# INTEGRATED FARM MANAGEMENT FOR SMALL HOLDINGS IN LOMBOK (INDONESIA)

Thesis submitted by

ABDOERRAHMAN
B.Sc (Brawidjaja), Ir (Gadjahmada)
Indonesia
Grad.Dip.Agr.(Roseworthy Agr.Coll)
Australia

For the Degree of
Master of Applied Science (Agriculture)
in the
University of Adelaide

Department of Business and Extension
Agricultural and Natural Resource Sciences Faculty
The University of Adelaide

## ACKNOWLEDGEMENTS

I wish to thank my supervisors, **Mr. Alastair J. Fischer** and **Christopher M. Boast, Dip.Ag., Dip.Farm Management, Dip.Farm Bus.Admin., M.Sc** for their guidance and encouragement throughout this project. I also would like to thank **Ir. H. Machmud** of the Agricultural Department West Nusa Tenggara Province, **John Perkins** of the Department of Agriculture and Forestry, the University of Melbourne and **R. John Petheram** of the Victorian College of Agriculture and Horticulture Longerenong Campus for their advice and assistance, and **Mr Peter Ninnes** of the Key Centre, Roseworthy Campus, the University of Adelaide, for his interest in my study.

Thanks are due to **Ian M. Cooper, B.Agr.Sc., M.Sc.,** Head of Department of Business and Extension, and **Elizabeth M Hiskey,** Postgraduate Co-ordinator of Department of Business and Extension, Faculty of Agriculture and Natural Resource Sciences, the University of Adelaide, for their advice and assistance.

For specific services I thank **Mr. Brian M. Glaetzer,** Computer Manager of Roseworthy Campus and **Melissa Gibbs,** Computer Manager of Faculty of Economics, the University of Adelaide, for their assistance during the analysis of data and also **Margaret Cargill** of the Language and Learning Service, Advisory Centre for University Education, the University of Adelaide, for her help in English expression.

The work described in this thesis was made possible by the award of a scholarship from the Agricultural Department of the Republic of Indonesia. I gratefully acknowledge the Republic of Indonesia Government for the award.

Finally, my deep gratitude is extended to my wife Sri Sutrisni, my daughter Diah Rahmawati and my son Aries Dwi Ananto for their continuous support, understanding and encouragement.

# DECLARATION

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of my knowledge and belief, no material described herein has been previously published or written by another person except when due reference is made in the text.

**Abdoerrahman**

# SYNOPSIS

The main problems of small farmers in Lombok Island particularly, are the small size of farm, lack of capital and low capabilities of managerial skill. These problems cause low outputs and incomes. Serious efforts are being made to overcome them. The Indonesian Government has paid a lot of attention to small farmers in an effort to increase their income through increasing food production, and to overcome their inertia in order that they are also able to play a role in the ongoing programme of agricultural development.

The problems of these farmers are the precarious marginality of their enterprise, with average incomes so low as to lift them only slightly above subsistence levels.

As expected from the small size of their holdings, these farmers concentrate on the production of staple food crops, especially rice, but also corn and/or peanuts and soybean, with little variation. The alternative typical crop rotations usually practised by the farmers of this region in a year, are: Rice-Rice-Corn, Rice-Rice-Mixed Crops, Rice-Rice-Peanut, and Rice-Rice-Soybean. The type of crop rotation as Rice-Rice-Soybean was practised more widely than the others. At the same time , small farmers possess some livestock, particularly cattle or buffaloes as draft animals for soil cultivation activities. Farmers cultivate the soil as well as possible, constrained by capital availability.

The performances of poorer farmers are hindered by a lack of capital to purchase the optimal quantities of inputs. The remedies would appear to lie in further extension of credit to poor farmer or in other measures to make the distribution of income more even.

In the effort to increase the small farmers' output, it is also necessary to look for appropriate technologies which are affordable by the farmers.

The integration between livestock production and food crop production, will prove more beneficial when the farmers, as decision makers, have abilities not only in technical areas, but also in managerial ones , because integrated farming systems have a more complex management process.

In the sampled villages farming involves mainly loosely integrated mixed farming systems where most farmers engage in the production of food crops, cattle, and/or catch fish from the ponds. Integration of livestock into food crop production occurs not only when livestock are used as draft animals for soil cultivation, but also as livestock producing manure which is used as fertilizer for food crops (organic fertilizer). To increase the farmers' output, the quality

of farming practices must be considered. For this purpose a survey was done to collect data from farmer respondents, incorporating the results from interviews and questionnaires used.
The aim of the survey was to find out whether a number of farming practices can be improved.

The survey for this study was conducted in 1991 in six sampled villages of three regencies in Lombok island (West, Central and East Lombok), but only two villages of West Lombok were analysed for detailed consideration because of limitations of time. The sample used comprised 121 respondents, consisting of 58 farmers who had livestock and 63 farmers who did not.

In this survey data was collected not only on number and age of farmers, their educational levels and other personal data (relationships, etc.), but also on farming practices, i.e.: details of cropping pattern, livestock, inputs (amounts and values), outputs and gross margins of farming.

Furthermore, from the results of the survey we looked at farmers who have livestock compared to farmers who do not in terms of their inputs, outputs, gross margins, crop rotations, use of inorganic fertilizer and manure (organic fertilizer). and also the educational levels of the farmers.

In this study seven farm models were used based on crop rotation: (1) Rice-Rice-Corn, (2) Rice-Rice-Mixed Crops (With Livestock), (3) Rice-Rice-Mixed Crops (Without Livestock), (4) Rice-Rice-Peanut (With Livestock), (5) Rice-Rice-Peanut (Without Livestock), (6) Rice-Rice-Soybean (With Livestock), and (7) Rice - Rice - Soybean (Without Livestock).

Basically, farmers use inorganic fertilizer for their food crops, such as Urea, Triple Super Phosphate and Potassium Chloride, while manure (waste of livestock) is occasionally used for fertilizer of secondary crops (corn, peanut, soybean, sweet potatoes, and cassava).

The quality of these farming practices might be affected not only by the availability of capital, but also the levels of education of farmers themselves. In the sampled villages, most farmers (48.8 percent) attended primary school, while 36.4 percent did not have a formal education.

From the results of data analysis, it can be concluded that farmers with livestock have a statistically-significant higher gross margin than those without livestock. The reason for this appears to be that those with livestock are generally richer farmers, who are not faced with the same constraints of capital. Consequently they apply higher levels of inputs than those without livestock, and this is what appears to give rise to the higher gross margins.

In the year referred to in the survey (1990), some farm-models (rotation patterns) were better than others. The results showed that a farm model with rotation

pattern Rice-Rice-Peanut had a significantly higher output and gross margin than other rotations patterns. This is partly because in 1990 the price of peanuts was higher than could have been expected from past prices. When the expected 1990 price of peanuts was used instead of the actual 1990 price, the expected gross margin was still higher than that of corn and soybean.

All farmers apply recommended levels of inorganic fertilizer for the rice crops, according to government policy, while for secondary crops farmers used less than the recommendation. However, manure was not used by the farmers as a fertilizer for rice, and only in small amounts for secondary crops. The analysis in that part of the thesis attempts to explain why farmers use so little manure, and derives a value for manure. The value of manure per Tonne implied by its nutrient content is approximately Rp.9,300, or Rp.9.3 per kilogram. An alternative measure based on its value in enhancing soybean yield gives Rp.5.3 per kilogram. Another result is that the use of manure was not related to distance from manure production site to the nearest field of farmers. A cost-benefit analysis of manure usage is undertaken, and shows that the cost of gathering, storing and spreading manure is worthwhile, and is likely to add 0.7 to 2.7 percent to gross margins.

Farmers' formal education levels were not significantly related to gross margin. By this, it can be understood that educational level is a factor which influences the output and/or gross margin only indirectly. It appears that improving the techniques or managerial skills of adult farmers can be achieved by informal education through agricultural extension activities.

The conclusions of the thesis relate to three areas of farming practice.

First, it appears that the performances of poorer farmers are hindered by a lack of capital to purchase the optimal quantities of inputs. The remedies would appear to lie in further extension of credit to poor farmers, or in other measures to make the distribution of income more even.

Second, at current relative prices, farmers should be encouraged to grow more peanuts relative to soybeans. However, care needs to be taken in this area, because if all farmers in Indonesia undertook such advice in the same year, it would almost certainly result in the collapse of peanut prices and a large increase in soybean prices. For that reason, and to diversify farmer's crops (and hence reduce their exposure to risk) it is suggested that soybean farmers plant <u>some</u> peanuts as well. The result that significantly higher gross margins would accure to peanut farming rather than soybean production comes not only from the survey using the 1990 price and yield data, but was also sustained when <u>expected</u> 1990 price data was used. The 1990 peanut prices were higher

than expected and resulted in gross margins for rice-rice peanuts being 26 % higher than for rice-rice-soybean. But even when actual gross margins were replaced by expected gross margins, based on the price expected in 1990 on the basis of 1985-1989 prices, the expected gross margin for rice-rice-peanuts was 16 to 18 percent higher than for rice-rice-soybean. Thus it is clear that even on this basis, farmers would be a lot better off with peanuts ( or a peanut-soybean mix) rather than soybean alone.

In addition to the possibility of a change in emphasis on crop rotation choice, it should also be possible, as production of rice continues to outstrip population growth, to phase down the production of secondary starch crops such as sweet potatoes and cassava, and to use that acreage for protein crops (soybean and peanut).

Third, a case has been made for a large-scale extension effort, concentrating on encouraging the use of natural manures on secondary crops.

# INTEGRATED FARM MANAGEMENT FOR SMALL HOLDINGS IN LOMBOK (INDONESIA)

## LIST OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

## LIST OF APPENDICES

## ABBREVIATIONS USED IN THIS THESIS

| | |
|---|---|
| IROUT_HA | : Outputs of Irrigated Lowland (sawah) per Hectare, per Year |
| IRINP_HA | : Total Inputs of Irrigated Lowland (Sawah) per Hectare, per Year |
| ICLAB_HA | : The Amount of Labour used in Soil Cultivation of Irrigated Lowland (Sawah) per Hectare, per Year |
| ICLS_HA | : The Number of Livestock (Cattle) used in Soil Cultivation of Irrigated Lowland (Sawah) per Hectare, per Year |
| IFERT_HA | : The Amount of Inorganic Fertilizer used for Food Crops on Irrigated Lowland (Sawah) per Year, per Hectare |
| IWAST_HA | : The Amount of Manure (Waste) used for Food Crops on Irrigated Lowland (Sawah) per Year, per Hectare |
| EDC1 | : The Educational Level of Farmers |
| UPOUT_HA | : Outputs of Upland (Lahan Kering) per Hectare, per Year |
| UPINP_HA | : Total Inputs of Upland (Lahan Kering) per Hectare, per Year |
| UCLAB_HA | : The Amount of Labour Used in Soil Cultivation of Upland (Lahan Kering) per Hectare, per Year |
| UCLS_HA | : The Number of Livestock (Cattle) Used in Soil Cultiovation of Upland (Lahan Kering), per Hectare,per Year |
| UFERT_HA | : The Amount of Inorganic Fertilizers Used for Food Crops on Upland (Lahan Kering), per Hectare, per Year |
| UWAST_HA | : The Amount of Waste (Manure) Used for Food Crops on Upland (Lahan Kering), per Hectare, per Year |
| SCLABHA | : The Amount of Labour Used in Soil Cultivation per Hectare, per Year |
| COSCLBHA | : Costs of Soil Cultivation Using Labour per Hectare, per Year |
| SCLSHA | : The Number of Livestock (Cattle) Used in Soil Cultivation per Hectare, per Year |
| COSCLSHA | : Costs of Soil Cultivation Using Livestock (Cattle) per Hectare, per Year |
| SEEDHA | : The Value of Seeds per Hectare,, per Year |
| PLANLBHA | : The Amount of Labour in Planting per Hectare, per Year |
| COPLANHA | : Costs of Planting per Hectare, per Year |
| FERTHA | : The Value of Inorganic Fertilizers per Hectare, per Year |
| WASTEHA | : THe Value of Manure per Hectare, per Year |
| FERTLBHA | : The Amount of Labour in Fertilizing per Hectare, per Year |
| COFERTHA | : Costs of Fertilizing per Hectare, per Year |

| | | |
|---|---|---|
| WEEDLBHA | : | The Amount of Labour in Weeding per Hectare, per Year |
| COWEEDHA | : | Costs of Weeding per Hectare, per Year |
| PESTICHA | : | The Value of Pesticides per Hectare, per Year |
| SPRALBHA | : | The Amount of Labour Used in Spraying per Hectare, per Year |
| COSPRAHA | : | Costs of Spraying per Hectare, perr Year |
| COHARVHA | : | Costs of Harvesting per Hectare,per Year |
| IRRINPHA | : | Total Inputs in Irrigated Lowland (Sawah) per Hectare, per Year |
| IROUTHA | : | Output of Irrigated Lowland (Sawah) per Hectare, per Year |
| GROSSMHA | : | Total Gross Margin per Hectare per Year |
| COSCLTOT | : | Total Costs of Soil Cultivation per Hectare, per Year |
| EFFICNCY | : | Efficiency |