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**Training Programs For Agricultural
Development Bank Personnel:
The Honduras Experience**

Loren L. Parks
Daniel D. Badger

AID/ta - CA - 1
Project No. 931-1134-02

Cooperative Agreement Between
USAID, Oklahoma State University and
Colorado State University

International Development Series
No. 80-2
August 1980

Department of Agricultural Economics
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Preface

This report is one of a series emanating from the joint Oklahoma State University - Colorado State University cooperative agreements on Small Farmer Credit with the Agency for International Development. The overall objective of the project was to carry out small farm data collection analysis activities to improve credit use. The specific objectives of the cooperative effort between the two Universities and the agricultural development banks in Honduras and the Dominican Republic are to: (a) develop data collection and analysis approaches for use by credit institutions; (b) test these approaches in developing countries; and, (c) disseminate the results.

The approach envisioned and implemented was to evaluate alternative methodologies for farm level data collection and farm management analyses. These steps led to recommendations for improving credit allocation to small farmers in developing countries. Another major part of the project involved training of counterpart personnel and Bank loan personnel in credit policies and farm management approaches for solving small farmer credit problems.

The in-field phase of the project began in Honduras with the Banco Nacional de Fomento, now the Barco Nacional de Desarrollo Agricola (BANADESA), on July 1, 1978, and in the Dominican Republic with the Banco Agricola on July 1, 1979. Dr. Loren Parks, faculty member in the Department of Agricultural Economics at Oklahoma State University (OSU), was the field staff professional in Honduras for two years. Dr. Tom Dickey, faculty member in the Department of Economics at Colorado State University (CSU), is the field staff professional in the Dominican Republic.

The OSU part of this three year cooperative project was funded by AID under Cooperative Agreement AID/ta-CA-1, Project No. 931-1134-02, Basic

Memorandum of Agreement No. AID/ta-BMA-2; CSU operated under AID/ta-Ca-3 and AID/ta-BMA-6. The Credit Project began in 1977.

Dr. William Merrill, former chief of the Economics and Sector Planning Division, Bureau of Development Support, Agriculture, AID, provided early encouragement and leadership in implementing this project; Ms. Anne Grace-Ferguson, Agricultural Economist in ESP/DSB/AGR/AID helped develop the contractual agreements; and, Mr. Erhard Rupprecht and Ms. Karen Wiese, AID served as project managers and provided guidance and support during the past three years. Many in-country AID personnel provided suggestions and support for the project. Strong support of all AID personnel is greatly appreciated. Special recognition is due Mr. René Cruz, President of the Banco Nacional de Fomento in Honduras, Mr. Roberto Valladares, Vice-President of BNF and BANADESA, and Mr. Alfonso Bonilla, former head of the Technical Division where the OSU project was located. Honduran counterparts on the project were Reynerio Barahona, Ricardo Arias and Rolando Medrano.

Faculty involved in the cooperative agreement, included James Osborn, Odell Walker, Harry Mapp, Michael Hardin, and Joe Williams of the OSU faculty, and Kenneth Nobe of the CSU faculty. In addition, J. D. Longwell, CSU Graduate Research Assistant was stationed in the Dominican Republic, and Kurt Rockeman, OSU Research Associate, was stationed in Honduras.

Ronald Tinnermeier
CSU Project Coordinator, and
Overall Project Coordinator
Small Farmer Credit Project

Daniel D. Badger
OSU Project Coordinator
Small Farmer Credit Project

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INTRODUCTION

Personnel training programs in agricultural credit institutions can include a wide variety of topics due to the range of services provided and the kinds of administrative support required. The National Agricultural Development Bank of Honduras is a typical case; in addition to the principal task of providing credit for agricultural production it provides a full range of national and international banking services, participates in financing multidisciplinary development programs, helps finance the land reform program, provides limited technical assistance in agricultural production and operates a chain of agricultural input supply stores. Selection of training program topics is therefore not as difficult a task as selecting the participants who will benefit both themselves and the Bank the most, designing courses which are useful and interesting, and meeting the objectives of the project.

The training topics selected under the auspices of the Small Farm Credit Project (SFC) are heavily oriented toward the general field of farm management. These topics, which build upon the enterprise budget data base generated by the project, include budget synthesis (variable and fixed costs), enterprise profitability, loan repayment capacity, cash flow planning, partial budgeting analysis and general investment analysis. Courses of this nature had not been previously given for Bank personnel. Topics and participants were chosen not only for general education purposes; they were also chosen to help institutionalize new loan evaluation and supervision procedures designed for the Bank by project personnel. In the process it

was also deemed desirable to prepare a core group of persons who could continue the training program once the project terminated, and to share this experience with others who have similar ambitions. In summary, the multiple objectives of the SFC training program were to:

1. Improve the general knowledge of Bank personnel so they can do their jobs better;
2. Institutionalize reforms in procedures and policies designed by the Small Farm Credit Project;
3. Prepare a core group of persons to continue the training programs;
4. Design training program courses and materials which can be adapted for use in other countries.

Although the training topics and methodologies reported herein were designed to meet some specific needs and conditions encountered in this particular institution, the experience yielded some useful lessons for others to heed. The training topics are so universal that they would be useful in most agricultural credit institutions. This report includes a discussion of the particular situation encountered in the National Agricultural Development Bank, how we identified training needs and participants, how we organized and conducted the training program, and our evaluation of the experience. Particular experiences are expanded to generalizations when possible. Syllabus outlines with practical exercises are included as Appendixes.

THE SETTING

The Bank is headquartered in Tegucigalpa, with 24 branch offices throughout the country. Each branch office has a staff of loan officers with vehicles who visit clients at their farms. The purposes of their visits are to fill out loan application forms, inspect the condition of

crop and livestock operations financed by the Bank, and investigate miscellaneous problems such as failure to repay a loan on time. The loan officer is the "workhorse" of the Bank; he is the person who maintains contact with the client, estimates his credit needs and loan repayment capacity, and judges his character.

The loan application and supervision procedure is identical for all farm sizes and types. The prospective client first visits the Bank or meets the loan officer in the field to fill out an application form. The loan officer then visits the farm to verify the information reported, including the value of any assets pledged as collateral. During the interview the loan officer should prepare a detailed production budget for each crop and livestock enterprise for which the client seeks credit. These budgets are supposed to indicate every cost item, activity by activity. The application forms and budgets are subsequently examined by the credit analyst in the branch office who reviews them for errors, omissions, financial viability and past repayment performance. Unless there is a problem the branch manager routinely approves an application once the credit analyst reviews it.

In practice there are many deficiencies in the procedure described. A brief description is warranted because revised procedures and training programs were designed in part to alleviate the problems.

1. There existed no standardized format for preparing clients' production budgets, resulting in enormous differences in production cost estimates, omission of much information which should have been included, and inability to use the budgets in an ex post comparison and analysis of problems such as crop failure or loan default.
2. The Bank issued a "standard budget" annually for each crop, but only one budget per crop was used for the entire country. The cost

estimates served as upper limits, on loan authorizations, and the limits were set very high so that all regions could use the same budget without having problems of limits set too low. Since many loan officers merely copied the standard budget limits onto the loan application form (avoiding the tedious interview), a large and widening gap developed between amounts authorized and amounts actually loaned.

3. Standard budgets were not synthesized according to any uniform methodology, and they excluded some variable costs and all fixed costs.
4. Estimation of farm and enterprise gross revenues was deficient because of lack of product price information, and because estimated total production was used to calculate gross revenue. In fact, the smaller the farm the greater the proportion of production that is consumed or used on the farm.
5. There were no uniform financial criteria for approving or rejecting a loan.
6. There were no uniform procedures for analyzing the profitability of investments in infrastructure, nor could we find anyone who knew how to do such analysis properly.

Another important consideration in designing a training program is examination of the successes and failures of past courses. Interviews with participants in previous courses offered to Bank personnel revealed the following general criticisms.

1. Topics were not directly relevant or useful. This problem sometimes occurred simply because the wrong persons were selected to take the course. For example, a loan officer has little need to learn about managerial accounting, and does not typically have the background necessary to understand it. The primary problems, however, were that the courses were too abstract or unrelated to Bank operations.
2. The usual course format was all lecture and no practical exercises or class participation. There is a tendency in Latin American culture to let the professor expound on theoretical matters, and students are expected to absorb this wisdom and relate it themselves to the real world. Participants quickly get bored with such a format, realizing of course that there will be little practical usefulness of the material. This problem has been acute in Bank training courses because teachers are outsiders who are unfamiliar with Bank problems and training needs.
3. Courses were scheduled in blocks of one week, whether or not warranted by the subject matter. The topic was often exhausted before the time allotted, which was inefficient for both the Bank and the trainee.

These criticisms helped us define a general set of guidelines for designing courses in the topics selected. Specific guidelines and teaching methods are described below.

TRAINING PROGRAM ORGANIZATION

Given the general criticisms of previous training programs, we were able to establish some general guidelines for the training program.

1. The course curriculum must stress participation and practical exercises;
2. The number of participants should not exceed 30 in one course; to facilitate participation;
3. The subject matter must relate clearly to Bank needs and the jobs of the participants;
4. Courses should not exceed one week, but regardless of the duration there must be more than enough material on hand in case it is covered more rapidly than expected.

Course Timing

The timing of training courses must consider both project progress and the Bank's work load. Our principal constraint was project progress; we were not ready to conduct courses until we had developed and tested the methodologies that we wanted to institutionalize. Furthermore, we needed time to generate basic farm data on enterprise budgets, cash flow and investments in infrastructure which could serve as real examples. Even after one year we were not entirely ready with some things needed for the training course, but some prototype methodologies were developed which at least served the purpose of teaching concepts. This "readiness" problem occurred primarily in two topics--loan evaluation forms (Course 1) and livestock budgets (Course 2)--which are discussed subsequently.

The principal time constraint in the Bank is the crop season. Loan officers and credit analysts from the branch offices cannot be taken from their jobs during the grain production season, which runs from mid-March through September. Courses for those persons can be scheduled with some difficulty in October and November, and without difficulty from mid-January to mid-March. Early December is satisfactory, but the holiday schedule precludes courses from mid-December to mid-January. The point is that the time available for courses is limited, and during the favorable times we still had numerous conflicts with other training courses, special Bank programs for one thing or another, and personnel vacations.

The general recommendation resulting from this experience is that the course dates be planned well in advance, with invitations and confirmations exchanged at least two weeks before the course begins to ensure adequate participation. In spite of our efforts to follow our own recommendations we were occasionally, forced to cancel a course or recruit different participants at the last moment. Once a participant is committed to the course, it is efficient to keep him and give a long course. We quickly abandoned the concept of two-day courses because of startup costs in coordination, travel and preparation.

Selection of Participants

Our approach to working on this project was to start in the field and work toward the office, or in other words, from the bottom up. In so doing we learned to identify with the job of the loan officer, which naturally led to development of new methodologies that affect his job. Loan officers and credit analysts were therefore our principal "target group" for training programs.

The first session of each training course was composed of a key group of loan officers--one from each of thirteen geographic regions. These loan officers were usually the best available, hence it was a select group by Bank standards. Following the course they were charged with the responsibility of preparing or coordinating preparation of crop and livestock budgets in their respective regions. Subsequent sessions included loan officers, credit analysts, agronomists with miscellaneous jobs, and some supervisors. Summaries of participants and job titles are provided subsequently.

The educational level of loan officers is usually that of "agronomist," which consists of three years training in an agricultural school following completion of secondary (high school). In general, their training in agronomy is acceptable, but mathematical ability is poor and knowledge of economics is nil. Training courses are therefore based on the assumption that the participants know absolutely nothing about economic principles, and that every mathematical manipulation must be broken down into fundamental steps. These precautions are unnecessary for some participants, but training programs must be geared to the least able of the participants to avoid discouraging them.

Training The Teachers

The first session of each course was taught by project staff, both Americans and Hondurans. Some participants from the first session were selected to help teach subsequent sessions. Selection was based on (1) their understanding of the material, (2) ability to speak and explain concepts to a group, and (3) willingness to participate in teaching. In eight

sessions of two courses, a total of nine different persons helped the project team teach. Their response and that of the other participants was exceptionally favorable; we were surprised at the competence and enthusiasm that teachers and participants manifested. The advantages of this approach are that the teachers learn the topics thoroughly, and that they relate very well to the questions and problems raised by their participating colleagues. The persons recruited for teaching also developed a kind of "esprit de corps" in that they were honored to have been selected. This helped build dedication to the project and to the reforms which were later to be introduced.

It should be obvious from this discussion that training Bank personnel to be teachers was a great success. It is important to remember, however, that project team members must always be present to rescue the teacher in case he commits an error or cannot answer a question. To be sure, the use of persons not accustomed to teaching is somewhat inefficient in terms of time spent teaching and clarity of presentation, but we judge the benefits to be greater than the costs.

Teaching Methods

The teaching aids employed consisted of blackboard, overhead projector and handouts. These proved to be entirely satisfactory and sufficient. Participants were called upon to respond to questions with great frequency, as well as to work on problems on the blackboard. Practical exercises were done by forming teams of two to four participants, each team with at least one portable calculator.

REVIEW OF TOPICS AND RESULTS

As mentioned previously, the topics selected for training programs focus on traditional farm management. The first course entitled "Economic Analysis of the Farm Firm" (Appendix A) concentrated on the concepts of variable and fixed costs, synthesis of enterprise budgets, and use of the budgets in farm financial analysis. Reaction to the course was very positive, but there was a general feeling that the impending changes in Bank procedures that we were teaching would never come about. In retrospect the doubters were proved wrong and those who learned the material had a decided advantage over those who did not understand it or who did not take the course. In total, 112 persons took the course in five different sessions (Table 1).

Of the topics presented in the first course, variable cost was the easiest concept to teach because all of the participants were already familiar with the items the Bank has financed for 30 years. Interest was intense in subjects which people had taken for granted but never actually studied. For example, what is the "quantity of production," what product price should be used to calculate gross revenues, and of what economic value is "technology?" Exposure to costs such as depreciation, interest on invested capital and maintenance of equipment was an entirely new experience for all of the participants, and a difficult one at that. Even the best of the participants were lacking confidence about this material at the end of the course.

Practical exercises in filling out prototype loan application forms were useful in inducing participants to think in economic terms--enterprise profitability and loan repayment capacity. They were forced to consider total farm and household expenditures including enterprises not financed

TABLE 1: PARTICIPANTS IN FIRST COURSE ON ECONOMIC ANALYSIS OF FARM FIRMS

<u>Place and Date</u>	<u>No. Participants</u>	<u>Teaching Assistants</u>
Tegucigalpa, D.C. September 11-13, 1979	12 Loan Officers 4 Agronomists 3 Loan Officer Supervisors 1 Head of Field Operations	- 0 -
Tegucigalpa, D.C. October 8-11, 1979	13 Loan Officers 3 Agronomists 4 Credit Analysts	Armando Ramirez Odilio M. Guevara Roberto Sierra
San Pedro Sula October 16-19, 1979	26 Loan Officers 4 Credit Analysts 2 Credit Supervisors	J. Hector Munoz Luis Serrano
San Pedro Sula October 30 - November 2, 1979	12 Loan Officers 2 Agronomists 6 Credit Analysts	J. Hector Munoz Miguel Leiva
Tegucigalpa, D.C. November 20-23, 1979	10 Loan Officers 3 Agronomists 2 Loan Officer Supervisors 4 Loan Analysts 1 Credit Supervisor	Clemente Meraz
	<u>112 Participants</u>	
TOTALS	73 Loan Officers 12 Agronomists 18 Credit Analysts	5 Loan Officer Supervisors 3 Credit Supervisors 1 Head of Departments

by the Bank. In other words, the exercise was useful to force thinking on a "whole farm" basis instead of an enterprise basis--a problem which we think has contributed to excessive loan default. The problem with the exercise was that the prototype loan forms were destined to be replaced, but we didn't know the ultimate form they would take. Nevertheless, concepts were taught.

The most tenuous of the topics taught was cash flow analysis. A cash flow projection is usually required for a production loan in the USA, but it is somewhat complicated and perfunctory in the Honduran setting. A similar criticism can be made of whole farm analysis. The fact is that ex ante cash flow analysis is reasonably accurate for production costs, but unreliable for revenues. Market prices are highly volatile; the farmgate price of grains doubles or triples from harvest time to the months of greatest scarcity, and vegetable prices vary by a multiple of eight in some cases. Farmers cannot predict their sales or product prices well enough to justify preparation of an ex ante cash flow. In addition, we believe that mandatory preparation of ex ante cash flow statements would soon evolve into the kind of situation we encountered for production budgets: they all begin to look alike because they are copied from a standard which the Bank deems acceptable. Finally, we have found it impractical and inefficient to prepare an ex ante cash flow for each client. A problem in the Bank is the high cost of administering small loans, and it just isn't worth the administrative expense of preparing a cash flow statement for a loan of \$500 for which the revenue estimates are unreliable, and for which the non-financed activities are unreported or unreliable. In spite of the drawbacks of cash flow analysis in this setting, we included it in the course under the category "educational but not immediately useful."

Once the loan evaluation process becomes more sophisticated cash flow analysis will play a role, and it could be used now for large loans. Permanent implementation of cash flow analysis in loan evaluation might be a goal for the future, but even then it had best be confined to large or complex loans which justify the administrative expense.

Course evaluations tended to be uniformly excellent. Criticisms were that the course was too short (3½ days) given the complexity of the material, and that supervisors (principally branch office managers) hadn't been required to take the course. The first criticism is valid in that some persons simply could not master the subject matter, and repeated exposure and practical experience with the concepts is necessary to really learn them. The second criticism is valid; we were guilty of training the lower ranks without bringing in managers. This created some misunderstandings and enmity among loan officers, branch managers and our project. In retrospect we should have included branch managers and other middle level managers in training programs early on.

Second Course

All of the participants in the second course were required to be graduates of Course One (Table 2). The material was more difficult than the First Course and it assumes basic knowledge of enterprise budgets for crops. Basic economic concepts--including enterprise budgets--were nevertheless reviewed (Appendix B).

Among the topics taught in this course the lecture and practical exercises in livestock budgets proved to be the most difficult for the participants. One reason was that the prototype budget format was difficult to understand. As a result of that experience the format was revised. An

TABLE 2: PARTICIPANTS IN SECOND COURSE ON ANALYSIS OF AGRICULTURAL INVESTMENTS

<u>Place and Date</u>	<u>Participants</u>	<u>Teaching Assistants</u>
Tegucigalpa, D.C. January 29 - February 1, 1980	13 Loan Officers 2 Agronomists 2 Credit Analysts 2 Loan Officer Supervisors	- 0 -
San Pedro Sula February 12-15, 1980	21 Loan Officers 3 Agronomists 4 Credit Analysts 1 Loan Officer Supervisor	Clemente Meraz Cruz Roberto Sierra
Tegucigalpa, D.C. March 4-7, 1980	22 Loan Officers 4 Agronomists 7 Credit Analysts 2 Credit Supervisors	Carlos Mayorga Manuel R. Valdeś
TOTALS	<u>83 Participants</u> 56 Loan Officers 9 Agronomists 13 Credit Analysts 3 Loan Officer Supervisors 2 Credit Supervisors	

additional source of difficulty was that participants had never seen a livestock budget before; the concepts and mathematical manipulations were not as easy to learn as for crops.

The section on present value as applied to perennial crops had limited practical usefulness. Participants understood the concept well enough, and we think it worthwhile to teach the subject just for its educational value. The sections on partial budgeting, grain marketing and investment in a grain storage shed were generally good.

Criticisms of the second course were identical to those of the first-- too much material in such a short time, and failure to include more supervisors. In our defense with respect to the first criticism, Bank employees were not accustomed to working so hard in training sessions. Extensive use of practical exercises both interested them and tired them; there was no way to doze off or be ignored.

Overall Topic Evaluation

The principal topics taught in these two courses are listed in Table 3. Each topic was ranked from one to three in the categories of (1) comprehension on the part of participants, (2) practical usefulness in the Bank at this time, and (3) the interest manifested by the participants. We judge the educational value of the topics to be uniformly high, so no rating scheme is necessary for such a category.

In retrospect we would consider elimination of the topics of cash flow and present value and expand treatment of the topics of livestock analysis and partial budgeting. This is not to say that some topics are not useful; the problem is one of priorities in the Bank. Once the Bank has completely institutionalized some of the more basic methodologies we

TABLE 3: EVALUATION OF TRAINING COURSE TOPICS

Topic	Compre- hension	Practical Usefulness	Interest of Participants
	Rank		
Variable costs	3	3	3
Other (fixed) costs	2	3	2
Loan evaluation forms	3	3	3
Cash flow	2	1	2
Partial budgeting	3	3	3
Present value	2	1	2
Perennial crops	3	2	2
Grain storage bin	2	3	3
Grain marketing strategy	3	2	3
Livestock budgets	1	3	3

Rank: 3 = very good
 2 = good
 1 = fair

introduced it will be appropriate to dwell on topics of a more sophisticated nature. Additional topics could also be introduced given more time, but we are satisfied with our selection.

Organizational Evaluation

If we had it all to do over again, what would we do differently?

1. Include managerial level personnel from the outset;
2. Schedule courses and obtain confirmations on attendance further in advance, and do not schedule courses back-to-back;
3. Prepare more complete course syllabi;
4. Have the methodologies more thoroughly developed.

An explanation is needed for item 2. We once scheduled two sessions in consecutive weeks. This proved to be very difficult in terms of coordination, plus it was tiring for the teachers.

Preparation of more complete syllabi for the courses would have been desirable. The problem was that we were revising methodologies and teaching materials until the last moment, plus our ongoing work load left little time for revision between sessions. Final development of loan evaluation forms was still not complete by the time the project ended, and other methodologies were still to be revised. It is not advisable to introduce a methodology at an intermediate state of development because the participants will have to be taught again when the methodology is finalized, and because it erodes confidence in the competence of the project group. In retrospect we should have delayed introduction of loan evaluation forms, for example. In our defense, we had to conduct training programs without having the time to fully develop the methodologies and materials.

Followup

During the training sessions numerous questions were raised by participants regarding area-specific problems which did not pertain to the rest of the group. Questions and problems which could not be immediately resolved were noted, then subsequent contact with the participant was made to resolve the issues. For example, a participant wanted to know how to include cooperative farms, if at all, in the sampling process for budget synthesis because his area included virtually no private farms.

Participants were given a "certificate of completion" for each course (Figure 1). Diplomas and certificates are very important in many LDC's because education is so important yet so difficult to obtain. The visual impact of the certificates created a great deal of good will for the project and for the cooperating universities.

El Banco Nacional de Fomento y La Universidad Del Estado de Oklahoma



*Certifican
que*



Ha participado en el Curso: _____

Cubriendo un total de _____ horas de instrucción teórica y práctica

Extendido en Tegucigalpa, D.C., a los _____ días del mes de _____ de 19__

Presidente, Banco Nacional De Fomento

Representante, Universidad Del Estado de Oklahoma

THE FARM RECORDS COURSE

A one-day training course in record-keeping was conducted only twice. Participants, dates and locations are shown in Table 4. The sessions were limited to recording information--not analysis of results--because summary and analysis is the responsibility of the project team, and because an entire year had to pass before the summaries could be done.

Record-keeping sessions were limited to our hired record-keepers, a few farmers who had the record book on their farms, and some loan officers who wanted to learn. There was demand for the course on the part of farmers and other government institutions, but we did not have the personnel to devote more time to this activity.

TABLE # : PARTICIPANTS IN THE FARM RECORDS COURSE

<u>Place and Date</u>	<u>Participants</u>	<u>Instructor</u>
Tegucigalpa, D.C. April 9, 1979	Nereyda Vargas Paulina Méndez Rigoberto Vallecillo Dan Galt	Reynerio Barahona
Choluteca December 20, 1979	Wilberto Mendoza Juan Ramón Hernández Marcelino Morales Núñez Clemente Meraíz Cruz Benito Canales Flores Mario Bentancourt Roberto Sierra	Reynerio Barahona and Ricardo Arias
TOTAL	11 Participants	

APPENDIX A

OUTLINE AND SELECTED MATERIALS

FOR COURSE 1

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SMALL FARM CREDIT PROJECT
TRAINING COURSE ONE
ECONOMIC ANALYSIS OF THE FARM FIRM

A G E N D A

Day 1

8:30 a.m.	Inauguration
8:45	Description of the Small Farm Credit Project
9:15	Lecture on variable production costs
10:00	Break
10:15	Lecture (continued)
12:00	Lunch
1:30 p.m.	Practical exercise in variable costs and enterprise budgets
3:30	Break
3:45	Practical exercise (continued)
4:30	End

Day 2

8:00 a.m.	Lecture on fixed costs of production
10:00	Break
10:15	Lecture (continued)
12:00	Lunch
1:30 p.m.	Practical exercise in fixed costs

Day 2 (continued)

3:30 p.m.	Break
3:45	Practical exercise (continued)
4:30	End

Day 3

8:00 a.m.	Lecture and examples on preparation and interpretation of revised loan evaluation forms
10:00	Break
10:15	Lecture (continued)
12:00	Lunch
1:30 p.m.	Practical exercise in preparation and analysis of loan forms
3:30	Break
3:45	Practical exercise (continued)
4:30	End

Day 4

8:00 a.m.	Lecture and examples of farm financial analysis, including cash flow
10:00 a.m.	Break
10:15	Lecture (continued)
12:00	Lunch
1:30	Review, discussion and course evaluation

TRAINING COURSE ONE
ECONOMIC ANALYSIS OF THE FARM FIRM
OUTLINE AND SELECTED MATERIALS

1. INTRODUCTION

A. Objectives of the course

- (1) Learn the theory of variable and fixed costs of production.
- (2) Learn how to prepare and interpret crop budgets.
- (3) Learn to use budgets in loan evaluation.
- (4) Learn to prepare and interpret farm firm cash flow.

B. Review and discussion of the Bank's traditional enterprise budgeting system.

- (1) Physical quantities of inputs used are not indicated, precluding simple adjustment for price or input quantity changes.
- (2) Communications between loan officers and credit analysts are inefficient because of the absence of physical input information on the budgets.
- (3) There is no existing standard for preparing individual client budgets, resulting in large differences in estimates of physical inputs, costs, and revenues among clients and among loan officers.
- (4) Actual differences among regions and technologies are obscured by the fact that there is only one standard budget for each crop for the entire country. Differences between two regions are shown in Table 1.

C. Review of the advantages of the new budgeting system

- (1) Budgets are classified by region and by yield level, resulting in greater accuracy.
- (2) Budgets include all physical input quantities and unit prices, eliminating the problems of adjustments, communications and realism.
- (3) Budgets are more accurate, permitting their direct use as a reference for loan evaluation and other economic studies.

D. Lecture and examples of basic economic concepts

- (1) Variable costs
- (2) Fixed costs
- (3) Opportunity cost
- (4) Enterprise budget

2. VARIABLE COSTS OF PRODUCTION

A. Definition of variable costs in agricultural production

- (1) Length of time during which the input is used
- (2) Examples of variable costs
- (3) Examples of variable costs traditionally ignored in Bank loans
- (4) Objectives of this lecture
 - (a) Learn theory of variable cost
 - (b) Learn to synthesize variable costs for an enterprise budget using the new methodology.

B. The New Methodology

- (1) Budget Codes (Table 2)
Interpretation of enterprise budget codes (crops).

- (2) Yield level categories (Table 3).
 - (a) How and why the yield level categories are determined.
 - (b) The link between yield level categories and production technology.
 - (c) Placement of a client in a yield level category.
- (3) Definition of production.

How should we define "yield?" See Table 4.
- (4) Components of variable costs -- overview of Sections
 - (a) Labor
 - (a-1) Definition of man-day.
 - (a-2) Activities included: planting, weeding, harvesting, etc.
 - (a-3) Estimation of labor requirements per unit of land using questionnaires.
 - (a-4) How to determine man-day equivalent of child labor.
 - (a-5) Identification of work calendar.
 - (a-6) Determination of labor wage, including non-cash remuneration.
 - (a-7) How to treat managerial time.
 - (a-8) How to handle labor that accompanies a contracted service.
 - (b) Contracted Services (other than labor)
 - (b-1) Definition of a "contracted service." Give examples of tractor or bullock plowing, grain dryer rental, transportation.
 - (b-2) Estimation of physical input-output coefficients.
 - (b-3) How to handle costs incurred per unit of land, per unit of product, and per unit of time.

- (b-4) Valuation of services not paid for in cash.
- (b-5) How to determine average cost in the region.

- (c) Materials.
 - (c-1) Specification of generic names and trade names.
 - (c-2) Specification of units and costs per unit.
 - (c-3) Estimation of average input quantities.
 - (c-4) Valuation of materials not purchased (e.g., seed).

- (5) Estimation of variable costs -- other issues.
 - (a) Selection of a sample of farmers for questioning, considering,
 - (a-1) reliability of information.
 - (a-2) "typicalness" of production activities.
 - (a-3) geographic dispersion.

 - (b) Calculation of the input-output coefficients.
 - (b-1) The arithmetic mean.
 - (b-2) Rounding off to the nearest 0.1.

 - (c) Determination of input costs.
 - (c-1) Labor costs that vary by season.
 - (c-2) Materials costs excluding transportation.
 - (c-3) Inputs that are not used when purchased.
 - (c-4) Verification of reported input costs.

 - (d) Alternatives for handling "outliers."
 - (d-1) What is an "outlier?"
 - (d-2) Making the decision to accept or reject the coefficient.
 - (d-3) Substitution of another producer.

 - (e) Interview techniques.

- (e-1) The questionnaire.
- (e-2) Explanation to the farmer.
- (e-3) Determination of crop yield category.
- (e-4) Phrasing questions to farmers.
- (e-5) Double checking.
- (e-6) Follow-up

(f) Review of the Budget Methodology handout (attached)

C. Practical exercise in estimation of variable costs

The participants gather in small work groups for the practical exercise. Each group receives five different completed questionnaire forms which supposedly came from farmer interviews. (An example of a completed questionnaire form is shown in Table 5.) Each group calculates the arithmetic averages of the reported observations and to obtain a final enterprise budget.

The completed questionnaire forms intentionally contain some problems which must be solved by the group. These include:

1. One farmer reports very low labor use for harvesting relative to other farmers;
2. One farmer hires bullocks for plowing whereas the other four hire a tractor;
3. Two farmers purchase seed and three use their own stock;
4. The reported purchase price of fertilizer is different among farmers for the identical product.

3. OTHER COSTS OF PRODUCTION

A. Interest

(1) Interest is paid on operating capital during the production cycle in the same sense that a bank charges interest on a loan. There are two methods of calculation.

$$(a) \frac{\text{Total Cost}}{2} \times \text{interest rate} \times \frac{\text{No. months}}{2}$$

This method is easy to use but inaccurate when the amounts invested differ from month-to-month.

$$(b) \text{ (Cost per month} \times \text{interest rate} \times \frac{\text{No. months}}{12})$$

This method is used by the Bank.

Example: Monthly costs of producing corn are indicated below.

The annual rate of interest is 12%, and the loan is paid off March 31.

DATE	COSTS	INTEREST
12 April	180.00	21.60
11 May	255.00	28.05
10 June	430.00	43.00
09 July	-	-
08 August	200.00	16.00
07 September	90.00	6.30
06 October	-	-
05 November	175.00	8.75
04 December	<u>220.00</u>	<u>8.80</u>
	1,550.00	132.50

Sample Calculations

$$\text{April } 180 \times 0.12 \times \frac{12}{12} \text{ months} = 21.60$$

$$\text{June } 430 \times 0.12 \times \frac{10}{12} \text{ months} = 43.00$$

Using the first method we would have obtained

$$\frac{1,550}{2} \times 0.12 \times \frac{12}{12} = 93.00$$

which understates actual interest costs in this case.

(2) Interest on Invested Capital

A producer has money invested in equipment and infrastructure such as bullocks, a plow, fences, irrigation pipe, storage buildings, etc. There is an opportunity cost associated with the money invested.

We will use the simplest method.

Interest on invested capital = $\frac{1}{2}$ (initial cost + residual value) \times interest rate

Examples	Initial Cost	Scrap Value	Average Value during life	Interest rate (10%)	Interest
1. Backpack sprayer	125.00	5.00	$\frac{125+5}{2} = 65$	$\times .10 =$	6.50
2. Pair bullocks	1,000.00	800.00	$\frac{1000+800}{2} = 900$	$\times .10 =$	90.00
3. <u>Irrigation System</u>					
Pump	2,000.00	200.00	1,000.00	.10	110.00
Pipe	500.00	10.00	255.00	.10	25.50
Permanent canals	1,000.00	-	500.00	.10	50.00
Land leveling	200.00	-	100.00	.10	10.00
			<hr/> 1,955.00		<hr/> 195.50

B. Other costs of ownership

The costs of owning and using tangible assets include depreciation and maintenance, in addition to the interest on invested capital (already discussed).

(1) Depreciation is calculated annually. It is the loss in value of the asset during one year of its useful life. The useful life of an asset is influenced by:

- (a) Intensity of use of the item;
- (b) Physical environment, such as weather and soils;
- (c) The quality of maintenance of the item;
- (d) The care or abuse of the item by the operator;
- (e) Quality of the item at the outset;
- (f) The amount of time it takes to become obsolete.

We will use straight line depreciation, which is the simplest form. It assumes that the loss in value is equal for each year of useful life of the item.

$$\text{Annual depreciation} = \frac{\text{Initial cost} - \text{Residual Value}}{\text{No. of years of useful life}}$$

Example of Irrigation System

<u>Equipment</u>	<u>Cost</u>	<u>Scrap</u>	<u>Years Life</u>	<u>Annual Depreciation</u>	<u>Annual Maintenance</u>
Pump	2000	200	5	360	120
Pipe	500	10	10	49	40
Canals	1000	-	10	100	100
Land leveling	200	-	10	20	-

- (2) Maintenance costs are the costs of replacement parts and labor used in one year. Technically, these are variable costs, but they are not included in the Bank's traditional enumeration of variable costs on the enterprise budgets.

C. Assignment of Costs to One Unit of Land

Enterprise budgets are prepared on the basis of one manzana of land, so use of equipment and other assets must be expressed on a per-manzana basis. This task is complicated by the fact that some kinds of equipment are used for a variety of different jobs (tractor) or crops (sprayer).

Calculation

- (1) Define the useful life of the item.
- (2) Define how many units of land could be handled in one year with the equipment, given its useful life.

Example

<u>Useful life</u>	<u>Manzanas/year</u>	<u>Total</u>
1 year	20	20 manzanas
2 years	10	20 manzanas

Notice that there are two dimensions to use--time and intensity. In the example above the end result is the same.

D. Practical Exercise

Calculation of "other costs" for a corn production budget (see table 6).

4. FINANCIAL ANALYSIS

Prototype loan application forms are filled out by the participants in the training program. One of the participants plays the role of the farmer being interviewed and one plays the role of the Bank loan officer who conducts the interview. The hypothetical farmer--Pedro Perez--double crops corn and beans on five manzanas of land. Information is entered on two kinds of forms.

A. Enterprise profitability form.

This form (Tables 7 and 8) is filled out for each crop or enterprise for which the farmer seeks Bank financing. The amount of the loan requested cannot exceed the standard budget amount unless justified in writing. An estimate of gross and net income appears at the bottom of the form.

B. Repayment capacity form.

All enterprises of the farm unit are summarized on this form to determine if farm net income will be sufficient to repay the loan (Table 9). Notice that costs and revenues other than those financed by the loan are included.

C. Cash Flow

Although cash flow analysis is not proposed for small loans, the principals are taught and a practical exercise is completed. A handout in Spanish (not included) summarizes the principals and use of cash flow. The completed practical exercise is shown in Table 10.

TABLE 1: ESTIMATED PRODUCTION AND PRODUCTION COSTS
FOR CORN, REGIONS OF CHOLUTECA AND TOCOA
IN 1979

<u>Low Technology</u>	Choluteca	Tocoa
Yield/manzana (quintals)	14	40
Total variable production cost, L/qq	4.57	10.25
 <u>Medium Technology</u>		
Yield/manzana (quintals)	25	60
Total variable production cost, L/qq	4.51	9.54

TABLE 2: CROP BUDGET CODES

<u>Grains</u>		<u>Fruit Crops</u>	
01	Corn	41	Orange
02	Beans	42	Grapefruit
03	Sorghum	43	Tangerine
04	Rice	44	Lemon
05	Soybeans	45	Lime
06	Sesame	46	Mango
07	Wheat	47	Avocado
08		48	Cashew
09	Corn and Beans	49	Papaya
10	Corn and Sorghum	50	Banana - Plantain
		51	Pineapple
		52	Cocoa
		53	
		54	
		55	
<u>Vegetable Crops</u>		<u>Yield Code</u>	
11	Tomato	1 -	Low Yield
12	Potato	2 -	Intermediate Yield
13	Onion	3 -	High Yield
14	Cabbage	4 -	
15	Yucca	5 -	Irrigated
16	Cucumber	6 -	
17	Cantaloupe	7 -	
18	Watermelon	8 -	
19	Peppers	9 -	Establishment
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
<u>Specialty Crops</u>			
31	Cotton		
32	Coffee		
33	Sugar Cane		
34	Tobacco		
35	Castor Bean		
36	African Palm		
37			
38			
39			
40			

TABLE 3: GRAIN YIELD CATEGORIES

(quintals/manzana)

Crop	Low	Medium	High
Corn	< 30	30-60	>60
Sorghum			
Common	< 15	15-30	>30
Improved	< 30	30-60	>60
Beans	<12	12-25	>25
Rice			
Irrigated	< 50	50-80	>80
Dryland	<30	30-40	>60

TABLE 4: DETERMINATION OF "PRODUCTION QUANTITY TO ESTIMATE GROSS INCOME"

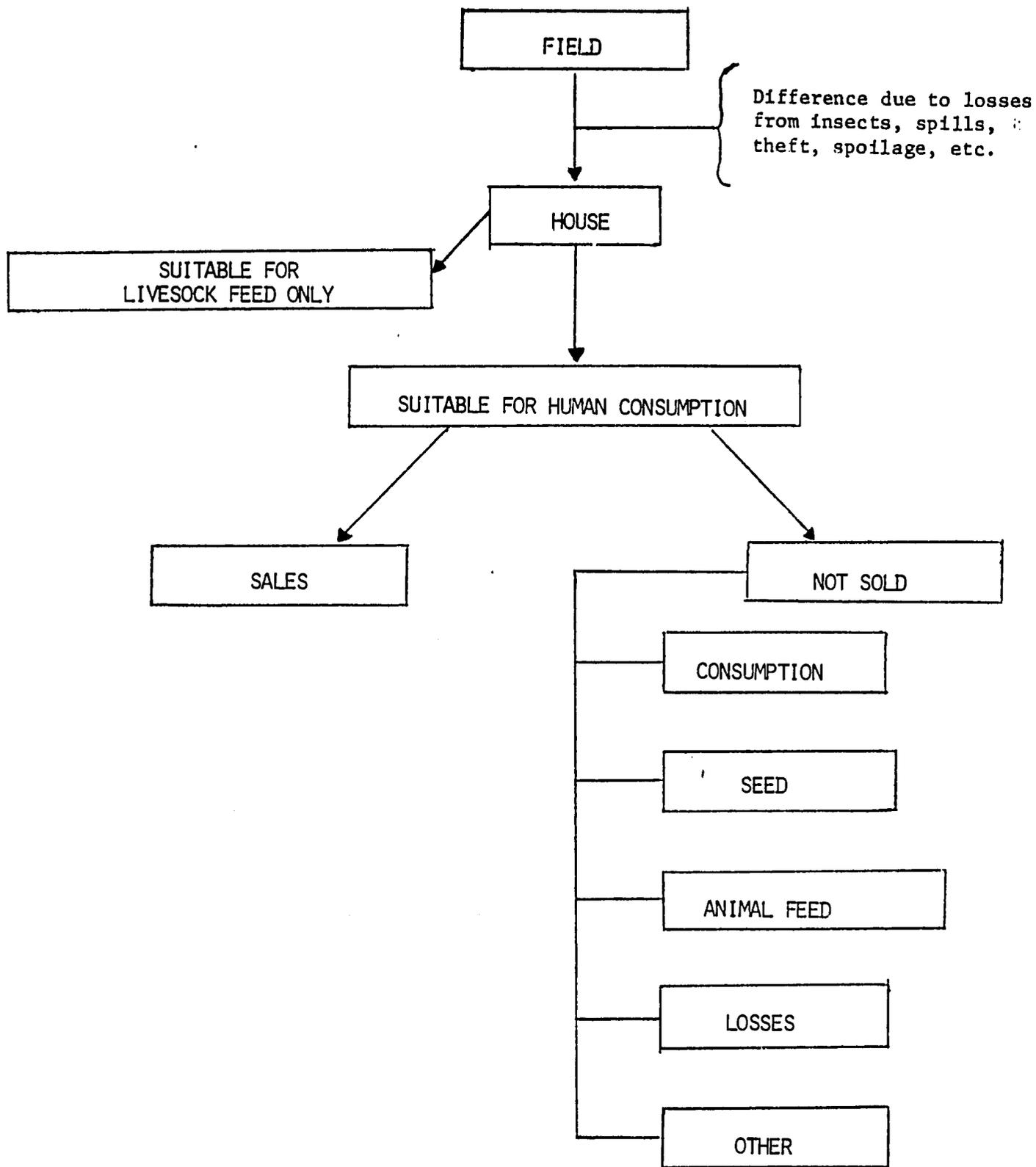


TABLE 5: COMPLETED VARIABLE COST QUESTIONNAIRE

BANCO NACIONAL DE DESAROLLO AGRICOLA

Enterprise Budget No. 18022Enterprise: Beans, yield: Medium, 16 qq/MzRegion: Olayoche Producer: Roberto Sierra Area Planted: 7 manzanasPrepared by: Ricardo Arias Date: 7/15/79

MONTH	LABOR (MAN-days) ^{a/}	Total Units	L/ Unit	Total Cost	7 mzs
August	Plant	12	3.00	36.00	
August	Apply Fertilizer	12	3.00	36.00	
Sept.	Apply Insecticide	7	3.00	21.00	
Sept.	Weed	84	3.00	252.00	
Oct.	Harvest	42	3.00	126.00	
Nov	Haul	22	3.00	66.00	

OTHER CONTRACTED SERVICES

July	Plow tractor - hours	15	16.00	240.00	
August	Disc tractor - hours	7	14.00	98.00	
August	Plant bullock days ^{b/}	7	10.00	70.00	

MATERIALS

August	Improved Seed	350 lbs.	0.50	175.00	
August	Fertilizer (formula)	14 qq	23.50	164.50	
Sept.	Tanapox (insecticide)	5 liters	32.00	160.00	
SUBTOTAL (Labor and Contracted Services and Materials)				1,444.50	

OTHER COSTS

TOTAL COST OF PRODUCTION					

^{a/} Man-day =

TABLE 6: CALCULATION OF "OTHER COSTS" OF CORN PRODUCTION

No. Units	Materials	1 Initial Cost	2 Scrap Value	3 Average Investment	4 Interest on Investment 12% Year	5 Useful life	6 Annual Deprec.	7 Maintenance cost	8 #/Mzs. Year	9 % assignment Mz.	10 Annual Interest Mz.	11 Depreciation Mz.	12 Maintenance Mz.
2	Hoe	9.00	-	4.50	.54	2	4.50	-	8	.125	.135	1.125	-
3	Machete	6.00	-	13.00	.36	2	3.00	-	6	.166	.179	1.494	-
1	Backpack sprayer	150.00	-	75.00	9.00	4	37.50	2	100	.01	.09	.375	.02
1	Sacks (25)	37.50	-	18.75	2.25	2	18.75	-	1	1.0	2.25	18.75	-
1	Fence (5 Mzs)	600.00	50.00	325.00	39.00	20	27.50	50.00	5	.2	7.80	5.50	10.00
2	Bullock	600.00	500.00	550.00	66.00	5	20.00	100.00	80	.0125	1.65	.50	2.50
											12.10	27.74	12.52

COLUMN

FORMULAS

3	Average Investment =	$\frac{\text{Col. 1} + \text{Col. 2}}{2}$
4	Annual Interest =	Col. 3 x Rate of interest
6	Annual Depreciation	$\frac{\text{Col. 1} \times \text{Col. 2}}{\text{Col. 5}}$
9	% Mz =	$\frac{1.0^{**}}{\text{Col. 8}}$
10	Annual Interest/Mz =	Col. 4 x Col. 9 x No. Units
11	Annual Deprec./Mz =	Col. 6 x Col. 9 x No. Units
12	Annual Maint./Mz =	Col. 7 x Col. 9 x No. Units

Annual Interest/Mz	L. 12.10
Annual Depreciation/Mz	" 27.74
Annual Maintenance/Mz	" 12.52
TOTAL	<u>L. 52.36</u>

** 1 = Constant

TABLE 7: ANALYSIS OF ENTERPRISE PROFITABILITY--CROP

Client Pelco Perez Enterprise Peru 5 manzanas
 Date 4/15/79 Plan No. 11012

(1)

Estimated total Production	Production Available for sale	Expected unit Price received	Expected Gross Revenue
<u>230 qq</u>	<u>200 qq</u>	L. <u>14.00</u>	L. <u>2,800.00</u>

COSTS OF PRODUCTION.

	Standard Budget	Loan Requested
Labor.	L. <u>1,99.50</u>	L. <u>577.00</u> ^{a/}
Other Contracted Services.	<u>595.40</u>	<u>575.90</u>
Materials.	<u>515.10</u>	<u>611.10</u> ^{b/}
Contingencies.	<u>181.05</u>	<u>178.40</u>
	L. <u>1,991.55</u>	L. <u>1,962.40</u>

(2)

Other Costs. L. 255.00

Difference in costs ^{a/} + L. -26.50

{ Net differences
from a/ and b/.

Total Estimated cost L. 2,250.65
(3)

Gross revenue (1) less total estimated cost (3) = Net income

L. 2,800.00 L. 2,250.05 L. 549.95

^{a/} The second weeding shown in the standard budget will not be done.

^{b/} Client wants to apply 2qq of fertilizer instead of one.

TABLE 8: ANALYSIS OF ENTERPRISE PROFITABILITY--BEANS

Client P. deo Pariz Enterprise Beans 5 Manzanas
 Date 4/15/79 Plan No. _____

(1)

Estimated total Production	Production Available for sale	Expected unit Price received	Expected Gross Revenue
<u>90 qq</u>	<u>80 qq</u>	L. <u>35.00</u>	L. <u>2,800.⁰⁰</u>

COSTS OF PRODUCTION

	Standard Budget	Loan Requested
Labor	L. <u>489.50</u>	L. <u>489.50</u>
Other Contracted Services	<u>304.95</u>	<u>265.70</u> ^{a/}
Materials	<u>501.80</u>	<u>535.42</u> ^{b/}
Contingencies	<u>129.62</u>	<u>128.86</u>
	<u>L. 1,425.87</u>	<u>L. 1,417.48</u>

(2)

Other Costs L. 300.⁰⁰

Difference in costs^{a/} + L. -7.63

Total Estimated cost L. 1,718.24
(3)

Gross revenue (1) less total estimated cost (3) = Net income

L. 2,800.00 L. 1,718.24 L. 1,081.76

^{a/}Plowing time reduced to 1.5 hours = -L39.25

^{b/}Seed price increased to .12/lb: +L31.62
-7.63

TABLE 9: ANALYSIS OF REPAYMENT CAPACITY--WHOLE FARM

Client Dolro Perez Agency Davis

Enterprise	(2) Loan Amount	(1) Estimated Gross Revenue	(3) Estimated Total Cost
Corn 5m2	1912.40	2800. ⁰⁰	2250.05
Beans 5m2	1417.48	2800. ⁰⁰	1718.24
Sell 5 hogs	0	500. ⁰⁰	250. ⁰⁰
Sell 5 ⁰⁰ Pigs	0	1200. ⁰⁰	300. ⁰⁰
Totals	L.		
Sub-Total		L. 7100. ⁰⁰	L. 4518.29

1. Other cash costs of the farm and home (cash living expenses).	L.	<u>1500.⁰⁰</u>
2. Payment of other debts and interest	"	<u>100.⁰⁰</u>
TOTALS		<u><u>7100.⁰⁰</u></u>
	(A)	<u><u>6118.29</u></u>
		(B)

Gross revenue (A) less Total Cost (B) = Net Income

L. 7100.⁰⁰ L. 6118.29 L. 981.71

TABLE 10: CASH FLOW

The cash flow example is the same as that shown in the Farm Records Course, Appendix C. Alternatively, one was sometimes made up in class using any two crop budgets and hypothetical farm data.

2B (5) (f) ENTERPRISE BUDGETING HANDOUT

THE NATIONAL AGRICULTURAL DEVELOPMENT BANK (BANADESA)

ENTERPRISE BUDGET PROGRAM FOR CROPS

The BANADESA enterprise budget program is a systematic scheme for determining the average costs and returns associated with the production of selected crops. The objective of the program is to obtain accurate and detailed budget information for use in loan evaluation and general economic analysis. Some specific kinds of analysis which require budgets are (1) estimation of the costs and returns from producing a particular crop; (2) estimation of farm profitability and loan repayment capacity; (3) determination of the timing of clients' cash expenditures and receipts; (4) comparison of alternative production technologies to determine relative profitability; and (5) determination of the product price necessary to cover production costs.

Geographic Regions and Yield Levels

Due to the great ecological diversity in Honduras it is necessary to establish locational categories for crop production budgets. The country is divided into 13 regions (excluding the Mosquitia) according to ecological homogeneity and service areas of the Bank (see the attached list). Budgets are prepared for all crops financed by the Bank in each region.

One production budget per crop per region is usually inadequate because crop production technology is highly diverse, ranging from the most rudimentary hillside agriculture to modern, mechanized production. Due to insuf-

efficient data however, the effects of differences in input quality and quantity on crop yields cannot be established with precision. Furthermore, a specific set of inputs often results in very different crop yields because of uncontrolled locational variables such as soil and rainfall. For these reasons the budgets are not classified according to the level of production technology -- i.e., from the input side. Instead, budgets are classified according to production levels -- i.e., yield per unit of land. Low, medium and high yield categories for grains are subjectively set as follows:

Grain Yield Categories
(quintals/manzana)

Crop	Low	Medium	High
Corn	< 30	30-60	> 60
Sorghum			
Common	< 15	15-30	> 30
Improved	< 30	30-60	> 60
Beans	< 12	12-25	> 25
Rice			
Irrigated	< 50	50-80	> 80
Dryland	< 30	30-40	> 60

All three yield levels are not necessarily found in a region. For example, high yield corn is virtually absent from Santa Rosa de Copan and low yield rice is not found in the Choluteca region. The methodology used to prepare a production budget for a particular crop yield category is described below.

A production budget is a statement of the physical inputs and costs necessary to obtain a specified quantity of product. The budgets described

herein are the averages of what producers do, and therefore might not accurately represent a particular producer.

Budget Format

Each budget is identified by a five-digit code indicating the region, crop, and yield level. For example, Budget 11012 corresponds to region 11 (Cholulteca), crop 01 (corn), and yield level 2 (medium).

A budget is composed of four sections -- labor, other contracted services, materials, and other costs. The first three sections include nearly all of the variable costs of production; the last section includes fixed costs and some variable costs. The second page of the budget contains a list of equipment required to produce the crop, plus detailed calculations of fixed costs which are summarized on the first page.

Within a given section the production activities are listed in chronological order, with the month indicated in the left column. The quantity of the input required to cultivate one manzana of land is indicated in the first right-hand column, followed by the cost per unit of input and the total cost per manzana.

Methodology: Variable Costs

Coefficients indicating the quantity of physical input required for one manzana of land are obtained from interviews with farmers. A BNF loan officer selects five farmers who usually obtain crop yields corresponding to a particular yield category, then questions each about all of the activities and materials he uses. The resulting coefficient for input use is the arithmetic mean of five reported numbers. For example, five farmers might report the following numbers of man-days required to plant

seed on one manzana of land; 1.8, 1.5, 2.0, 2.5, and 2.5. The average is simply the sum of the numbers divided by five, or 2.06. The coefficient reported in the budget would be 2.1 man-days because averages are rounded off the nearest tenth.

When a farmer reports a number which is unbelievable or which represents a peculiar situation on that farm, the loan officer either omits that particular number from the sample or replaces that farmer with another to bring the sample size up to five.

Each farmer interviewed also reports input prices, such as labor, contracted services and materials. These reported prices are verified by means of a separate program for collection of input prices. Since input prices vary little within a region, it is usually unnecessary to compute the average. The most common price is therefore used. In the case of materials the prices charged by the BANADESA Sales Department is used because some Bank clients are required to purchase inputs there.

Methodology: Other Costs

"Other costs" include (1) interest on operating capital and (2) ownership costs of equipment. The former is calculated on the assumption that the producer must have all the capital required for a given month on the first day of that month. Interest is accumulated until harvest.

Ownership costs include interest on investment capital, depreciation and maintenance costs. The equipment required to produce a particular crop is determined by the Bank loan officer from his experience and farmer interviews, and costs are obtained in a similar manner. All "other costs" are reduced to one crop (harvest) on one manzana of land. A detailed explanation of how "other costs" are calculated is available from the Farm Data Analysis Unit of BANADESA.

Analysis of Enterprise Profitability

Three product prices — high, medium and low — are used to calculate the gross revenue the producer could receive. These prices merely represent the judgement of Bank loan officers working in the region, and of course the actual price received by the producer depends on the month of sale and his particular marketing arrangement. The right-hand column is for entering the client's expected revenue using his assumed yield and price.

The "breakeven price" is calculated at the end of the section. It is the price per unit sold required to exactly cover (1) only variable costs, and (2) all costs (including "other costs").

Budget Processing

Budgets are stored on computer diskettes in the main office of the Banco Nacional de Desarrollo Agrícola. They are updated annually to allow for price changes and production technology changes. Copies may be obtained from the Farm Data Analysis Unit of the Bank Headquarters, or from branch offices.

NATIONAL AGRICULTURAL DEVELOPMENT BANK

Enterprise Budget Regions

No.	Branch Offices	Principal Valleys
1	San Pedro Sula Puerto Cortés El Progreso	Sula, Quimistán, Naco, Cuyamel Santa Cruz de Yojoa
2	Tela and La Ceiba	Lean, Papaloteca, Masica, Tela
3	Olanchito	Olanchito (Medio and Alto Aguán)
4	Tocoa	Bajo Aguán
5	Marcala and Camasca	La Esperanza, Masaguara
6	Comayagua and Minas de Oro	Comayagua, Jesús de Otoro, Taulabé
7	Tegucigalpa	Siria, Talanga, Guaimaca, San Juan de Flores, Zamorano.
8	Danlí and El Paraíso	Jamastrán, El Paraíso
9	Juticalpa and Catacamas	Guayape, Lepaguare, Juticalpa, Telica, Agalta, Patuca, Salamá, Paulaya.
10	Sta. Rosa de Copán and Ocotepeque	Sonseti, La Unión, La Entrada, Florida, Corquín.
11	Choluteca and Nacaome	Chouteca, Nacaome, Pespire, San Marcos de Colón.
12	Santa Bárbara and San Luis	Santa Bárbara
13	Yoro	Locomapa.

BANCO NACIONAL DE DESARROLLO AGRICOLA
PLAN DE INVERSION NO. 11012

RUBRO- MAIZ RENDIMIENTO MEDIO 33 00/MZ
REGION- CHOLUTECA-NACAOME
PREPARADO POR- CLEMENTE MERAZ CRUZ 18-9-79

CUSTOS DE PROPIEDADES DETALLADOS

INFORMACION INICIAL

EQUIPOS	NO. UNID	CCSTO INICIAL	VALOR RESIDUAL	VIDA UTIL	MZ/ AÑO
MOCHILA	1.0	225.00	15.00	2.0 AÑ	120.0
SACOS -15-	1.0	36.00	0.00	2.0 AÑ	1.0
CERCA -4MZ-	1.0	460.00	48.00	15.0 AÑ	4.0

COSTOS ANUALIZADOS

EQUIPOS	T O T A L E S			POR MANZANA		
	INTER	DEPREC	MANTEN	INTER	DEPREC	MANTEN
MOCHILA	14.40	105.00	3.00	0.12	0.87	0.02
SACOS -15-	2.16	18.00	0.00	2.16	18.00	0.00
CERCA -4 MZS-	31.63	22.20	16.00	7.92	7.20	4.00
TOTALES POR MANZANA				10.20	26.07	4.02

ANALISIS DE RENTABILIDAD DEL RUBRO

	PRECIO POSIBLE ESPERADO			INGRESO CLIENTE
	BAJO	MEDIO	ALTO	
	11.00	13.00	15.00	
INGRESO BRUTO	363.00	429.00	495.00	
INGRESO NETO *	93.97	159.97	225.97	
INGRESO NETO **	43.03	109.03	175.03	

PRECIO NECESARIO PARA CUBRIR COSTOS VARIABLES 8.15
PRECIO NECESARIO PARA CUBRIR COSTOS TOTALES 9.69

* INGRESO BRUTO MENOS COSTOS VARIABLES
** INGRESO BRUTO MENOS COSTO TOTAL

BANCO NACIONAL DE DESARROLLO AGRICOLA
PLAN DE INVERSION NO. 11312

RUBRO- MAIZ RENDIMIENTO MEDIO 33 CG/M2
REGION- CHCLUTSCA-NACACME
PREPARADO POR- CLEMENTE MERAZ CRUZ 18-9-79

NO. MANZANAS -----

MANO DE OERA - JORNAL A*	TOTAL UNID.	L/ UNID.	COSTO TOTAL	CCSTO PROYECTO
MAY. SIEMBRA	1.0	4.00	4.00	
MAY. APLICACION FERTILIZANTE	1.0	4.00	4.00	
MAY. APROLE	1.0	4.00	4.00	
JUN. APLICACION UREA	1.0	4.00	4.00	
JUN. LIMPIA	4.8	4.00	19.20	
JUN. APLICACION PESTICIDAS	1.0	4.00	4.00	
JUL. APLICACION PESTICIDAS	1.0	4.00	4.00	
AGT. TAPIZCA Y ACARREG	9.2	4.00	36.80	
SEP. DESGRANE	9.0	4.00	36.00	
OTROS SERVICIOS CONTRATADOS				
AER. ARADA TRACTOR	C*	35.00	35.00	
AER. RASTRA TRACTOR	C*	17.00	17.00	
MAY. SIEMBRA BUEYES	C*	10.00	10.00	
JUN. APROLE BUEYES	C*	11.00	11.00	
MATERIALES				
AER. SEMILLA	32.0 LB	0.40	12.80	
MAY. FERTILIZANTE	1.0 CG	25.35	25.35	
JUN. INSECTICIDA	1.0 KL	15.00	15.00	
JUN. UREA	1.0 CG	23.50	23.50	
JUL. INSECTICIDA	2.7 LB	1.25	3.38	
SUB-TOTAL			269.03	
OTROS COSTOS				
INTERESES SOBRE CAPITAL ANUAL DE INVERSION 12%			10.65	
DE PROPIEDADES- INTERESES 12%			10.20	
DEPRECIACION			26.07	
MANTENIMIENTO			4.02	
CCSTO TOTAL DE PRODUCCION			319.97	
A* JORNAL DE 6 HORAS				
C* COSTO FIJO POR MANZANA				

APPENDIX B

OUTLINE AND SELECTED MATERIALS
FOR COURSE 2

"ANALYSIS OF INVESTMENTS IN AGRICULTURE"

<u>Contents</u>	<u>Page</u>
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Grain storage and marketing	79
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SECOND TRAINING COURSE

Tegucigalpa, January 29 - February 1

ANALYSIS OF INVESTMENTS IN AGRICULTURE

AGENDA

Tuesday

- 8:30 a.m. Inauguration: Rene Cruz, BNF President
8:45 Lecture on economic concepts, including fixed costs, variable costs, opportunity cost, marginal cost, marginal income, and budgets.
- 10:30 Break
- 10:45 Lecture and practical exercises on partial budgeting. Examples include fertilizer, improved seed, and herbicide.
- 12:00 Lunch
- 1:30 p.m. Lecture and practical exercises on partial budgeting (continued)
- 3:00 Break
- 3:15 Lecture and practical exercise on evaluation of an irrigation system.
- 4:30 Close

Wednesday

- 8:30 a.m. Lecture on present and future value as applied to economic analysis of investments.
- 10:00 Break
- 10:15 Lecture and practical exercise in economic analysis of investments in perennial crops.
- 12:00 Lunch
- 1:30 Lecture and practical exercise in determination of grain storage and marketing strategy for the producer.
- 3:00 Break
- 3:15 Lecture and practical exercise on evaluation of an investment in a grain storage structure.

Agenda....

4:30 Close

Thursday

8:30 a.m. Lecture on preparation of cattle budgets

10:00 Break

10:15 Lecture (continued). Investment analysis of infrastructure such as fences.

12:00 Lunch

1:30 p.m. Practical exercise in preparation of cattle budgets

3:00 Break

3:15 Practical exercises (continued)

4:30 Close

Friday

8:30 a.m. Lecture and practical exercise on partial budgeting analysis of livestock investments.

10:00 Break

10:15 Lecture and practical exercise on partial budgeting analysis of livestock investments

12:00 Lunch

1:30 p.m. Review of concepts and principals learned in the course.

2:30 Course evaluation and coordination of future activities.

3:00 Presentation of certificates.

APPENDIX B
OUTLINE AND SELECTED MATERIALS FOR
TRAINING COURSE TWO
ANALYSIS OF INVESTMENTS IN AGRICULTURE

OVERALL OUTLINE

1. Basic Economic Concepts
2. Partial Budgeting
 - A. Principles of partial budgeting
 - B. Simplified example of partial budgeting
 - C. Practical exercises in partial budgeting
 - (1) Increased use of fertilizer and herbicides on corn
 - (2) Investment in an irrigation system for rice and sugar cane.
 - D. Checklist of budget changes caused by selected investments.
3. Present Value
 - A. Lecture on concepts
 - B. Practical example/exercise: Investment analysis of a perennial crop
4. Practical Exercises in Grain Storage and Marketing
 - A. Investment in a grain storage shed
 - B. Marketing strategy for stored grain
5. Investment in Livestock Enterprises
 - A. Lecture and example of cow/calf enterprise budget
 - B. Practical exercise in estimating cattle budgets

TRAINING COURSE TWO
 ANALYSIS OF INVESTMENTS IN AGRICULTURE
 DETAILED OUTLINE AND SELECTED MATERIALS

1. BASIC ECONOMIC CONCEPTS

The introductory section includes basic economic definitions and examples of opportunity cost, marginal cost, marginal revenue, variable cost, fixed cost, and enterprise budgets. Definitions and examples are standard textbook cases in agriculture.

2. PARTIAL BUDGETING

A. Definition and use of partial budgeting analysis are taken from standard farm management course materials. It is explained that an expenditure will have one or more of the following impacts on production costs: (1) elimination or reduction of some costs; (2) increase in costs; (3) reduction of income; or (4) increase in income.

B. Simplified example of partial budgeting.

Given

Nine manzanas of land planted in corn

Budget No. 11011

Change: Increase in fertilizer use by one quintal of formula (L. 25.35/qq) and one quintal of urea (L. 23.50/qq) per manzana.

Yield Change: Increase of eight quintals/mz.

Cost Changes: Increase in materials cost of fertilizer (48.85/mz)
 Labor (3 man days) to apply fertilizer (12.00/mz)
 Interest on operating capital (3.04/mz)

Revenue change: Increase of 104.00/mz.
Net income change: Increase of 40.11/manzana, or 360.99 for
the nine manzanas.

Assumptions

No more grain sacks purchased
Product price is constant
Change in harvesting and shelling labor is ignored

Supporting Materials for Section 2B

1. Enterprise budget no. 11011
2. Summary of costs and revenues per manzana

BANCO NACIONAL DE DESARROLLO AGRICOLA
ENTERPRISE BUDGET NO. 11011

Enterprise: corr low yield, 20 quintals/manzana
Region: Cho' teca and Nacaome
Prepared by: Clemente Meraz Cruz, 9/18/79

Labor (man-days) ^{A/}		Total Units	Lempiras/ Unit	Total Cost
April	clear and burn	8.2	4.00	32.80
May	plant	3.0	4.00	12.20
June	weed	6.8	4.00	27.20
June	Apply pesticides	1.0	4.00	4.00
Aug	Harvest	5.8	4.00	23.20
Sept	Shell (remove grain)	2.0	4.00	8.00
<u>Other Contracted Services</u>				
None				
<u>Materials</u>				
Apr	seed	25.0 lbs	0.40	10.00
May	Insecticide	0.5 lit	8.21	4.10
Sub-Total				121.30
<u>Other Costs</u>				
Interest on annual invested capital (12%)				5.29
Ownership costs: Interest (12%)				9.48
Depreciation				19.64
Maintenance				4.01
Total Production Cost				159.72

^{A/} Man-day = 6 hours

ENTERPRISE BUDGET NO. 11011 (continued)

Detailed ownership costsInitial information

<u>Equipment</u>	<u>No. Units</u>	<u>Initial Cost</u>	<u>Scrap Value</u>	<u>Useful Life</u>	<u>Manzanas/ Year</u>
Backpack sprayer	1.0	225.00	15.00	4.0	120.0
Sacks (10)	1.0	24.00	0.00	2.0	1.0
Fence (4 manzanas)	1.0	480.00	48.00	15.0	4.0

Annualized Costs

<u>Equipment</u>	<u>Totals</u>			<u>Per Manzana</u>		
	<u>Inter</u>	<u>Deprec</u>	<u>Maint</u>	<u>Inter</u>	<u>Deprec</u>	<u>Maint</u>
Backpack sprayer	14.40	52.50	1.50	0.12	0.44	0.01
Sacks (10)	1.44	12.00	0.00	1.44	12.00	0.00
Fence (4 mz)	31.68	28.80	16.00	7.92	7.20	4.00
Totals per manzana				9.48	19.64	4.01

2B EXAMPLE OF PARTIAL BUDGETING

Example: Increased use of fertilizer on corn

Reference: Budget No. 11011

SUMMARY OF COSTS AND REVENUES PER MANZANA

<u>Income</u>	<u>BUDGET</u>	
	<u>Before</u>	<u>After</u>
Yield/Manzana	20 qq	28 qq
Assumed price/qq	<u>L. 13.00</u>	<u>L. 13.00</u>
Gross income	260.00	364.00
 <u>Variable Costs</u>		
Labor	L. 107.20	119.20
Contracted services	-	-
Materials	<u>14.10</u>	<u>62.95</u>
Total variable costs	121.30	182.15
 <u>Other Costs</u>		
Interest on operating capital	5.29	8.30
Ownership costs: 12% interest	9.48	9.48
Depreciation	19.64	19.64
Maintenance	<u>4.01</u>	<u>4.01</u>
Total Other Costs	38.42	41.43
Total Costs	159.72	223.58
Net Income	<u>100.28</u>	<u>140.42</u>

2C(1) PRACTICAL EXERCISE IN PARTIAL BUDGETING

Determine the change in net income per manzana resulting from application of formula fertilizer, urea and herbicide in corn production.

Reference budget No. 11011.

<u>1. Increased application</u>	<u>Quantity</u>	<u>Cost/unit</u>
Formula fertilizer	1 quintal	L. 25.00
Urea	1 quintal	35.00
Herbicide	2 kilograms	15.00

2. Yield increase in 10 qq/mz

3. Man-days required for application are as follows:

Fertilizers	3 man-days/mz
Herbicide	1 man-day/mz

4. Labor required for weeding is eliminated because of herbicide use.

5. Harvesting labor increases by two man-days and shelling labor increases one man-day due to the increased yield.

6. The producer supplies his own funds, hence there is no interest on borrowed capital.

2C(1). PRACTICAL EXERCISE (continued)

SUMMARY OF COSTS AND REVENUES PER MANZANA

<u>Income</u>	<u>Budget</u>	
	<u>Before</u>	<u>After</u>
Yield, qq/mz	20.00	30.00
Price, L./mz	13.00	13.00
Gross income, L./mz	260.00	390.00
 <u>Variable Costs</u>		
Labor	107.20	108.00
Contracted services	-	-
Materials	14.10	92.10
Total Variable Cost	121.30	200.10
 <u>Other Costs</u>		
Interest on operating capital (12%)	5.29	5.00
Ownership costs: Interest on investment (12%)	9.48	9.48
Depreciation	19.64	19.64
Maintenance	4.01	4.01
Total Other Costs	38.42	38.13
Total Cost	159.72	238.23
Net Income	100.28	151.77

2C (2) PRACTICAL EXERCISE IN PARTIAL BUDGETTING

Determine the change in net income resulting from investment in an irrigation system. Reference budgets No. 11333 and 11043.

1. Assume that the producer does not change crops as a result of installation of the system. He plants 15 manzanas in sugar cane and 15 manzanas in rice before and after installation of the system.

	<u>Dry</u>	<u>Irrigated</u>
Rice yield, qq/mz	50	90
Sugar cane yield, tons/mz	65	85

2. Product prices remain constant

Rice	L 20.00/qq
Sugar cane	L 24.00/ton

3. The cost of the irrigation system is as follows:

Construction of a well	L 15,000
Motor and pump	L 11,000
Pipes and other equipment	L 29,000

4. Increase in labor use and costs

<u>Price</u>	<u>Man-days</u>	<u>L/man-day</u>
Irrigation	8	4.50
Canal maintenance	21	3.75

Cane

Irrigation	10	4.00
Canal maintenance	4	4.00

5. Increase in "other contracted services"

Rice

Harvester	L. 3.75/ton
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Section 2C(2) continued

Cane

Cut	L. 3.20/ton
Crane lift	1.00/ton
Handling	0.50/ton
Fees	0.50/ton
Haul	2.70/ton

6. Increase in other costs

Rice

Interest on operating capital (12%)	L. 43.50
Ownership costs: Interest on capital (12%)	94.30
Depreciation	82.73
Maintenance	167.31

Cane

Establishment costs (20%)	L. 95.20
Interest on establishment cost	28.55
Interest on operating capital	53.45
Ownership costs: Interest on capital (12%)	94.30
Depreciation	82.73
Maintenance	167.31

BANCO NACIONAL DE DESARROLLO AGRICOLA
ENTERPRISE BUDGET 11333

Enterprise: Sugar cane (dryland), yield 65 tons/mz, maintenance
Region: Choluteca
Prepared by: Clemente Meraz Cruz, 5/3/79

Labor (man-days) ^{a/}		Total Units	L/ Unit	Total Cost
May	Fence maintenance	2.50	4.00	10.00
May	Apply herbicide	2.50	4.00	10.00
Jun	Apply fertilizer	1.25	4.00	5.00
Jun-Oct	Rat control <u>d/</u>	1.25	4.00	5.00
Jul-Sep	Canal cleaning <u>d/</u>	6.00	4.00	24.00
Jul-Sep	Road maintenance	6.00	4.00	24.00
Jul-Oct	Weeding	6.00	4.00	24.00

Other contracted services

Apr	Deep plow <u>e/</u>	<u>c/</u>	36.00	36.00
Jun	Cultivate	c	18.00	18.00
Jun	Re-plant	c	37.00	37.00
Jul	Furrow	c	18.00	18.00
Jul	Cultivate	c	18.00	18.00
Aug	Control borer	c	10.00	10.00
Sep	Control borer	c	10.00	10.00
Apr	Cut	b	3.20	208.00
Apr	Crane lift	b	1.00	65.00
Apr	Handling cut cane	b	0.50	32.50
Apr	Fees	b	0.50	32.50
Apr	Haul	b	2.70	175.50

Materials

May	Herbicides	3 lbs	11.00	33.00
Jun	Fertilizer (formula)	2 qq	22.00	44.00
Jun	Urea	3 qq	22.00	66.00
Aug	Parathion	1 lit	6.00	6.00
Sep	BHC	25 lbs	1.32	33.00

ENTERPRISE BUDGET 11333 (cont)

Other Costs

Interest on operating expenses (12%)		
Establishment	<u>f/</u>	28.55
Maintenance	<u>f/</u>	46.70
20% of Establishment costs	<u>g/</u>	95.20
<hr/>		
Total Cost/Mz		L. 1,114.95
<hr/>		

- a/ man-day = 8 hours
- b/ Fixed cost per quintal
- c/ Fixed cost per manzana
- d/ Equally distributed each month
- e/ From second year on
- f/ See Budget No. 11339
- g/ Interest on average investment

BANCO NACIONAL DE DESAROLLO AGRICOLA
ENTERPRISE BUDGET NO. 11043

Enterprise: Rice, dryland, high yield 50 qq/mz
Region: Choluteca
Prepared by: Clemente Meraz Cruz, 9/22/79

Labor (man-days) <u>A/</u>		Total Units	L/ Unit	Costs Total
Jun	clear brush	11.6	3.00	34.80
Jul	seed/fertilizer	2.0	3.00	6.00
Aug	weed	11.6	3.00	34.80
Aug	Apply fertilizer	1.4	1.40	1.96
Aug	Apply fungicide and herbicide	2.2	2.20	4.84
Oct	Protect crop from birds	1.0	1.00	1.00
<u>Other contracted services</u>				
Jun	plow (1 time)	c	30.00	30.00
Jun	Disc (4 times)	c	12.00	48.00
Aug	Apply herbicide	c	7.50	7.50
Aug	Apply fungicide	c	7.50	7.50
Oct	Combine harvester	B	3.75	187.50
<u>Materials</u>				
Jun	Seed	2.0 qq	42.00	84.00
Jun	Fertilizer (formula)	2.0 qq	23.50	47.00
Jun	Urea	2.0 qq	23.50	47.00
Jun	Herbicide Stam LV-10	1.5 qq	32.50	48.75
Jun	Dipterex	1.1 qq	30.00	33.00
Jun	Lannate	1.0 qq	30.00	30.00
Jun	Benlate	1.0 lb	26.00	26.00
Sub Total				L. 679.65

ENTERPRISE BUDGET NO. 11043 (continued)

Other Costs

Interest on annual operating capital (12%)	23.35
Ownership costs: Interest on investment (12%)	11.64
Depreciation	38.07
Maintenance	4.02

Total production cost/manzana	758.77
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- A Man-day = 6 hours
 B Fixed cost per quintal
 C Fixed cost per manzana

Detailed Ownership CostsInitial information

Equipment	No. Units	Initial Cost	Scrap Value	Useful Life	Manzanas/ Year
Backpack sprayer	1.0	225.0	15.00	2.0 years	120.0
Sacks (25)	1.0	60.0	0.00	2.0 years	1.0
Fence (4 manzanas)	1.0	480.0	48.00	15.0 years	4.0

Annualized Costs

Equipment	Totals			Per Manzana		
	Inter	Deprec	Maint	Inter	Deprec	Maint
Backpack sprayer	14.40	105.00	3.00	0.12	0.87	0.02
Sacks (25)	3.60	3.00	0.00	3.60	30.00	0.00
Fence (4 manzanas)	31.68	28.80	16.00	7.92	7.20	4.00
Totals per manzana				11.64	38.07	4.02

SUMMARY OF COSTS AND RETURNS FOR IRRIGATION SYSTEM
ONE MANZANA OF LAND

<u>Production and Revenue</u>	<u>Dryland</u>	<u>Irrigated</u>
Rice yield	50 qq	90 qq
Rice price/qq	L. 20.00	L. 20.00
Cane yield	65 tons	85 tons
Cane price/ton	L. 24.00	L. 24.00
Gross Income	L. 2,560.00	L. 3,840.00
<u>Variable Costs</u>		
Rice labor	L. 83.40	L. 198.15
Cane labor	102.00	158.00
Rice contracted services	244.50	394.50
Cane contracted services	660.50	818.50
Rice materials	315.75	415.75
Cane materials	<u>182.00</u>	<u>287.00</u>
Total Variable Cost	L. 1,588.15	L. 2,271.90
<u>Other Costs</u>		
Interest on operating capital	L. 70.25	L. 167.20
Ownership costs: Interest on investment	38.03	160.88
Depreciation	115.29	293.20
Maintenance	<u>4.02</u>	<u>221.33</u>
Total Other Costs	227.57	842.61
Total Cost	L. 1,815.72	L. 3,114.51
Net Income	L. 744.28	L. 725.49

PARTIAL BUDGETING
2D. CHECKLIST OF BUDGET CHANGES CAUSED BY
SELECTED INVESTMENTS

Investment	Labor Cost	Contracted Services Costs	Materials Cost	"Other Costs"	Production Profitability of other enterprise	Product Price Received/Unit	Change in enterprises
1. Improved seed (corn)	+	+	+	+	+	0	x
2. More fertilizer	+	+	+	+	+	0	x
3. Backpack sprayer/herbicide	+	-	+	/	+	0	x
4. Irrigation system	+	+	+	+	+	0	✓
5. Improved plow	-	-	0	+	0	+	0
6. Bullocks	+	-	0	+	0	+	0
7. Fence for crop fields	+	0	+	+	/	0	0
8. Feed concentrates (cattle)	+	0	+	0	+	0	0
9. Livestock immunization	+	0	+	0	/	0	0
10. Grain storage shed	0	0	+	+	0	0	+

CodeNotes on investments

+ increase
- reduction

0 no change

/ prevent losses

✓ yes

x no

3. Purchases own equipment and reduces weeding labor.

5. Plowing not contracted.

6. Purchases bullocks and ceases hiring; rents team out to others.

10. Construction costs excluded.

3A. PRESENT AND FUTURE VALUE -BASIC CONCEPTS

V_0 = Value in period zero (at the beginning)

V_1 = Value in period 1 (at the end of period 1)

V_n = Value in period n (at the end of period n)

r = Rate of interest, or rate of discount

PV = Present value

FV = Future value

Future Value

1. The value of \$1.00 invested now will yield \$1.12 at the end of one year, given a 12% interest rate:

$$FV = V_0 (1 + r)^n = 1.00 (1 + .12)^1 = 1.00 (1.12) = 1.12$$

2. The value of \$30 invested now will yield \$42.15 at the end of three years:

$$FV = V_0 (1 + r)^n = 30 (1 + .12)^3 = 30 (1.12)^3 = 30 (1.405) = 42.15$$

3. The value after three years of an investment at the beginning of each year for three years:

$$FV = V_0 (1 + r)^3 + V_1 (1 + r)^2 + V_2 (1 + r)^1 =$$

$$FV = 30 (1.12)^3 + 20 (1.12)^2 + 25 (1.12)^1 =$$

$$FV = 30 (1.405) + 20 (1.254) + 25 (1.12) =$$

$$FV = 42.15 + 25.08 + 28.00 = \$95.23$$

Present Value

1. The present value (PV) of \$1.00 received one year from today (r=12%):

$$PV = V_1 / (1 + r)^n = 1.00 / (1.12)^1 = \$0.893$$

2. The PV of \$15.00 received two years from today:

$$PV = V_2 / (1 + r)^n = 15.00 / (1.12)^2 = 15 / 1.25 = \$12.00$$

3. The PV of different amounts received at the end of each year:

$$PV = \frac{V_1}{(1+r)^1} + \frac{V_2}{(1+r)^2} + \frac{V_3}{(1+r)^3} =$$

$$PV = \frac{40}{(1.12)^1} + \frac{60}{(1.12)^2} + \frac{30}{(1.12)^3} =$$

$$PV = \frac{40}{1.120} + \frac{60}{1.254} + \frac{30}{1.405} =$$

$$PV = 35.71 + 47.84 + 21.35 = \$104.90$$

APPENDIX TABLE II
Present Value of \$1.00
 $V_n = \$1(1 + i)^{-n}$

n	.5%	.75%	1%	1.5%	2%	3%	4%	5%	6%	7%
1	.995	.993	.990	.985	.980	.971	.962	.952	.943	.935
2	.990	.985	.980	.971	.961	.943	.925	.907	.890	.873
3	.985	.978	.971	.956	.942	.915	.889	.864	.840	.816
4	.980	.971	.961	.942	.924	.888	.855	.823	.792	.763
5	.975	.963	.951	.928	.906	.863	.822	.784	.747	.713
6	.971	.956	.942	.915	.888	.837	.790	.746	.705	.666
7	.966	.949	.933	.901	.871	.813	.760	.711	.665	.623
8	.961	.942	.923	.888	.853	.789	.731	.677	.627	.582
9	.956	.935	.914	.875	.837	.766	.703	.645	.592	.544
10	.951	.928	.905	.862	.820	.744	.676	.614	.558	.508
11	.947	.921	.896	.849	.804	.722	.650	.585	.527	.475
12	.942	.914	.887	.836	.788	.701	.625	.557	.497	.444
13	.937	.907	.879	.824	.773	.681	.601	.530	.469	.415
14	.933	.901	.870	.812	.758	.661	.577	.505	.442	.385
15	.928	.894	.861	.800	.743	.642	.555	.481	.417	.362
16	.923	.887	.853	.788	.728	.623	.534	.458	.394	.339
17	.919	.881	.844	.776	.714	.605	.513	.436	.371	.317
18	.914	.874	.836	.765	.700	.587	.494	.416	.350	.296
19	.910	.868	.828	.754	.686	.570	.475	.396	.331	.277
20	.905	.861	.820	.742	.673	.554	.456	.377	.312	.256
24	.887	.836	.788	.700	.622	.492	.390	.310	.247	.197
25	.883	.830	.780	.689	.610	.478	.375	.295	.233	.184
30	.861	.799	.742	.640	.552	.412	.308	.231	.174	.131
35	.836	.764	.699	.585	.490	.345	.224	.173	.123	.085
40	.819	.742	.672	.551	.453	.307	.208	.142	.097	.067
48	.787	.699	.620	.489	.387	.242	.152	.096	.061	.039
50	.779	.688	.608	.475	.372	.238	.141	.087	.054	.034
50	.741	.639	.550	.409	.305	.170	.095	.054	.030	.017

APPENDIX TABLE II (Continued)

n	8%	9%	10%	11%	12%	13%	14%	15%	16%
1	.926	.917	.909	.901	.893	.885	.877	.870	.862
2	.857	.842	.826	.812	.797	.783	.769	.756	.743
3	.794	.772	.751	.731	.712	.693	.675	.658	.641
4	.735	.708	.683	.659	.636	.613	.592	.572	.552
5	.681	.650	.621	.593	.567	.543	.519	.497	.476
6	.630	.596	.564	.535	.507	.480	.456	.432	.410
7	.583	.547	.513	.482	.452	.425	.400	.376	.354
8	.540	.502	.467	.434	.404	.378	.351	.327	.305
9	.500	.460	.424	.391	.361	.333	.308	.284	.263
10	.463	.422	.386	.352	.322	.295	.270	.247	.227
11	.429	.388	.350	.317	.287	.261	.237	.215	.195
12	.397	.356	.319	.286	.257	.231	.208	.187	.168
13	.368	.326	.290	.258	.229	.204	.182	.163	.145
14	.340	.299	.263	.232	.205	.181	.160	.141	.125
15	.315	.275	.239	.209	.183	.160	.140	.123	.108
16	.292	.252	.218	.188	.163	.141	.123	.107	.093
17	.270	.231	.198	.170	.146	.125	.108	.093	.080
18	.250	.212	.180	.153	.130	.111	.095	.081	.069
19	.232	.194	.164	.138	.116	.098	.083	.070	.060
20	.215	.178	.149	.124	.104	.087	.073	.061	.051
24	.158	.126	.102	.082	.066	.053	.043	.035	.029
25	.146	.116	.092	.074	.059	.047	.038	.030	.024
30	.099	.075	.057	.044	.033	.026	.020	.015	.012
36	.063	.045	.032	.023	.017	.012	.009	.007	.005
40	.046	.032	.022	.015	.011	.008	.005	.004	.003
48	.025	.016	.010	.007	.004	.003	.002	.001	.001
50	.021	.013	.009	.005	.004	.002	.001	.001	.001
60	.010	.006	.003	.002	.001	.001	.000	.000	.000

3B. INVESTMENT ANALYSIS OF A PERENNIAL CROP

Objectives

1. Estimate costs and revenues for the life of a crop.
2. Determine when to replace the plantation with new stock.
3. Estimate investment profitability using present value techniques.

Procedures

1. Use the two attached coffee production budgets (establishment and maintenance) as guides to set up a long term cost and revenue schedule assuming constant input and product prices.
2. Use marginal revenue and marginal cost concepts to determine when a plantation should be replaced with new trees.
3. After learning present value concepts the participants should consult table of present value coefficients to calculate total discounted costs and benefits.

Results

1. The marginal annual cost of production exceeds the marginal annual revenues going into the ninth year, hence the plantation should be replaced after completion of the eighth year.
2. At the end of eight years the discounted benefit/cost ratio is 2.86 and the undiscounted ratio is 3.18, indicating the effect of discounting.

Supporting Material

1. Enterprise Budget No. 03328
2. Enterprise Budget No. 03321
3. Calculation of costs, revenues and income
4. Present values of incomes and costs

NATIONAL AGRICULTURE DEVELOPMENT BANK

BUDGET NUMBER 03328

Crop: Coffee - low yield - establishment only

Region: Olanchito

Prepared by: Juan Francisco Molina

Date: 10-12-79

Month	Labor (man-days A*)	Total Units	Lempiras/ Unit	Total Cost	
				1 st year	2 nd year
April	Land clearing	10	4.00	40.00	-
June	Deep cultivation	5	4.00	20.00	-
Aug	Weeding	6	4.00	24.00	-
Jan	Weeding	6	4.00	-	24.00
June	Weeding	6	4.00	-	24.00
<hr/> Other Contracted Services <hr/>					
May	Digging holes for seedlings	E*	.05	75.00	-
May	Transplanting	E*	.05	75.00	-
<hr/> Materials <hr/>					
May	Purchase seedlings	1,500	.10	150.00	-
Sub-total				384.00	48.00
<hr/> Other Costs <hr/>					
Interest: Annual investment capital-12%				30.20	4.56
Capital from preceding year-12%				-	49.70
Annual establishment cost				L. 414.20	L. 102.26
Total establishment cost				L. 516.46	

A* Man-day = 6 hours

E* Cost per seedling

NATIONAL AGRICULTURAL DEVELOPMENT BANK

BUDGET NO. 03321

Crop: Coffee, low yield, 10 quintals/ manzana

Region: Olanchito

Prepared by: Juan Francisco Molina

Date: 10-12-79

Month	Labor (man-days A*)	Total Units	Lempiras/ Unit	Total Cost
Jan	Weeding	6	4.00	24.00
June	Weeding	6	4.00	24.00
<u>Other Contracted Services</u>				
Dec	Harvesting	B*	20.00	200.00
Dec	Drying	B*	5.00	50.00
Jan	Transportation	B*	3.00	30.00
<u>SUB-TOTAL</u>				<u>L. 328.00</u>
<u>Other Costs</u>				
Interest: Annual Capital				10.34
Establishment Cost				30.99
Payment of 10% of Establishment Cost				<u>51.65</u>
Ownership costs: Interest				.54
Depreciation				<u>4.50</u>
<u>Total Production Cost</u>				<u>L. 426.02</u>

B* = Fixed cost/quintal

CALCULATION OF COST, REVENUE AND INCOME
ANALYSIS OF INVESTMENT IN A COFFEE PLANTATION
OLANCHITO REGION, LOW TECHNOLOGY

Year	Production	Price/qq	Gross Revenue	Marginal Revenue	Total Cost	Marginal Cost	Net Income
1	0	150	0		414		-414
2	0	150	0	0	102		-102
3	6	150	900	900	314	212	586
4	10	150	1500	600	426	112	1074
5	12	150	1800	300	482	56	1318
6	15	150	2250	450	566	84	1684
7	15	150	2250	0	566	0	1684
8	15	150	2250	0	566	0	1684
9	12	150	1800	-450	482	-84	1314
10	8	150	1200	-600	370	-112	830
11	6	150	900	-300	314	-56	586
12	4	150	600	-300	258	-56	342
13	4	150	600	0	206	0	394
14	4	150	600	0	206	0	394

COFFEE: OLANCHITO REGION
PRESENT VALUES OF INCOMES AND COSTS

Year	12% Discount Coefficient	Gross Revenue		Total Cost	
		Not Discounted	Discounted	Not Discounted	Discounted
1	.893	0		414	369
2	.797	0		102	81
3	.712	900	640	314	223
4	.636	1500	954	426	270
5	.567	1800	1020	482	273
6	.507	2250	1140	566	286
7	.452	2250	1017	566	255
8	.404	2250	909	566	228
9	.361	1800	649	482	174
10	.322	1200	386	370	119
11	.287	900	258	314	90
12	.257	600	154	258	66
13	.229	600	137	206	59
14	.205	600	123	206	52
TOTALS (through 8th year)		10,950	5680	3436	1985

B/C Ratio (Not Discounted) = L. 10,950 ÷ L. 3,436 = 3.18

B/C Ratio (Discounted) = L. 5,680 ÷ L. 1,985 = 2.86

Benefits-Costs (Discounted) = L. 5,680 ÷ L. 1,985 = L. 3,695

4A. ANALYSIS OF INVESTMENT IN A GRAIN STORAGE SHED

Objectives

1. Estimate the profitability of the investment, with and without present value concepts.
2. Determine an appropriate loan repayment period.

Description of the Structure

Floor area: 100 square meters
 Construction: Brick/adobe, sheet metal or sheet asbestos roof, elevated floor
 Capacity: 250 quintals of corn grain on the ear (in husk) and 75 quintals of shelled beans in sacks, plus miscellaneous farm equipment. This capacity is adequate for a five-manzana farm, double cropped in corn and beans.

Assumptions about the structure

Useful life = 20 years
 Initial cost = L. 2000
 Residual value = zero
 Maintenance cost = L. 100/year
 Depreciation = L. 100/year (straight line)
 Rate of interest = 12%
 Cost of chemicals to protect grain from insects = L. 100/year

Other Assumptions

1. Existing storage technology is assumed
2. Storage losses are known, with and without the shed
3. Product prices are known and constant (by month) for 20 years.
4. The schedules of grain sales with and without the shed, are as indicated, and remain as such for 20 years.

Supporting Material

1. Estimation of sales and storage losses—— corn
2. Estimation of sales and storage losses—— beans
3. Change in opportunity cost
4. Summary of benefits
5. Present value of benefits and costs
6. Summary of the investment

ESTIMATION OF SALES AND STORAGE LOSSES

CORN

I. WITHOUT STORAGE SHED, PRODUCTION OF 250 QUINTALS

Month	Quintals			Lempiras		
	Quantity Stored	Sales	Losses	Price L/qq	Gross Revenue	Value of Losses
Jan	100.00	150	1.0	12	1,800	12.00
Feb	99.00	0	1.0	13	-	13.00
Mar	98.0	0	1.0	14	-	14.00
Apr	47.0	50	0.5	15	750	7.50
May	46.5	0	0.5	16	-	8.00
June	46.0	0	0.5	17	-	8.50
Jul	45.5	45	0.5	18	810	9.00
Aug	0	0	-	19	-	-
Sept	0	0	-	20	-	-
TOTALS		245	5.0		3,360	72.00

II. WITH STORAGE SHED

Month	Quantity Stored	Sales	Losses	Price L/qq	Gross Revenue	Value of Losses
Jan	250.0	-	2.5	12	-	30.00
Feb	247.5	-	2.5	13	-	32.50
Mar	245.0	-	2.5	14	-	35.00
Apr	242.5	-	2.5	15	-	37.50
May	240.0	-	2.5	16	-	40.00
June	237.5	-	2.5	17	-	42.50
Jul	235.0	-	2.5	18	-	45.00
Aug	232.5	-	2.5	19	-	47.00
Sept	230.0	230	-	20	4,600	-
TOTALS		230	20.0		4,600	310.00

ESTIMATION OF SALES AND STORAGE LOSSES

BEANS

I. WITHOUT STORAGE SHED, PRODUCTION OF 75 QQ

Month	Quintals			Lempiras		Value of Losses
	Quantity Stored	Sales	Losses	Price L/qq	Gross Revenue	
Jan	75.0	-	1.0	22	-	22.00
Feb	34.0	40	0.5	25	1,400	12.50
Mar	33.5	-	0.5	28	-	14.00
Apr	33.0	15	0.5	30	450	15.00
May	17.5	-	0.5	30	-	15.00
June	17.0	-	0.5	35	-	17.50
Jul	16.5	16	0.5	40	640	20.00
Aug	0	-	-	50	-	-
Sept	0	-	-	65	-	-
Oct	0	-	-	70	-	-
TOTALS		71	4.0		2,490	116.00

II. WITH STORAGE SHED

Month						
Jan	75	-	1.0	22	-	22.00
Feb	74	-	1.0	25	-	25.00
Mar	73	-	1.0	28	-	28.00
Apr	72	-	1.0	30	-	30.00
May	71	-	1.0	30	-	30.00
June	70	-	1.0	35	-	35.00
Jul	69	-	1.0	40	-	40.00
Aug	68	-	1.0	50	-	50.00
Sept	67	-	1.0	65	-	65.00
Oct		66	-	70	4,620	-
TOTALS		66	9.0		4,620	325.00

CHANGE IN OPPORTUNITY COST¹⁾

(Rate of Interest = 12%)

I. CORN

Month	With Storage Shed		Without Storage Shed		Difference
January	30.00	-	12.00	=	18.00
February	32.18	-	12.87	=	19.31
March	34.30	-	13.72	=	20.58
April	36.38	-	7.05	=	29.33
May	38.40	-	7.44	=	30.96
June	40.29	-	7.82	=	32.47
July	42.30	-	8.19	=	34.11
August	44.17	-	0.00	=	44.17
September	0	-	0	=	0
Total					228.93

January: (250 qq) (L.12) (0.01) = L.30 (with shed)
 (100 qq) (L.12) (0.01) = L.12 (without shed)

II. BEANS

Month					
January	16.50	-	16.50	=	0.00
February	18.50	-	8.50	=	10.00
March	20.44	-	9.38	=	11.06
April	21.60	-	9.90	=	11.70
May	21.30	-	5.25	=	16.05
June	24.50	-	5.95	=	18.55
July	27.60	-	6.60	=	21.00
August	34.00	-	0	=	34.00
September	43.55	-	0	=	43.55
Total					165.91

¹⁾ Opportunity cost of grain in storage can be thought of as the interest the farmer could earn on the money he could get for his grain. Alternatively, it is the interest charged on his Bank loan which he cannot repay until he sells his grain.

GRAIN STORAGE SHED

Summary of Benefits

	YEAR																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Change in Gross Revenue (ΔI)																				
Corn	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240	1240
Beans	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130
Total	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370	3370
Change in Costs (ΔC)																				
Depreciation	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Maintenance	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Chemicals	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Interest on Investment	240	228	216	204	192	180	168	156	144	132	120	108	96	84	72	60	48	36	24	12
Opportunity Cost	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395	395
Δ value of losses, corn	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238	238
Δ value of losses, loans	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209
Total	1382	1370	1358	1346	1334	1322	1310	1298	1286	1274	1262	1250	1238	1226	1214	1202	1190	1178	1166	1154
Difference ($\Delta I - \Delta C$)	1988	2000	2012	2024	2036	2048	2060	2072	2084	2096	2108	2120	2132	2142	2156	2168	2180	2192	2204	2216
Loan repayment	1000	1000																		
Capital	240	120																		
Interest	1240	1120																		
Total																				
Δ Net Income	748	920	2012	2024	2036	2048	2060	2072	2084	2096	2108	2120	2132	2144	2156	2168	2180	2192	2204	2216

* / means "change in"

ECONOMIC ANALYSIS OF INVESTMENT IN A GRAIN STORAGE SHED

PRESENT VALUE OF BENEFITS AND COSTS

Year	12% discount Coefficient	△ Benefits		△ Costs	
		Not Discounted	Discounted	Not Discounted	Discounted
1	.893	3370	3009	2622*	2141
2	.797	3370	2686	2490*	1985
3	.712	3370	2399	1358	967
4	.636	3370	2143	1346	856
5	.567	3370	1911	1334	756
6	.507	3370	1709	1322	670
7	.452	3370	1523	1310	592
8	.404	3370	1361	1298	524
9	.361	3370	1217	1286	464
10	.322	3370	1085	1274	410
11	.287	3370	967	1262	362
12	.257	3370	866	1250	321
13	.229	3370	772	1238	284
14	.205	3370	691	1226	251
15	.183	3370	617	1214	222
16	.163	3370	549	1202	196
17	.146	3370	492	1130	165
18	.130	3370	438	1178	153
19	.116	3370	391	1166	135
20	.104	3370	350	1154	120
TOTALS		67,400	25,176	27,660	11,774

* Includes loan and interest repayment.

SUMMARY OF PROFITABILITY OF THE INVESTMENT
IN A GRAIN STORAGE SHED

1. Benefit/Cost Ratio

a. Not discounted

$$\frac{\Sigma \Delta B}{\Sigma \Delta C} = \frac{67,400}{27,660} = 2.44$$

b. Discounted

$$\frac{\Sigma \Delta B}{\Sigma \Delta C} = \frac{25,176}{11,774} = 2.14$$

2. Benefits minus costs

a. Not discounted

$$\Sigma \Delta B - \Sigma \Delta C = 67,400 - 27,660 = \text{L. } 39,740$$

b. Discounted

$$\Sigma \Delta B - \Sigma \Delta C = 25,176 - 11,774 = \text{L. } 13,402$$

4B. MARKETING STRATEGY FOR STORED GRAIN

Objectives

1. Determine which month to sell grain to maximize net income when market price is known.
2. Determine how to calculate the minimum unit grain price required to store grain another month (market price unknown).

Assumptions

1. Storage losses are known;
2. All grain is sold at one time;
3. Opportunity cost is 12% per year, or 1% per month
4. The only variable cost of storing grain is opportunity cost.
5. Grain held for any other purpose than sale (i.e., seed, consumption) is not considered.

Examples

1. The participant learns to calculate net income each month. Net income is at a maximum in September.
2. Since prices are usually unpredictable the producer could take a more realistic approach and calculate the minimum unit price required to justify keeping the grain stored another month. He can then compare the required price to his subjective estimate of what the price will be and decide whether or not to sell. In July, for example, the producer calculates that he must receive a unit price of at least L. 18.19 in August to justify storing the corn that much longer.

Limitations

1. Producers rarely can estimate their grain losses to spoilage,

insects, sprouting, etc., while it is in storage.

2. Producers usually sell at least part of their grain when they need cash -- not when prices are high.

Supporting Material

1. Determination of when to sell stored corn when market price is predictable.
2. Determination of when to sell stored corn when market price is unknown.
3. Calculation of the unit price required to store corn another month.

EXAMPLE 1: DETERMINATION OF WHEN TO SELL STORED CORN WHEN MARKET PRICE IS PREDICTABLE

Assumptions: High grain losses in storage
 Rate of opportunity cost = 12%
 Initial storage quantity = 250 quintals

Month	Accumulated ¹ Storage Losses (quintals)	Quantity ² Available For Sale (quintals)	Market ³ Price/ quintal (Lempiras)	Potential ⁴ Gross Revenue (Lempiras)	Opportunity ⁵ Cost (Lempiras)	Accumulated ⁶ Opportunity Cost (Lempiras)	Total ⁷ Net Income (Lempiras)
Jan.	0.0	250.0	12	3,000.00	30.00	30.00	2,970
Feb.	0.5	249.5	13	3,243.50	32.43	62.43	3,181
Mar.	1.0	249.0	14	3,486.00	34.86	97.29	3,389
Apr.	2.0	248.0	15	3,720.00	37.20	134.49	3,586
May	3.5	246.5	16	3,944.00	39.44	173.93	3,770
June	5.5	244.5	17	4,156.50	41.56	215.49	3,941
July	9.0	241.0	18	4,338.00	43.38	258.87	4,079
Aug.	14.0	236.0	19	4,485.00	44.84	303.71	4,180
Sep.	19.0	231.0	20	4,620.00	46.20	349.91	4,270*
Oct.	27.0	223.0	20	4,460.00	44.60	394.51	4,065
Nov.	33.0	217.0	19	4,123.00	41.23	435.74	3,687
Dec.	38.0	212.0	15	3,180.00	31.80	467.54	2,712

¹ Assumed

² Initial quantity stored minus column (1)

³ Assumed

column (2) multiplied by column (3)

of column (4), i.e., 1% per month = 12% per

accumulation of column (5)

column (4) minus column (6)

EXAMPLE 2: DETERMINATION OF WHEN TO SELL STORED CORN WHEN MARKET PRICE IS UNKNOWN

Year	Gross Revenue	Marginal Revenue	Marginal Cost ^{1/}	Price required/quintal to Store grain another month ^{2/}
Jan.	3,000	243	32.43	11.89 in February
Feb.	3,243	243	34.86	12.88 in March
Mar.	3,486	234	37.20	13.91 in April
Apr.	3,720	224	39.44	14.93 in May
May	3,944	212	41.56	15.96 in June
June	4,156	182	43.38	17.48 in July
July	4,338	146	44.84	18.19 in August
Aug.	4,484	136	46.20	19.21 in September
Sep.	4,620	-160	44.60	20.52 in October
Oct.	4,460	-337	41.23	20.36 in November
Nov.	4,123	-943	31.80	19.30 in December
Dec.	3,180			

^{1/} Equal to opportunity cost in this case.

^{2/} Formula: $\text{Revenue}_1 - (\text{Price}_2 \times \text{Quantity}_2) = \text{Marginal Cost}_{1,2}$

$$\begin{array}{ccccccc}
 300 & - & (11.89 & \times & 249.5) & = & 32.43 \\
 \text{(Jan)} & & \text{(Feb)} & & \text{(Feb)} & & \text{(Jan-Feb)}
 \end{array}$$

EXAMPLE 2: CALCULATION OF THE UNIT PRICE REQUIRED TO KEEP
CORN STORED ANOTHER MONTH

Period	Revenue	- (Price ₂ X Quantity ₂) = MC ₁₋₂	Price/qq
Jan-Feb	3,000	- (P _{Feb} X 249.5) = 32.43	L. 11.89
Feb-Mar	3,243	- (P _{Mar} X 249.0) = 34.86	L. 12.88
Mar-Apr	3,486	- (P _{Apr} X 248.0) = 37.20	L. 13.91
Apr-May	3,720	- (P _{May} X 246.5) = 39.44	L. 14.93
May-June	3,944	- (P _{Jun} X 244.5) = 41.56	L. 15.96
June-July	4,156	- (P _{Jul} X 241.0) = 43.38	L. 17.48
July-Aug	4,338	- (P _{Aug} X 236.0) = 44.84	L. 18.19
Aug-Sep	4,484	- (P _{Sep} X 231.0) = 46.20	L. 19.21
Sep-Oct	4,620	- (P _{Oct} X 223.0) = 44.60	L. 20.52
Oct-Nov	4,460	- (P _{Nov} X 217.0) = 41.23	L. 20.36
Nov-Dec	4,123	- (P _{Dec} X 212.0) = 31.80	L. 19.30

5. INVESTMENT IN LIVESTOCK ENTERPRISES
by Kurt Rockeman

A. ENTERPRISE BUDGETS FOR CATTLE

This is a discussion of the nature of cattle operations and preparation of enterprise budgets. The particular characteristics discussed include: 1) the unit produces a variety of products, 2) annual operating expenses are relatively low, and 3) the costs associated with the investment in livestock, equipment and buildings are relatively high.

1. Total Production and Estimated Income

This section is a discussion of the base information required to estimate total production and estimated income.

(a) Production

To estimate production the following information is required:

1. Number of mature cows in the operation.
2. Inventory of livestock by age and sex.
3. Number of calves born in a year.
4. Number of animals who die in a year.
5. Length of lactation and average daily milk production (dairy).

(b) Estimated Income

To estimate income resulting from the production the following information is required.

1. Number of animals sold during the year by sex, age, and weight.
2. Prices per unit of product sold.
3. Amount of milk products sold.

2. Production Costs

In this section all the factors influencing production costs are explained by category.

a. Labor

Labor is identified by man-months according to classification (common, manager) and the corresponding monthly wage by activity.

b. Materials

Materials are identified by type and quantity if possible.

Such items as supplemental feed are detailed, while general items such as veterinary products are the average value of normal expenditures for the operation. Maintenance costs as estimated in the inventory of equipment and improvements are also included here.

c. Other Costs

The items included under other costs are interest on operating and investment capital, depreciation of equipment and improvements.

(1) Interest on Annual Operating Capital

Interest on Annual Operating Capital is calculated by summing the labor and materials costs, dividing by two to calculate average capital, and multiplying by the rate of interest. The principle of "average capital" is explained in detail.

(2) Interest on Livestock Investment Capital

Livestock investment is calculated using the livestock inventory obtained earlier. Total Livestock Investment reflects the value of the livestock owned at any given point in time. Sucking calves are not included because they are essentially a product. Total Livestock Investment is multiplied by the interest rate to obtain

the interest on Livestock Investment Capital.

(3) Interest on Equipment and Improvement Capital

To calculate these costs it is necessary to take an inventory of the equipment and improvements existing in the operation. A list of all equipment and improvements is made containing the number of items, Initial Cost, Salvage Value, Useful Life, and Annual Maintenance Costs for each item. Interest on Equipment and Improvement Capital is the sum of the interest costs calculated for each item. For each item, interest costs are calculated as:

$$\text{Interest} = \frac{(\text{Initial Cost} - \text{Salvage Value} + \text{Salvage Value}) \times i}{2}$$

In this manner interest is calculated on the average capital invested in these Items.

(4) Depreciation of Equipment and Improvements

Annual depreciation of each of the items is summed to provide total annual depreciation. Annual depreciation for each item is simple straight-line calculated as:

$$\frac{\text{Initial Cost} - \text{Salvage Value}}{\text{years of useful life}}$$

The sum of each of these categories is entered under "other costs" on the first page (front) of the budget, while the calculations are based on information contained on the second page. Finally, the totals are divided by the operating size to estimate costs and returns on a per-animal basis. This facilitates calculation of costs and returns for various herd sizes.

3. Summary

Each livestock budget is synthesized from a sample of at least five producers, and is meant to serve as a guide for estimating individual costs and financial analysis. Financial analysis of livestock loans is most often done on a partial budgeting basis, using the master budgets as a base for estimating the differences in income and expenses resulting from a change in the operation.

BANCO NACIONAL DE DESARROLLO AGRICOLA

LIVESTOCK BUDGET NO. 05053

Enterprise: 1000 Feeders - 6 months

Region: Choluteca y Valle

Prepared by: Clemente Meraz Cruz

EQUIPMENT AND IMPOROVEMENTS FOR 1000 FEEDER UNIT

Detail	No. Units	Initial Cost	Salvage Value	Useful Life	Interest	Depreciation	Maintenance
Materials	—	100	—	3 years	7.00	33.33	—
Tools	—	500	—	10 years	35.00	50.00	—
Feed Bunks	10	3,500	500	15 years	280.00	200.00	50
Tractor	0.5	16,100	1,611	10 years	1,280.73	1,448.90	650
Pickup	0.5	6,200	620	5 years	4,477.40	1,116.00	400
Improved Pasture	—	20,000	20,000	20 years	7,700.00	3,500.00	4,000
Horses	4	1,500	200	6 years	119.00	216.66	120
Corrals	—	200	—	6 years	14.00	20.00	10
Fences B*	—	13,720	3,000	5 years	1,170.40	2,144.00	1,000
Annual Total					11,073.53	8,728.89	6,230
÷ 2 =	6 Month Total				5,536.76	4,364.45	3,115
Total/Animal					5.54	4.36	3.12

NOTES:

A* 280 Hectares of land with 14,000 meters of fence

B* Each feeder weighs 450 lbs at L. 54/pound

BANCO NACIONAL DE DESARROLLO AGRICOLA
LIVESTOCK BUDGET NO. 05053

Enterprise: 1000 Feeders - 6 months
Region: Choluteca y Valle
Prepared by: Clemente Meraz Cruz

PRODUCTION

Product	Units Sold	Detail	Price L.	Total Income	Income /Animal
Feeders	980	666 lbs.	.64	417,715.20	417.72

PRODUCTION COSTS

LABOR (Man-Months)	Total Units	L/ Unit	Total Cost	Cost /Animal
Common Laborers	36	120.00	4,320.00	4.32
Foreman	6	150.00	900.00	.90
Manager	6	500.00	3,000.00	3.00

MATERIALS

Purchase of Feeders - A*	1,000	247.50	247,500.00	247.50
Salt and Minerals	—	—	1,300.00	1.30
Vaccines (2)	—	—	1,000.00	1.00
Livestock Spray	—	—	720.00	.72
Vitamins	—	—	490.00	.49
Urea	358 qq	29.75	10,650.00	10.65
Molasses	2220 barr.	20.62	45,830.00	45.83
Fuel and Lube	—	—	2,280.00	2.28
Maintenance of Equipment and Improvements	—	—	3,115.00	3.12

OTHER COSTS

Interest: Operating Capital - 14%	2.58	2,576.53	2.58
Feeders Purchased - 18%	22.27	22,274.00	22.27
Investment in Equipment and Improvements	5.54	5,536.76	5.54
Depreciation: Equipment and Improvements	4.36	4,364.45	4.36

TOTAL PRODUCTION COSTS

355,866.74 355.87

NET INCOME

61,848.46 61.85

BANCO NACIONAL DE DESARROLLO AGRICOLA

LIVESTOCK BUDGET NO. 05032

Enterprise: 100 Cow Dual Purpose
 Region: Choluteca y Valle
 Prepared by: Clemente Meraz Cruz

ANNUAL PRODUCTION

Product	Units Sold	Detail	Price (L)	Total Income	Income /Cow
Milk	83,160	Bottle	.31	25,779.60	257.80
Bull Calves	33	380 lbs	.53	6,646.20	66.46
Heifer Calves	20	340 lbs	.53	3,604.00	36.04
Cull Cows	11	900 lbs	.74	7,326.00	73.26
Herd Bull	.6	1280 lbs	.74	568.32	5.68
Total Estimated Income				43,924.12	479.24

PRODUCTION COSTS

LABOR (Man-Months)	Total Units	L/ Unit	Total Cost	Cost /Cow
Milkers	36	135.00	4,860.00	48.60
Common Laborers	12	120.00	1,440.00	14.40
Manager	12	300.00	3,600.00	36.00

MATERIALS

Salt and Minerals	A*	4.50	450.00	4.50
Veterinary Products and Medicines	A*	6.70	670.00	6.70
Supplemental Feed (Sugar Cane)	180 cwt.	1.20	216.00	2.16
Maintenance of Equipment and Improvements	—	—	1,747.00	17.47

OTHER COSTS

Interest: Operating Capital - 14%		778.98	7.79
Livestock Investment Capital - 14%		11,396.00	113.96
Investment in equipment and improvements - 14%		2,879.10	28.79
Depreciation: Equipment and Improvements		1,836.00	18.36
TOTAL PRODUCTION COSTS		29,873.08	298.73
NET INCOME		14,051.04	140.51

BANCO NACIONAL DE DESARROLLO AGRICOLA

LIVESTOCK BUDGET NO. 05032

Enterprise: 100 Cow Dual Purpose
 Region: Cholteca y Valle
 Prepared by: Clemente Meraz Cruz

LIVESTOCK INVESTMENT

Type of Animal	No. Units	Value /Unit	Total Investment	Investment /Cow
Cows	100	700	70,000	700
Heifers	13	300	3,900	39
Herd Bulls	3	2,500	7,500	75
TOTAL INVESTMENT			81,400	814

EQUIPMENT AND IMPROVEMENTS FOR 100 COW UNIT

Detail	No. Units	Initial Cost	Salvage Value	Useful Life	Interest	Depreciation	Maintenance
Materials and Tools B*	—	800		10 years	56.00	80	—
Backpack Sprayer	1	210	20	5 years	16.10	38	5
Water Tank	—	500	50	15 years	38.50	30	10
Horses	3	1,200	150	5 years	94.50	210	108
Improved Pasture	—	20,000	5,000	20 years	1,750.00	750	1,000
Well	1	2,000	500	20 years	175.00	75	—
Milk House	1	1,200	240	20 years	100.80	48	24
Fences and Corrals C*	—	8,260	1,000	12 years	648.20	605	600
Annual Total					2,879.10	1,836	1,747
+ = Total/Cow					28.79	18.36	17.47

Annual Rates

Weaning	66%	Death	2%
Replacement	13%	Bull/Cow	1/33

NOTES: Milk: 6 Bottles per day for 210 days
 Supplemental Feed 3 lbs per day per cow for 60 days

A* Cost per cow

B* Includes all types of small tools

C* 70 Hectares divided into 14 pastures

B. EXERCISE IN ESTIMATING CATTLE BUDGETS

Objective:

The objective of the exercise is to give the participants practice in ordering the basic information for livestock operations so as to calculate estimated costs and returns.

Given

1. <u>Cattle Inventory</u>	<u>No. Units</u>	<u>Value/ Unit</u>
Cows	100	L. 800.00
Heifers	12	400.00
Bulls	4	2,500.00
70% Birth rate		
12% Replacement rate		
3% Mortality - mature animals		
Lactation: 210 days		
Milk Production: 5 bottles/day		
2. <u>Products Sold</u>	<u>Detail</u>	<u>Price</u>
Milk	Bottle	.30
Bull calf	350 lbs	.57
Heifer calf	310 lbs	.57
Cull cow	850 lbs	.68
Bull	1200 lbs	.70
Bulls are sold every 5 years.		
3. <u>Labor Force</u>	<u>Salary/Month</u>	
3 milkers	120.00	
2 cowboys	100.00	
4 common laborers	90.00	
1 foreman	175.00	
4. <u>Materials</u>	<u>Details</u>	<u>Price</u>
Salt and minerals	100 cwt	L. 16.00/cwt
Veterinary products	per cow	6.00
Supplemental feed (sugar cane)	200 cwt	1.20/cwt

5. Equipment and Improvements

<u>Detail</u>	<u>No. Units</u>	<u>Initial Cost</u>	<u>Salvage Value</u>	<u>Useful Life</u>	<u>Annual Maintenance</u>
Tools	—	300.00	-0-	5 years	-0-
Materials	—	200.00	-0-	4 years	-0-
Sprayer	2	400.00	50.00	5 years	40.00
Milk Pails	4	360.00	60.00	10 years	-0-
Milk Cans	4	40.00	-0-	2 years	-0-
Horses	2	1400.00	200.00	10 years	100.00
Milking Barn	1	3000.00	500.00	20 years	100.00
Fences and Corrals *	—	6615.00	500.00	20 years	100.00

* 105 hectares, 4 pastures, 7350 meters of four wire fence.
Interest Rate = 14%

Assignment

1. Order the information on the work sheet to estimate the total income and total expenses for the operation.
2. Estimate total income, total expense, and net income per cow.

BANCO NACIONAL DE FOMENTO

LIVESTOCK BUDGET NO. _____
 DE GANADERIA NO. _____

Enterprise _____

Region: _____

Prepared by: _____

PRODUCTION

Type of Product	Units Sold	Detail	Price (L.)	Total Income
Estimated Total Income				

PRODUCTION COSTS

LABOR (Man-Months)	Total Units	L/ Unit	Total Cost

MATERIALS

OTHER COSTS

Interest:	
Depreciation:	
Total Production Costs	

INVESTMENT IN EQUIPMENT AND BUILDINGS

No. of Units	Detail	Initial Cost	Salvage Value	Useful Life	Interest	Depre- ciation	Maintenance
		Totals					
		Total/Animal					

APPENDIX C

TRAINING COURSE IN FARM RECORDS

The training course consists of sample entries recorded on pages from the record book entitled "El Libro de Contabilidad Para Empresas Agropecuarias." The attached example includes inventory, cash flow, balance sheet and income statements corresponding to the record book entries.

CASH RECEIPTS FROM CROPS

Line	DATE	DESCRIPTION	UNITS	QUAN- TITY	C R O P S			
					CORN	BEANS	TOMATOES	
1	4/16	Sold @ \$4.00/Box	Boxes	75			300.00	
2	4/24	Sold @ \$3.40/Box	"	300			1170.00	
3	4/30	Sold @ \$3.00/Box	"	500			1,500.00	
4								
5	5/7	Sold @ \$2.50/Box	"	375			937.50	
6	5/14	Sold @ \$2.00/Box	"	235			470.00	
7	5/21	Sold @ \$1.50/Box	"	120			180.00	
8								
9	9/15	Sold @ \$10.00/qr	qr	440	4,400.			
10								
11	12/10	Sold @ \$25/qr	qr	55	1,375.			
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
TOTALS					4,400.0	1,375.	4,577. ⁵⁰	

CASH RECEIPTS FROM LIVESTOCK AND LIVESTOCK PRODUCTS

Line	DATE	DESCRIPTION	UNITS	QUAN- TITY	L I V E S T O C K				
					CATTLE	HOGS	POULTRY	HORSES	OTHER
1	2/10	Sold hogs @ \$100.00 each	each	6		600.00			
2									
3	2/2	Sold calves @ \$200.00 each	each	2	400.00				
4	4/17	Sold hogs @ \$70.00 each	each	7		490.00			
5	4/28	Sold milk @ \$0.45/liter	liter	100					45.00
6									
7	7/12	Sold milk	liter	100					45.00
8									
9	8/10	Sold milk	liter	100					45.00
10									
11	9/8	Sold milk	liter	100					45.00
12									
13	10/11	Sold milk	liter	100					45.00
14									
15	11/10	Sold milk	liter	100					45.00
16									
17	12/6	Sold milk	liter	100					45.00
18									
19									
20									
21									
22									
TOTALS					400.00	1830.00			315.00

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OTHER CASH RECEIPTS

Line	DATE	DESCRIPTION	MISC. SALES	OTHER RECEIPTS	LOANS
1	4/10	Bank loan for seed preparation and input purch			1,175. ⁰⁰
2					
3	6/1	Bank loan for materials purchases			175. ⁰⁰
4					
5	9/2	Bank loan for harvest			530. ⁰⁰
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
TOTALS					2,400. ⁰⁰

CASH EXPENSES FOR CROPS

Line	DATE	DESCRIPTION	UNITS	QUAN- TITY	CULTIVATION			
					10 MZ	5 MZ	1 MZ	
					COIN	BEANS	TOMATOES	
1	1/3	contract plowing 3 20/11z	MZ	1			20.00	
2	1/4	contract disking (2,755oz)	MZ	1			20.00	
3	1/5	Purchase seed	lb.	1			35.00	
4	1/7	Pay water quota	-				2.00	
5	1/15	Pay water quota	-				2.00	
6	1/16	Purchase Tomanon	liters	2			65.00	
7	1/16	Purchase Dithane M-45	lbs.	8			36.80	
8	1/16	Purchase Metasystox	liters	2			45.00	
9	1/16	Purchase fertilizer 12/23/12	quintal	3			69.00	
10	1/25	Pay water quota	-				2.00	
11								
12	2/1	Purchase Lannate	lbs	2			65.00	
13	2/5	Pay water quota	-				2.00	
14	2/7	Purchase Antracol	lbs	6			35.20	
15	2/14	Pay water quota	-				2.00	
16	2/14	Purchase fertilizer 5-15-15	quintal	3			69.00	
17	2/21	Pay water quota	-				2.00	
18								
19	3/4	Purchase ammonium nitrate	quintal	3			60.00	
20	3/4	Purchase Dithane M-45	lbs	8			36.80	
21								
22								
TOTALS								

CASH EXPENSES FOR CROPS

Line	DATE	DESCRIPTION	UNITS	QUAN- TITY	CULTIVATION				
					10 MZ	5 MZ	1 MZ		
					CORN	BEANS	TOMATOES		
1	3/4	Purchase Metasytox	Litres	2				40.00	
2	3/10	Pay water quota	-					2.00	
3	3/27	Pay water quota	-					2.00	
4									
5	4/1	Pay water quota	-					2.00	
6	4/3	Pay water quota	-					2.00	
7	4/4	Contract plowing, 2 hrs/MZ	MZ	10	240 ⁰⁰				
8	4/10	Contract disking 2 passes	MZ	10	240 ⁰⁰				
9	4/17	Purchase improved seed	lbs	250	100 ⁰⁰				
10	4/17	Purchase fertilizer (Amuk)	kg	20	460 ⁰⁰				
11	4/18	Pay water quota	-					2.00	
12	4/26	Pay water quota	-					2.00	
13									
14	5/1	Seed out fertilizer (Amuk)	MZ	10	145 ⁰⁰				
15	5/7	Pay water quota	-					2.00	
16									
17	6/13	Purchase Gesapron 80	Kg	20	200 ⁰⁰				
18	6/14	Purchase Urea	kg	15	334 ⁰⁰				
19	6/14	Purchase Lavente (Amuk)	MZ	50	100 ⁰⁰				
20	6/14	Purchase Dipterox 200 /MZ	Kg	2	35 ⁰⁰				
21									
22									
TOTALS									

CASH EXPENSES FOR CROPS

Line	DATE	DESCRIPTION	UNITS	QUAN- TITY	CULTIVATION					
					10 MZ CORN	5 MZ BEANS	1 MZ TOMATOES			
1	8/20	Plowing - contracted	MZ	5		50.00				
2	8/22	Purchase seed	lbs	250		112.50				
3										
4	9/14	Contract plowing - 1st time	MZ	5		50.00				
5	9/14	Contract 2nd time plowing	MZ	5		50.00				
6	9/20	Contract cultivation & bullet	MZ	5		150.00				
7	9/29	Purchase Seed	lbs	125		81.25				
8	9/29	Purchase Ortho-B	lbs	150.0		150.00				
9	9/30	Machine corn shelling	hours	10	500.00					
10										
11	10/6	Purchase Lardate	lbs	1.88		60.00				
12										
13	12/5	Track Freight	days	5		22.50				
14										
15										
16										
17										
18										
19										
20										
21										
22										
TOTALS						2,354.00	666.25	600.80		

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CASH EXPENSES FOR LIVESTOCK AND LIVESTOCK PRODUCTS

Line	DATE	DESCRIPTION	UNITS	QUAN- TITY	L I V E S T O C K				
					CATTLE	HOGS	POULTRY	HORSES	OTHER
1	6/3	Purchase vaccine	each	8	25 ⁰⁰				
2	6/3	Purchase insecticide	each	19	14 ⁰⁰				
3	6/8	Purchase vaccine	each	8		25 ⁰⁰			
4									
5	12/5	Purchase vaccine	each	7		22 ⁰⁰			
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
TOTALS					65 ⁰⁰	47 ⁰⁰			

HOUSEHOLD CASH EXPENSES

Line	DATE	DESCRIPTION	Total Expenses	Food	Medical	portation	Other
1	Jan	Household expenses	125	85	15	15	
2	Feb	" " reduction	200	85		15	100
3	Mar	" "	90	80	10		
4	Apr	" "	105	90		15	
5	May	" "	85	85			
6	June	" "	120	90	20	10	
7	July	" "	80	80			
8	Aug	" "	120	95		15	30
9	Sept	" "	85	85			
10	Oct	" "	100	90	10		
11	Nov	" "	105	85		20	
12	Dec	" "	155	90		15	50
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
TOTALS			1,370				

LABOR (IN HOURS)

Line	DATE	DESCRIPTION OF ACTIVITY	Enter- prise	HOURS OF WORK				
				Hired Labor			Family Labor	
				No. Hours	No. Meals	Cost	Head of Family	Other Family
1	12/20/76	Raise seedlings	tomato	80		30		
2	1/2/78	Irrigate for transplant	tomato	8		3		
3	1/11	Transplant	tomato	120		45		
4	1/17	Irrigate	tomato	8		3		
5	1/20	Fertilize 300 formula	tomato	24		9		
6	1/27	Fumigate	tomato	8		4		
7	1/27	Irrigate	tomato	8		3		
8								
9	2/1	Weed	tomato	96		36		
10	2/3	Fumigate, Dithane, Metasystox	"	8		4		
11	2/4	Irrigate	"	8		3		
12	2/11	Fumigate, Antracol, Kavonate	"	8		4		
13	2/13	Install stakes	"	32		12		
14	2/14	Tie plants	"	40		15		
15	2/14	Fertilize, 300 formula	"	24		9		
16	2/18	Irrigate	"			2		
17	2/18	Fumigate, Dithane, Metasystox	"	8		4		
18	2/22	weed	"	96		36		
19	2/27	Fumigate, Antracol Tamaron	"	8		4		
20								
21								
TOTALS								

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LABOR (IN HOURS)

Line	DATE	DESCRIPTION OF ACTIVITY	Enter- prise	HOURS OF WORK				
				Hired Labor			Family Labor	
				No. Hours	No. Meals	Cost	Head of Family	Other Family
1	3/2	Terrigato	Amala	8		3	8	
2	3/1	Terrigato 3 ¹ / ₂ p.m. Nitrate	"	24		9	8	
3	3/3	Terrigato Nitrate Lavate	"	8		4		
4	3/2	Terrigato	"	8		3	8	
5	3/4	weeding	"	96		36	16	
6	3/1	Terrigato Antracol Tamara	"	8		4		
7	3/12	Terrigato N	"	8		3	8	
8	2/25	Terrigato: Ditha ve, Metaxysta	"	8		4		
9								
10	4/3	Terrigato Ditha ve Lavate	"	8		4		
11	4/4	Terrigato	"	8		3	8	
12	4/11	Terrigato	"	8		3	8	
13	4/15	1st Harvest	"	40		15	8	
14	4/16	Terrigato ; Antracol Lavate	"	8		4		
15	4/8	Terrigato	"	8		3	8	
16	4/23	2nd Harvest	"	56		21	8	
17	4/27	Terrigato	"	8		3	8	
18	4/30	3rd Harvest	"	72		27	8	
19								
20								
21								
TOTALS								

LABOR (IN HOURS)

Line.	DATE	DESCRIPTION OF ACTIVITY	Enter- prise	HOURS OF WORK				
				Hired Labor			Family Labor	
				No. Hours	No. Meals	Cost	Head of Family	Other Family
1	5/7	4th Harvest	tomato	56		21	8	
2	5/11	Drainage		8		2	8	
3	5/14	5th Harvest	"	40		15	8	
4	5/21	6th Harvest	"	24		4	8	
5								
6	6/2	Apply herbicide	"	16		6	24	
7	6/17	Weeding	CORN	480		180		
8								
9	7/4	1st Application Insecticide	CORN	16		6		
10	7/8	Apply urea	CORN	104		39	16	
11	7/28	3rd Application Insecticide	CORN	16		6		
12								
13	8/2	Bind Stalks	CORN	480		180		
14	8/20	Clear land	beans	180		67.50		
15								
16	9/2	Harvest	CORN	800		300		
17	9/10	Control Pests (slugs)	beans	80		30		
18	9/2	Fumigation	beans	8		3		
19	9/15	Shell grind	CORN	80		30		
20								
21								
TOTALS								

916

LABOR (IN HOURS)

Line	DATE	DESCRIPTION OF ACTIVITY	Enter- prise	HOURS OF WORK				
				Hired Labor			Family Labor	
				No. Hours	No. Meals	Cost	Head of Family	Other Family
1	10/13	Apply insecticide	Bears	3		2.00		
2	10/17	weed	"	320		27.00		
3								
4	12/14	harvest	Bears	240		90.00		
5	12/18	sm and haul	"	240		90.00		
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
TOTALS						150.00		

PRODUCT BALANCE									
Line	DATE	Product: Tomato		Units: Boxes of 30 lbs. each					
		Quantity		Sales	Animal Feed	Seed	Losses	Family Consumption	Balance in Storage
		Purchased	Produced						
1	4/1		75	75					75
2	4/24		350	350					75
3	4/30		500	500					75
4									
5	5/7		375	375					75
6	5/14		235	235					75
7	5/21		120	120					75
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
TOTALS			1,655	1,655					

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PRODUCT BALANCE

Line	DATE	Product: Corn		Units: - Pounds					
		Quantity		Sales	Animal Feed	Seed	Losses	Family Consumption	Balance in Storage
		Purchased	Produced						
1	Dec								2000
2	Jan				186			248	2566
3	Feb				188			224	2174
4	Mar				186			248	1740
5	Apr				180			270	1320
6	May				186			248	836
7	June				180			240	446
8	Jul				186			248	32
9	Aug	402			186			248	0
10	Sept		50,000	44,000	180			240	5580
11	Oct				186			248	5146
12	Nov				180			240	4926
13	Dec				186			248	4292
14									
15									
16									
17									
18									
19									
20									
21									
TOTALS		402	50,000	44,000	2190			2920	

1 2 3 4 5 6 7 8

PRODUCT BALANCE									
Line	DATE	Product: Beans		Units: Pounds					
		Quantity		Sales	Animal Feed	Seed	Losses	Family Consumption	Balance in Storage
		Purchased	Produced						
1	Dec.							295	
2	Jan.						31	214	
3	Feb						28	216	
4	Mar.						31	185	
5	Apr.						30	155	
6	May		31				31	124	
7	Jun		30				30	94	
8	Jul		31				31	63	
9	Aug						31	32	
10	Sept						30	2	
11	Oct	29					31	0	
12	Nov	30					30	0	
13	Dec			5,500			31	469	
14									
15									
16									
17									
18									
19									
20									
21									
TOTALS		59	6000	5500			365		

LIVESTOCK PRODUCTION AND MORTALITY

Line	DESCRIPTION	Livestock Production			Livestock Mortality		
		Date of Birth	No. Born	No. Weaned	Date of Death	Natural Death	Slight. for Consumption
	Livestock _____						
1	<i>Calves</i>	<i>April May</i>	<i>5</i>		<i>March</i>	<i>1</i>	
2	<i>Calves</i>	<i>Sept</i>	<i>5</i>				
3							
4	<i>Pigs</i>	<i>May</i>	<i>8</i>		<i>May</i>	<i>2</i>	
5	<i>Pigs</i>	<i>Dec.</i>	<i>7</i>		<i>Dec.</i>	<i>1</i>	
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
TOTALS							

Line	DESCRIPTION	LIVESTOCK INVENTORY					
		Beginning January 1978			Ending December 1978		
		No. Head	Value/Unit	Total Value	No. Head	Value/Unit	Total Value
	Cattle						
1	Bull Calves - 1 yr.	3	50	150	2	40	80
2	Yearling Bulls 1 - 2 yrs.	2	150	300	3	150	450
3	Heifer Calves 1 yr.	2	50	100	2	40	80
4	Total (1 through 3)			550			610
5	Herd Bulls	1	800	800	1	900	900
6	Cows	5	400	2000	8	400	3200
7	Replacement Heifers	3	300	900	2	300	600
8	Oxen	2	550	1100	2	550	1100
9	Total (5 - 8)			4800			
	Hogs						
10	Feeder pigs	6	80	480			
11	Sucking pigs	7	20	140	6	20	120
12	Total (10 + 11)			620			120
13	Boars						
14	Sows	1	150	150	1	175	175
15	Total 13 + 14)						
	Poultry						
16	Roosters						
17	Hens						
18	Chicks						
19	Turkeys						
20	Ducks						
21	Total Poultry (16 through 20)						
	Other						
22	Horses	1	250	250	1	350	350
23	Mares	1	200	200	1	300	300
24	Burros						
25	Mules						
26	Goats						
27	Total Other (22 through 26)						650
	TOTAL (Lines 4+9+12+15+21+27)						

INVENTORY OF PERENNIAL CROPS

Line	DESCRIPTION	Beginning		Production		Value of Production	Ending	
		Date: Jan. 78'		Units	Sales		Con- sumption	Date: Dec. 78'
		No. Trees	Value		Quantity	Quantity	Value	No. Trees
1	Oranges	5	50				5	55.
2	Pineapple	2	20				2	22.
3	Bananas	20	100				20	110.
4	Apples	3	30				3	35.
5	Peaches	5	40				5	45.
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
TOTALS			240 ⁰⁰					

INVENTORY OF TOOLS, EQUIPMENT, LAND AND BUILDINGS

Line	DESCRIPTION	BEGINNING			ENDING		
		Number	Value Each	Total Value	Number	Value Each	Total Value
	Tools and Equipment						
1	Hoes	2	4.50	9.00	5	4.20	21.00
2	Shovels	1	6.00	6.00	1	3.00	3.00
3	Machetes	2	3.75	7.50	5	3.00	15.00
4	Planting tool	2	4.50	9.00	2	4.00	8.00
5	Picks	1	9.00	9.00	1	8.00	8.00
6	Dves	2	9.00	18.00	2	4.00	8.00
7	Backpack Sprayer	1	120.00	120.00	1	100.00	100.00
8							
9							
10							
11							
12	Total (Lines 1 through 11)			178.50			
	Land and Buildings						
13	Level land (Manzanitas)	20	500.00	10,000.00	20	500.	10,000.
14	Hillside (Manzanitas)	10	100.00	1,000.	10	100.	1,000.
15	House	1	2,000.00	2,000.	1	2,000.	2,000.
16	Warehouse	1	400.00	400.	1	400.	400.
17							
18							
19							
20	Total (Lines 13 through 19)			13,400			13,400.
	TOTALS (Lines 12 + 20)			13,578.50			13,610

BALANCE SHEET

ASSETS				LIABILITIES			
II	CURRENT	Jan. '78	Dec. '78	V	CURRENT	Jan. '78	Dec. '78
A	Personal			24			
1	Cash	2000 ⁰⁰	7743 44	25			
2	Other			26			
3				27	Total Current		
4				VI	INTERMEDIATE		
5	Total (lines 1 through 4)	2000 ⁰⁰	7743 44	28	Loan - BANDESHA	2250	1500
B	Farm			29			
6	Crops: (Form 4.1, pag. 1)			30			
7	(Form 4.1, pag. 2)	360 ⁰⁰	516 ⁰⁰	31	Total Intermediate		
8	(Form 4.1, pag. 3)	687 ⁷⁵	117 25	VI	LONG TERM		
9	(Form 4.1, pag. 4)			32			
10	Cattle (Form 5.1, line 4)	550 ⁰⁰	610 ⁰⁰	33			
11	Hogs (Form 5.1, line 2)	120 ⁰⁰	120 ⁰⁰	34			
12	Poultry (Form 5.1, line 12)			35	Total Long Term		
13	Annual Crops: (Form 5.2 pag. 1)	340 ⁰⁰	215 ⁰⁰				
14	(Form 5.2 pag. 2)			VII	TOTAL LIABILITIES (lines 27+31+35)	2250	1500
15	Others						
16	Total (lines 6 through 15)	1838 ⁷⁵	1628 ²⁵	IX	NET WORTH (lines IV-VIII)	20567 ²⁵	28106 ⁷⁵
17	INTERMEDIATE						
17	Cattle (Form 5.1, line 9)	4500 ⁰⁰	5800 ⁰⁰				
18	Hogs (Form 5.1, line 15)	150 ⁰⁰	175 ⁰⁰				
19	Other (Form 5.1, line 27)	450 ⁰⁰	500 ⁰⁰				
20	Total Livestock (lines 17-19)	5400 ⁰⁰	6475 ⁰⁰				
21	Tools and Equipment (Form 5.3)	178 ⁵⁰	210 ⁰⁰				
22	Total (lines 20 + 21)	5578 ⁵⁰	6685 ⁰⁰				
III	FIXED						
23	Land and Buildings (Form 5.3)	13400 ⁰⁰	13400 ⁰⁰				
III	Total Assets (lines 5+16+22+23)	22817 ²⁵	29606 ⁷⁵				

CASH FLOW								
RECEIPTS		Jan	Feb	Mar	Apr	May	Jun	Totals
1	Crops							
2	Corn							
3	Beans							
4	Tomato				2910. ⁰⁰	1587. ⁵⁰		
5								
6	Cattle						445. ⁰⁰	
7	Hogs		600.				130. ⁰⁰	
8	Poultry							
9	Horses							
10	Other							
11	Misc. Sales							
A	Total Farm Sales (lines 1 through 11)		600.		2910. ⁰⁰	1587. ⁵⁰	1075. ⁰⁰	
12	Other Income							
13	Loans				1175. ⁰⁰		625. ⁰⁰	
B	TOTAL AVAILABLE (lines A+12+13)		600.		4165. ⁰⁰	1,587. ⁵⁰	1750. ⁰⁰	
EXPENSES								
14	Crops							
15	Corn				1040. ⁰⁰	145. ⁰⁰	669. ⁰⁰	
16	Beans							
17	Tomato	386. ⁸⁰	163. ²⁰		8. ⁰⁰	2. ⁰⁰		
18								
19	Cattle						65. ⁰⁰	
20	Hogs						25. ⁰⁰	
21	Poultry							
22	Horses							
23	Other							
24	Repairs					65. ⁰⁰		
25	Other Expenses	67. ⁰⁰	129. ⁰⁰		113. ⁰⁰	48. ⁰⁰	186. ⁰⁰	
26	Improvements							
C	TOTAL FARM EXPENSES (lines 14 through 26)	353. ⁸⁰	292. ²⁰		1161. ⁰⁰	260. ⁰⁰	945. ⁰⁰	
27	Loan Repayment							
28	Household expenses	135. ⁰⁰	220. ⁰⁰		105. ⁰⁰	55. ⁰⁰	120. ⁰⁰	
D	TOTAL EXPENSES (lines C+27+28)	478. ⁸⁰	492. ²⁰		1266. ⁰⁰	345. ⁰⁰	1065. ⁰⁰	
E	Cash difference (lines B-D)	-478. ⁸⁰	107. ⁰⁰		2899. ⁰⁰	1,242. ⁵⁰	685. ⁰⁰	
F	Beginning Balance	2000. ⁰⁰	1,521. ²⁰		1532. ²⁰	4,331. ²⁰	5473. ⁷⁰	
G	Ending Balance (Lines E + F)	1521. ²⁰	1,629. ⁰⁰		4231. ²⁰	5,473. ⁷⁰	6158. ⁷⁶	

CASH FLOW								
RECEIPTS		Jul	Aug	Sept	Oct	Nov	Dec	Totals
1	Crops							
2	corn			442.00				442.00
3	beans						1395.00	1395.00
4	tomato							11577.50
5								
6	Cattle	45.00	45.00	45.00	45.00	45.00	45.00	450.00
7	Hogs						600.00	600.00
8	Poultry							
9	Horses							
10	Other							
11	Misc. Sales							
A	Total Farm Sales (lines 1 through 11)	45.00	45.00	445.00	45.00	45.00	2040.00	12897.50
12	Other Income							
13	Loans		240.00					240.00
B	TOTAL AVAILABLE (Lines A+12+13)	45.00	445.00	445.00	45.00	45.00	2040.00	13297.50
GASTOS								
14	Crops							
15	corn			500.00				2354.00
16	beans		162.50	471.25	60.00		77.50	1162.25
17	tomato							1100.80
18								
19	Cattle							1.50
20	Hogs						33.00	47.00
21	Poultry							
22	Horses							
23	Other							
24	Repairs							25.00
25	Other Expenses	51.00	241.50	363.00	123.00		180.00	1573.50
26	Improvements							
C	TOTAL FARM EXPENSES (lines 14 through 26)	51.00	410.00	1284.25	183.00		324.50	5391.55
27	Loan Repayment						2562.90	2562.90
28	Household expenses	80.00	120.00	85.00	100.00	115.00	155.00	1370.00
D	TOTAL EXPENSES (lines C+27+28)	131.00	530.00	1369.25	283.00	115.00	3942.40	10204.51
E	Cash difference (lines B-D)	-86.00	65.00	3075.75	-238.00	-110.00	-1932.40	4992.99
F	Beginning Balance	1158.70	6072.70	6137.76	9213.45	8975.45	8915.45	
G	Ending Balance (Lines E+F)	6072.70	6137.70	9213.45	8975.45	8915.45	6992.99	

INCOME STATEMENT			
1	Total Farm Sales (Form 6.2, line A)	23,597.50	
2	Total Farm Expenses (Form 6.2, line C)	5,784.51	
3	Net Farm Income (line 1 menos 2)		17,812.99
	Change in Inventory		
4	Sale of crops and livestock (Form 6.1, line 16)	-210.50	
5	Cattle (Form 6.1, line 20)	1,325.00	
6	Equipment & Machinery (Form 6.1, line 21)	31.50	
7	Land & Improvements (Form 6.1, Line 23)	-0-	
8	Total Change in Inventory		1,046.00
9	Value of personal consumption (4.1, 4.2, 5.2)	704.45	
10	Less value of meals for hired laborers (Form 3.1)	-0-	704.45
11	Net Farm Income (3 + 8 + 9 + 10)		8,863.44