

128857  
KM  
09.05.95

RS. 250/-

UNIVERSITY OF SRI JAYWARDENEPURA

A Comparative Analysis of Intercropping and Animal Husbandry with Pasture Cultivation under Coconuts in Sri Lanka: A Socio-economic Study

by



H.M.T.N.R.Herath  
B.A. Hons (Sri Jayewardenepura)

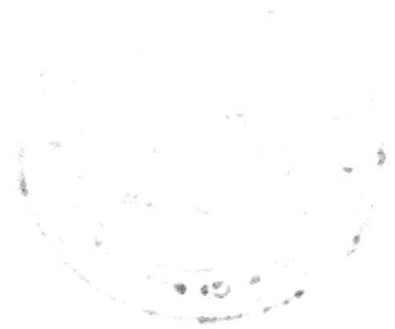
A thesis submitted to the Department of Economics, University of Sri Jayewardenepura in partial fulfillment of the requirements for the Degree of Master of Arts (Economics).

March 1993

128857

LB / Don / 75 / 95 . .

5315/2405/8018
2011/12
3815
2020



CR  
338-162  
HER

128857

## MEMORANDUM

The work described in this thesis was carried out at the Department of Economics, University of Sri Jayewardenepura, Sri Lanka, under the supervision of Dr. R.K.Ulluwishewa and Mr. Dayananda Somasundara.

This thesis, based on the author's independent work, has not been submitted to any other university for another degree.

Date: 01.03.1993

H.M.T.N.R.Herath

## A B S T R A C T

Monocrop coconut cultivation utilizes only about 25 percent of the land allowing the balance to be used for other agricultural purposes. Although intercropping and animal husbandry are technically feasible in coconut lands, the spread of the former has been much below the potential. The study, therefore, attempts to identify and compare the current status and constraints to both intercropping and animal husbandry, with a view to identifying the possibilities to develop the coconut sector. The technique for comparison is cost-benefit analysis.

The study revealed that the animal husbandry in coconut lands which is undertaken for the satisfaction of household needs, is less labour intensive than cultivation of popular intercrops. In terms of the prevailing conditions in coconut lands, animal feed is not a limiting factor for the further development of animal husbandry. When the constraints which restrict the development of intercropping and animal husbandry are considered, their influence on animal husbandry is less stronger than that of intercropping.

The comparative analysis of costs and benefits of both activities, revealed that animal husbandry is not more profitable than intercropping. In the case of government

intervention in animal husbandry, the study revealed that some of the development programmes are not effectively implemented.

The overall comparative analysis of animal husbandry with intercropping in coconut lands shows the necessity to transfer at least unutilized resources in coconut lands to animal husbandry in order to increase domestic production. There is an urgent need to take necessary steps to publicise the government support service programmes to the herd owners. In order to make a comparative analysis on a more comprehensive basis, status of marketing of both activities should also be included in the analysis.

ACKNOWLEDGMENTS

I am extremely grateful to: Dr.R.K.Ulluwishewa, Department of Geography, University of Sri Jayewardenepura, Mr.Dayananda Somasundara, Department of Economics, at the same university for their constructive comments and helpful advice as my supervisors; Mr.Jagath Wickramasinghe for comments on methodological part; and my sister Soma Herath for encouraging me at this work.

H.M.T.N.R.Herath

Department of Economics  
University of Sri Jayewardenepura  
Nugegoda  
March 1993.

*Look for definite comments*

## TABLE OF CONTENTS

	Page
ABSTRACT	iii
ACKNOWLEDGEMENTS	v
LIST OF TABLES	xii
LIST OF FIGURES	xv
LIST OF CHARTS	xv
ABBREVIATIONS	xvi
CHAPTER ONE – INTRODUCTION	01
1.1 Coconut cultivation	01
1.2 Suitability of coconut lands for intercropping	02
1.3 Coconut holdings and intercropped area	06
1.4 Constraints to intercropping	07
1.5 Scope of the study	07
1.6 Justification of the study	09
1.7 Objectives	09
1.8 Hypothesis	10
1.9 Methodology	10
1.10 Data sources	11
1.10.1 Secondary data	11
1.10.2 Primary data collection	12
a. Sample selection	12
b. Preliminary survey	14
c. Questionnaire survey	14
1.11 Limitations of the study	15
1.12 Organization of the study	16
1.13 Definitions	17

	Page
CHAPTER TWO - INTERCROPPING UNDER COCONUTS: AN ANALYSIS	18
2.1 The effect of intercropping on yield of coconut	18
2.2 Advantages and disadvantages of intercropping	21
2.3 Characteristics of intercropping	23
2.3.1 Intercropped holdings	23
2.3.2 Tenural status of intercropped holdings	25
2.3.3 Dominant intercrops and popular intercrops	26
2.3.4 Relationship between intercrops and size of coconut holdings	29
2.3.5 Cost of production	31
a. Total cost, net income and profit	31
b. Cash cost	33
c. Cost of inputs	34
2.4 Factors that influence selection of intercrops	37
2.4.1 Agroecological factors	37
2.4.2 Environmental factors	38
2.4.3 Socio-economic factors	40
a. Land	43
b. Family labour	44
c. Net income of the crop	45
d. Net profit	46
e. Special reasons	46
f. Cost of production	48



	Page
2.5 Socio-economic characteristics of	
intercroppers	48
2.5.1 Literacy and educational attainments	48
2.5.2 Major sources of income	50
2.5.3 Basis of intercroppers' farming activity	51
2.6 Constraints to intercropping	53
2.6.1 Presence of absentee ownership	54
2.6.2 Higher opportunity cost of labour	54
2.6.3 Higher prices of agrochemicals	55
2.6.4 Deficiencies in subsidy policy	56
2.6.5 Drought	57
2.7 Summary	60
CHAPTER THREE - ANIMAL HUSBANDRY	62
3.1 Agroecological environment for pasture	
cultivation and animal husbandry	62
3.2 The effects of animal husbandry, pasture	
cultivation and grazing on coconut yield	63
3.3 Herd characteristics	64
3.3.1 Purpose	65
3.3.2 Variety	68
3.3.3 Stock size and determinants of it	69
3.3.4 Animal health	71
3.3.5 Cost of production and income	71
a. Total cost and profits	71
b. Cost structure	73
c. Income structure	74
3.3.6 Surplus	76

	Page
3.3.7 Major feeding methods	77
3.4 Potential feed sources	80
3.4.1 Fodder trees (tree legumes)	81
3.4.2 Improved pastures	82
3.5 Characteristics of animal keepers	85
3.5.1 Additional income sources	86
3.5.2 Animal keepers by type of animals	87
3.5.3 Animal keepers by size of coconut holdings	88
3.6 Support service programmes and their influence	89
3.6.1 Pasture subsidy programme	91
3.6.2 Artificial insemination (AI)	94
3.6.3 Credit	96
3.6.4 Instruction booklets	100
3.6.5 Improved animals at concessionary prices	100
3.6.6 Contract breeding system	101
3.6.7 Stud-bulls supply programme	103
3.6.8 Training programmes	105
3.6.9 Audio visual programmes	107
3.7 Economic advantages of coconut-animal integrated farming system	109
3.8 Reasons for poor adoption of animal husbandry	114
3.9 Summary	117
 CHAPTER FOUR – COMPARATIVE COST BENEFIT ANALYSIS	 120
4.1 Meaning of a project	120
4.2 Cost-benefit analysis (CBA)	121
4.2.1 Meaning and objective	121

	Page
4.2.2 Deficiencies in cost-benefit analysis	122
4.3 Aspect of analysis	123
4.4 Economic life of animal husbandry	124
4.5 Identification of benefits, costs and their valuation	125
4.5.1 Benefits	125
4.5.2 Valuation of benefits	127
4.5.3 Identification of costs and their valuation	132
4.6 Comparing costs and benefits	133
4.6.1 Selection of the rate of discount	133
a. Social time-preference	134
b. Opportunity cost of capital	137
c. The approach of Little and Mirrlees	138
d. Market rate of interest	140
4.6.2 Determination of the rate of discount	141
4.6.3 Evaluation criteria	143
a. Pay back period	143
b. Benefit-cost (B/C) ratio	145
c. Net present value (NPV)	147
d. Internal rate of return (IRR)	149
4.6.4 Assumptions and limitation	151
4.6.5 Results and discussion	152
4.6.6 Objective of a family farm	156
4.6.7 Results and discussion	157
4.7 Summary	160

	Page
CHAPTER FIVE—SUMMARY, CONCLUSIONS AND RECOMMENDATIONS	161
5.1 Summary	161
5.2 Conclusions	167
5.3 Recommendations	170
5.4 Further studies	172
APPENDIX I      Intercrops Grown under Coconuts in Sri Lanka	173
APPENDIX II     Recommended and Suitable Intercrops by Agroecological Zones	174
APPENDIX III    Value of Milk Powder Imports to Sri Lanka (five year averages of Rs. millions)	175
APPENDIX IV     NLDB Farms and Their Stock Positions during the Selected Years in the Coconut triangle	176
APPENDIX V      Questionnaire on Intercropping under Coconuts	177
APPENDIX VI     Questionnaire on animal husbandry in coconut lands	185
BIBLIOGRAPHY	197



## LIST OF TABLES

Table	Title	Page
2.1	Level of Coconut Yield when Intercropped with Different Crops	20
2.2	Distribution of Coconut Holdings in Sri Lanka	23
2.3	Size-class Distribution of Intercropped Coconut Holdings	24
2.4	Nature of Tenural Status of Intercropped Coconut Lands (percentage of holdings)	26
2.5	Area under Intercrops	28
2.6	Extent Cultivated and Farmers' Preference for Intercrops under Coconuts	29
2.7	Percentage of Coconut Holdings under each Intercrop	30
2.8	Production, Income and Profit of Popular Intercrops (Rs/economic life/acre)	32
2.9	Cash Cost of Popular Intercrops	33
2.10	Percentage Cost of Labour for Main Intercrops	34
2.11	Composition of Percentage Labour Cost of Major Intercrops Grown under Coconuts	35
2.12	Cost of Agrochemicals of Popular Intercrops	36
2.13	Intensity of Light Transmission in Coconut Lands	39
2.14	Estimates of Regression Model (betel)	42
2.15	Estimates of Regression Model (banana)	43

	Page
2.16 Reasons for the Selection of Intercrops by Coconut Holders (percentage of farmers expressed their preference in respect of each crop)	47
2.17 Educational Attainments of Intercroppers (number of farmers as a percentage of overall sample)	49
2.18 Major Sources of Income of Intercroppers (percentage in relation to total number of farmers)	51
2.19 Basis of Intercroppers' Farming Activity - Full-time/Part-time (Percentage of farmers)	52
2.20 Choices of Intercrops by Full-time Farmers and Part-time Farmers	53
2.21 Problems Faced by Farmers in Intercropping (percentage of farmers in respect of each crop)	55
2.22 Subsidies for Intercropping	56
2.23 Averages of Annual Rainfall Figures Reported at Selected Stations in Coconut Triangle (inches)	58
3.1 Characteristics of Animal husbandry	66
3.2 Sex and Age Structure	67
3.3 Average Stock Size	70
3.4 Stock Size Distribution	70
3.5 Herd Profitability (Average Stock/Year)	72
3.6 The Cost Structure of Animal Husbandry	73
3.7 Income Structure of Animal Husbandry	74
3.8 Trade Surplus and Home Consumption of Milk	77
3.9 Feeding Systems (percentage of farmers)	78
3.10 Methods of Grazing (percentage of farmers)	79

	Page
3.11 Additional Income Sources of Animal Keepers	86
3.12 Basis of Animal Husbandry - Full-time/Part-time (percentage of herd owners)	87
3.13 Animal Keepers by Type of Animals	88
3.14 Size-class Distribution of Coconut Holdings	89
3.15 Performance of Pasture Subsidy Scheme of CCB	92
3.16 Farmers Awareness and Use of Support Services	93
3.17 Reasons for Not Obtaining Support Services (Percentage of farmers)	94
3.18 Number of Artificial Insemination	95
3.19 Particulars Regarding Loans Granted for Dairy Farming by the People's Bank under the ADB Project	99
3.20 Financial Allowances Granted under Contract Breeding System	103
3.21 Performance of Stud-bulls Programme	105
3.22 Training in livestock production by DAPH	106
3.23 Training in Livestock by NLDB	107
3.24 Fertilizer Application to Coconut	112
4.1 The Uncommitted Social Income Generated per Unit of Investment (r)	139
4.2 Present Values of Hypothetical Projects (rupees)	148
4.3 Values of Evaluation Criteria	152
4.4 Values of Evaluation Criteria	154
4.5 Values of Evaluation Criteria	157
4.6 Values of Evaluation Criteria	159