplementary relationships (22).

Antagonistic or conflicting relationships exist when the production of two independent products change as the two products are produced in the presence of each other. For example, turkeys and chickens when grown on the same farm frequently results in reduced production of both due to diseases. Figure 2 shows all four kinds of relationships.

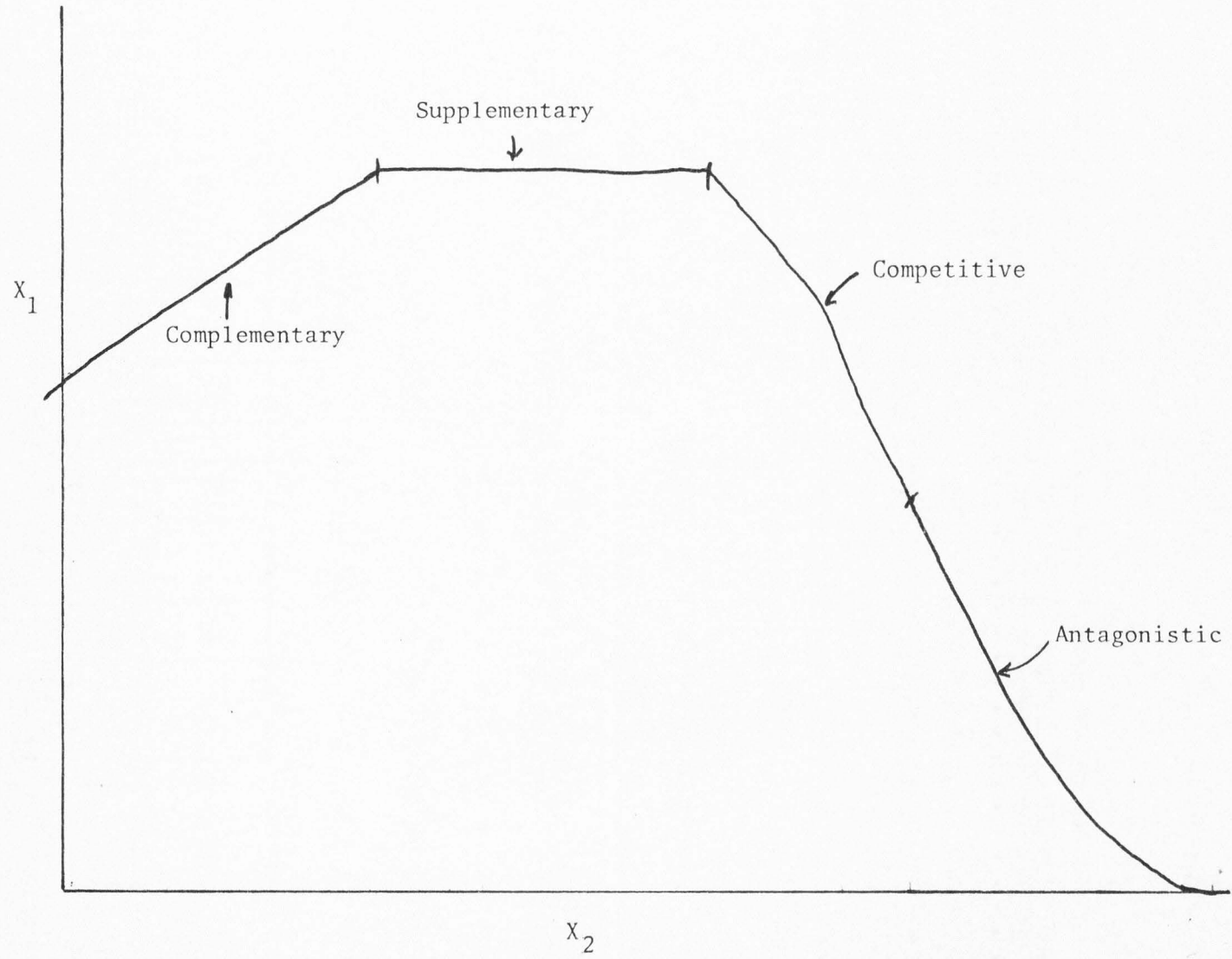


Figure 2. Product-product relationship.

Budgeting

There are four different types of budgeting, these include: enterprise budgeting, total farm budgeting, partial budgeting, and cash flow budgeting.

Total or complete budgeting refers to the operation of all farm enterprises. Partial budgeting does not include the whole farm operation. It is concerned with the effect of change of only one enterprise in the farm business. Since partial budgeting is concerned only with changes of one operation, such as the addition of new machinery or equipment or the introduction of a new crop, it is a good method for saving money and time. Cash flow budgeting is a useful guide for determination of availability of funds for specific periods of time. If the flow of cash is prepared for a year, it provides a statement which shows expected cash income and expenses for that particular year. It provides information concerning operating receipts, capital sales, operating expenses, capital expenditure, family living and non-farm business expenditures, payment on previous debts, payment borrowed this year and interest payments (23).

Linear programming

Since 1950, linear programming has become extremely important in agricultural economics for solving cost minimization or profit maximization problems for research purposes in farm management. Where there are only two or three alternatives, problems could be solved through budgeting, but when there are a large number of enterprises, linear programming can solve the problem with considerable saving of

time. It is a good method to determine the highest possible return with limited resources and prices. Indeed this can be done with budgeting methods with many trials and errors before the optimum point is reached. Still, we might not be sure of the highest point of profit through budgeting. Linear programming may or may not be superior to budgeting. The choice between budgeting and programming depends on the number of choices in decision-making processes. If the number of choices is small enough, we could use budgeting instead of linear programming (27).

INNOVATION OF FARM MANAGEMENT TEACHING IN IRAN

In general, most Iranian farmers have control over few factors of production by American standards where many of the farm management principles have been developed. In particular, capital is very limited and little machinery is used in Iranian agriculture. Since the land for most farmers is limited, they plant and harvest using simple tools and a large amount of labor.

In the last 20 years commercial farming owned by private Iranian investors or foreign companies were established in some parts of the country, especially in the states of Khuzastan and Azarbyjan. There is a wide range in size between these very large commercial farms and small farms. An important characteristic of most Iranian farmers is they still grow food for their own consumption, but some crops are also grown for sale.

Indeed, farm management is closely related with home management and consumption economics. In large commercial farms there are two kinds of individuals. A manager who is a decision-maker and a worker who provides physical labor. There is another group of farmers who are faced with organizing their own work and their family's.

Regardless of the size or type of farming, farmers are faced with basic principles of what to produce, how to produce, and how much to produce.

In most of Iran the majority of farmers act as a manager, following their father's methods of making decisions. They use the same crops

grown by the same methods their fathers have done. We cannot criticize traditional methods of farming. In some parts of the country this might be the safest guide to the farmer's survival. Experience shows that even though these farmers are illiterate, they could be classified as good managers because with the limited amount of resources they still survive.

Introduction of new production methods, even when they have been tested for several years, may not be successful under local conditions. Experience shows, in most parts of the country, that farmers do not accept newly developed methods very readily. The recent raise in the standard of living has resulted in farmers changing some of their traditional methods, but with unwillingness. Also, the introduction of new varieties of crops and new methods of controlling livestock diseases are causing farmers to accept new techniques.

An agronomist once asked a farmer, "Instead of planting your own variety of beans which produce 600 kilograms per hectare, why not plant the hybrid variety which gives you two tons per hectare." He resisted at first, but finally agreed to try 0.25 hectare of the new variety. The year after that the agronomist was presented with two chickens as a reward.

It is readily apparent that more attention should be devoted to training the agricultural students in the field of farm management. Farm management teaching is limited to farm management textbooks written in the United States and a few western European countries. These sources, largely in mimeographed form, have little concern with farming conditions as they exist in Iran today. Farm management in the United

States has always been concerned mainly with the individual farm accounting, business analysis, budgeting, and planning. In many parts of Iran this procedure is not possible. Farms are too small and farm advisors are too few to analyze and plan for the individual farms. Instead this should be done for a group. Farm advisors must attempt to survey and understand the problems of groups of similar farmers. He must plan and evaluate the effects of changes on a particular group of farms.

In Iran, a farm advisor can be an important link between farmers and government agencies, and between farmers and technical research work. Therefore, a farm advisor has two responsibilities; one is to survey and describe the present farming system. Then he can make recommendations for an agricultural policy maker and give direction for research work. The other responsibility is to evaluate the effects of technological changes and policies of different methods of farming.

To carry out these tasks, a farm advisor must deal with two areas: 1) basic farm management elements applicable to farming situations in Iran, and 2) research and surveying of farm problems and planning for improvements in farm productivity.

The above procedure, with five-hour lectures per week and two or three field trips, gives adequate time for instructors to acquaint students with all the relevant aspects of farm management. Translation of one foreign textbook will not fulfill this job effectively. For more effective teaching, subject matter should be selected very carefully and precisely from different sources and

reworked to fit the situation in Iran.

The course should deal mainly with the following subject matters:

1. The farm operator as a decision-maker.
2. Economic principles applied to farm management.
3. Farm accounting and record keeping.
4. Risk and uncertainty.
5. Choice of enterprises.
6. Management of machinery.
7. Labor management.
8. Farm planning and budgeting
9. Research and analysis
10. Farm business survey
11. Farm business analysis.

The farm manager as a decision-maker is mainly concerned with those kinds of decisions which influence the profitability of the farm operation. Profit from the farm operation covers many areas such as size of farm, location of farm, acquiring factors of production, feeding, breeding of plants and livestock. However, farm management is concerned only with those aspects which affect the profitability plus subsistence of farmers. Successful farmers should be flexible and change their operations according to the economic conditions. Since farm operators work with information from other fields such as physical and biological data for the desired amount of product, they should be able to obtain such information from different private and government agencies. Other information such as labor and machinery availability and price trends could be helpful to farmers as decision

maker. The formulation of ideas is largely deductive.

Economic principles are another important tool that could be used on the internal operation of a farm business which might be a valuable source of information for decision-making. The farm budget and farm situation are also good testing devices (25). These principles have already been discussed and include production functions, response to single variable inputs, the economic optimum, more than one variable input, product, product relationship, the least cost combination, marginal products and costs, scale and size, optimum relationship and optimum economic point of efficiency.

Farm accounting and record keeping courses have never been offered in any of the colleges of agriculture in Iran. Special attention should be devoted to this part. The intention should be to introduce a type of financial management which would be adaptable to farming situations in Iran. This should cover evaluation of farm inventory, income statements, balance sheet and cash flow statements, tools for future planning, different methods of depreciation, such as the straight line method, declining-balance method, and the sum-of-the-years digits. This information is fundamental for effective budgeting. In addition, costs of borrowing money, methods of computation of interest rates, nonmoney costs of debt capital and different methods of bookkeeping should be introduced.

This information serves as a guide to farm operators in knowing if his operation is profitable and if he is using his resources to their maximum. The income statement shows net income of farm operation during a specific period of time, usually a year. From income

statements show the return to various resources after deduction of expenses. Net worth statement or balance sheet is another important device that can be prepared for adequate record keeping. This statement shows the structure of assets and liabilities. With net worth statements, comparison of structural changes is possible (26).

Risk and uncertainty in economic principles often assumes that future yield, prices, costs, and yields are predictable. This is not true in the field of agriculture. The farmer is always faced with risk and uncertainty. There is an old saying that "Nothing is certain but death and taxes." This is especially true in farm management. Risk applies to situations where outcome is not certain, but probabilities of future events can be estimated. For instance, if a farmer knows his crop will fail every four years, that's a risk, but if there is no knowledge about the probability of his crop's failing, that is uncertainty. There are various kinds of insurances which are available to large farms in Iran, such as property, liability, life and health insurance (27). Yield insurance was once tried in Iran, but unfortunately it failed. There are some precautions against uncertainty which include flexibility and diversification. Flexibility refers to the method of planning from which new information could be used. There is cost associated with flexibility. Diversification is another precaution for risk taking. This is common in farming in Iran. A farmer will plant several crops, hoping if one crop fails the other one will save him. If different enterprises have negative relationships, diversification can only reduce the risk. When enterprises have positive relationships, failure of one enterprise causes failing

of all crops and then diversification does not decrease risk.

In summary, farmers may take advantage of some precautions against risk such as selection of reliable livestock or crops, diversification, flexibility, insurance, collection of more information, and some kind of contract for prices in advance. With all these, there might be some cost associated but it is a good way of increasing security for the farmer.

Choice of enterprise

Farmers are always faced with the problem of alternative enterprises including crop and livestock production. This section should cover problems of what to produce, a single resource and two products, the economic choice of enterprise, more than two enterprises, specialization, diversification, and resource allocation and whole farm (28).

Machinery management

Since World War II, machinery has become one of the important investments in developing and less developing countries. Machinery management should include type, size, proper combination of different kinds of machinery, replacement of machinery with labor, and proportion of machinery to other inputs.

Labor management

Labor is the work done by human beings and not necessarily the number of persons involved in the job. This section covers measurement of labor, productivity of family labor, hired labor and opportunity costs, number of hours worked and leisure time, the requirement of labor in

different seasons, increasing productivity of labor and improvement of working methods (29).

Farm planning and budgeting

Budgeting and planning resources, no matter what the enterprise may be is of importance. How well a farmer plans the use of his resources may in the long run determine a successful or unsuccessful operation. In this part special attention should be devoted to the need for planning of farm, the budgeting procedure, labor budget, capital budget, partial budget and program planning.

Research and analysis

Farm management research is preparation of data for the following purposes.

1. Description of present farm methods and estimation of cost income.
2. To change present planning.
3. Measurement of the effect of the change (30).

Farm business survey

This section should include selection of region, choice of period, sampling problem, designing, pretesting, duplication of survey form, selection and training of interviewers, interviews with farmers, controlling and checking the schedule and summarization and tabulation of survey data (31).

Farm business analysis

As long as the data in the schedule of farm survey have not been summarized and analyzed, they have no value for farm management research

work. The second stage is evaluation of income and management factors which effect the earning of farmers. Finally, some charts are made to find out causes of success or failure of farmers, so the farmers by comparing their own work with standard measures would be able to discover the weak points of their operations. This part of investigation is the heart of farm business and should be considered very carefully (32).

SUMMARY AND CONCLUSIONS

This paper has presented evidence of the need for improvement in the quality of teaching farm management in Iran. The most important areas have been emphasized in which the farm manager should be well-trained. Again, they are: economic principles, use of factors of production, investigation and analysis, farm budgeting and planning. Aside from these specialized areas of knowledge, the farm manager should have qualities such as creativeness, innovativeness, and as well good abilities in communications both written and spoken.

All areas of life are growing more and more complex. This has been the price of technology which has led to a specialized way of life. Technology has been viewed by some as a blessing and by others as something bad. Agriculture, which is the oldest industry, has not escaped the increase in complexity. Greater efficiency has been accompanied by greater complexities of management. In order for the implementation of a modern agricultural system, individuals specially trained to handle the complexities of management are needed. In Iran implementation of some of the new innovations such as the "pole concept" and cooperatives make farm management an even more important but difficult job.

A review of the number of graduates in different agricultural fields indicates that agricultural economics is not a major field of study in Iran. This demonstrates that this important area which includes the field of farm management has not received the attention

required to meet the needs of the country. Of all the fields of study taught in agricultural colleges, possibly farm management is the most responsible for increasing production, thereby decreasing the importation of food from foreign countries. This is of primary importance to the Iranian Government and for the well being of the people. Additional effort should be applied for improvement of quality and quantity of farm managers who can do an efficient job. Colleges and universities in Iran must recognize the importance of farm management training and implement new innovative programs of farm management teaching.

As it stands now, we are entirely dependent on texts and other sources of information from other countries, especially the United States. We should produce our own texts which reflect farm management problems of Iranian origin. In order to do this a seminar of all agricultural economists should be conducted on a regular basis. From this seminar much information about specific areas of the Iranian agricultural economy could be compiled. From this information, texts and other valuable teaching resources could be prepared.

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