Disclaimer

While every effort has been made to ensure the information in this publication is accurate, much of the base data that has been used for the analyses has been collected from farms and cannot be verified from written records. The Ministry of Agriculture and Fisheries does not accept any responsibility or liability for error or fact omission, interpretation or opinion which may be present, nor for the consequences of any decisions based on this information.

The information provided here does not form part of any recommendation or advice as to what crops should be grown or the production system to be used. Advisers and farmers need to interpret the information included here for individual farms before recommendations or decisions can be made.

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Any general enquiries regarding the content of the Farm Management Manual should be directed to the Assistant Chief Executive Officer, Policy and Planning Division, Ministry of Agriculture and Fisheries, Samoa.

Acknowledgements

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Foreword

As Samoa's agriculture sector becomes increasingly commercialised and farmers treat their farming operations as cash income earning businesses, there is an ever-growing need for farm management information. This information will assist farmers in making sound decisions about the choice of crops to grow, which markets to target, and whether to borrow money to invest in their farming businesses.

The Farm Management Manual for Samoa – 2016, marks the beginning of a source of farm management information that is up-to-date and relates specifically to Samoa's agricultural sector. It is the beginning because not all crops and not all production systems are yet included. Over time it is planned to add other crops, to add other production systems such as organics, and to look in more detail at the impact on farm profits of different markets, especially exporting.

The compilation of the Farm Management Manual for Samoa - 2016 comes as a result of MAF's new corporate plan which shifts the focus to being on the commercial development of Samoa's agricultural sector. The manual's primary purpose is to assist farmers and their advisers make informed decisions about their farm business, and ultimately, to maximise returns from agriculture.

Thirty eight farm budgets for key cropping, livestock and aquaculture enterprises are presented in the manual and contain useful information regarding the returns and costs associated with these activities.

Farm management information of the nature contained within this manual will be updated regularly to reflect changes experienced in the agriculture sector over time, particularly changes in prices, yields, markets, technology, and farming practices.

I commend the Farm Management Manual for Samoa – 2016 to you, and look forward to an agriculture sector that is increasing the incomes and standard of living of farmers and their families.

Honourable La'aulialemalietoa Leuatea Polata'ivao Fossie Von Schmidt
Minister of Agriculture and Fisheries

October, 2016

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1 INTRODUCTION

The Farm Management Manual for Samoa – 2016 has been compiled by MAF. Specifically, the manual is intended to assist farmers wishing to increase the income from their farms, and for farmers and their advisers to compile and analyse financial information for decision making regarding their farm business.

The manual contains budgets for a range of key cropping, livestock and aquaculture enterprises of commercial importance to Samoa.

The budgets that have been compiled for a general enterprise, based on an average of data collected from a number of farmers. The information in these budgets provides an indication of the profitability of a representative, "typical" enterprise and is designed to be simple to use for making farm business decisions.

The information contained in the manual provides farmers with:

- an indication of the relative profitability of crops and enterprises, to help when choosing which crops to grow or enterprises to carry out on the farm;
- a basis for benchmarking where farmers can compare their own performance with that of a representative, average enterprise in Samoa; and
- a guide for farmers preparing their own budgets.

For the 2016 edition of the farm management manual, budgets have been developed, based on information collected from Samoan farmers, for the following crops and enterprises.

- Root crops:
  - Taro (Taro Leaf Blight Tolerant varieties)
  - Taro Palagi
  - Ta'amu (Giant Taro)
- Tree crops:
  - Banana (Cavendish)
  - Papaya
  - Coconut (Samoan Tall and hybrid varieties, virgin organic coconut oil)
  - Cocoa (Samoan variety – Trinitario, koko Samoa)
  - Tahitian Lime
- Vegetables:
  - Capsicum
  - Tomatoes
  - Lettuce

- Water Spinach – Kang Kong
- Head Cabbage
- Cucumber
- Chinese cabbage

- Livestock:
  - Beef cattle
  - Dairy cattle
  - Chickens (meat and eggs)
  - Piggery
  - Sheep
- Aquaculture:
  - Tilapia
  - Sea urchins
  - Sea Grapes

2 FARM MANAGEMENT

2.1 Background

In recent years, there has been increasing recognition that the driving force that will revitalise the agriculture sector will be commercial development. While farmers whose primary objective is family food security are still the largest group of farmers, there are a growing number who are either becoming engaged or are interested in semi-commercial and commercial scale production to earn cash income for the families needs.

Growing urbanisation and tourism has given rise to commercial opportunities for increasing the local production of a range of agricultural products.

Advisers have traditionally focused on working with subsistence farmers to address technical issues relating to agricultural production. With increasing emphasis on commercial farming, there is a growing need to adopt a whole-farm management approach to farming, and in particular, to focus more on the business management and financial aspects of farming.

2.2 What is Farm Management?

"Farm management" is concerned with the management decisions made by a farmer that affect the performance of the farm, the impact on the land and outcomes for the family. Every year the farmer has many decisions to make such as which crops to grow, what area of each crop to plant, when to plant, where to market, how much fertiliser to use, etc., each of which will have an effect on the results that are achieved. The farmer has a certain amount of land available, money to spend and labour to use, and how these resources are used will determine whether he/ she achieves his/ her goals. The number of options available can make these decisions quite complex, and the shift to commercialisation and the demands of the marketplace make it even more difficult.

The allocation of resources and the decisions that are made is "farm management".

2.3 The Farm as a Business

If farm management is about allocating resources and making decisions, then it assumes that there are targets or goals to meet. For a farm earning cash income there will be two sets of goals – one dealing with the personal goals of the family, and the other with the farm as a business. Hence, farmers need to identify goals to guide and direct decision making.

Examples of personal and family goals might include:

- meeting church commitments;
- paying for children's education;
- meeting fa'alavelave and village obligations;
- paying off personal loans;
- acquiring personal possessions;
- improving the home, building a water tank, a septic tank, etc.;
- taking an overseas trip
- increasing leisure time;

Examples of possible farm business goals for Samoan farmers include:

- to earn a certain level of income (profit) to meet the family's needs;
- to reduce farm debt;
- to provide employment for family members;
- to build new businesses, such as processing or exporting;

As the goals that require increasing cash income become more important, subsistence and semi-subsistence farming households move towards developing more commercial farming operations. A commercial farm business cannot be sustained in the long run, without making a profit.

To be profitable a farm business needs to be able to achieve the following:

1. Cover the cash costs of farming, such as seed and fertiliser,

2. Service loan repayments for loans taken out to improve the farm;
3. When necessary, be able to maintain or replace aged equipment and to maintain resources such as pasture and trees.
4. Have some surplus cash (the profit) to meet personal needs and reinvestment in the farm.

A successful farm business with be one that meets both the personal and business goals. The farm business is a means to an end, not the end itself. The end is the social, family and personal goals. The farm is the means to achieve these.

2.4 Farm Records

Farmers need to be able to plan and assess the use of farm resources to ensure they are using these resources in the most profitable way. The information presented in this manual provides general budgets and gross margins, it does not specifically relate to an individual farm, in a specific district. To be able to convert this general information into individual farm business plans that are specific to a farm, farmers need to have access to good farm management records for their farm, or at the very least for their district.

Ideally advisers and farmers take the general information provided in the budgets in this manual and modify the figures with local information so that they end up with new budgets that are relevant to the local situation.

Common questions that farmers seek answers to and that would benefit from local information are:

How is my farm performing? How does it compare with other farmers, and how does it compare with what we have produced in other years?

- how are my production levels?
- how do the prices I get for my produce compare?
- how does the quality of my produce compare?
- what are my production costs compared to others?

The type of information that should be collected on the farm will include:

- the prices received for the produce
- the cost of all inputs
- the amount of labour used
- the number of plants grown, or area of land used
- the time of planting and harvesting
- varieties grown
- marketing details – where sold, packaging used (if any), and weight or number per package

A simple farm diary where farming and selling activities, and other information such as the price of seed, is recorded **every day** is the easiest way to keep this information.

2.5 Farm Management Terms

There are a number of farm management terms referred to throughout the manual.

Budgeting: Budgeting is a financial plan. It is an activity carried out for farm planning, which enables a farmer to consider the likely financial outcomes of certain management decisions. Different crops, different production systems and different districts will produce different financial or budget outcomes.

Gross Margin: The total or gross income minus direct costs for a farming enterprise

A gross margin shows how much cash surplus a particular crop or enterprise contributes to the overall profitability of the whole farm business.

Direct Costs (also referred to as variable or operating costs): Costs that are directly associated with a particular enterprise. These costs vary with the size of the enterprise and the amount produced, and include fertiliser, herbicide, planting material, transport to market, and hired labour.

Direct costs generally are for one production cycle, and will have to be paid again if and when the crop is replanted.

Fixed Costs (also referred to as fixed or non-operating costs): Costs that cannot be easily allocated directly to one particular enterprise and have to paid whether production takes place or not. Examples of fixed costs are vehicle repairs and building maintenance.

Fixed costs tend to be inputs that last more than one production cycle.

Working Capital: Cash required for day to day operation of the farm. Working capital is used for buying inputs such as planting material, breeding stock, fertiliser, paying labour, fuel etc. The amount of working capital needed is the amount of money that will have to be spent before the crop or enterprise is harvested, and the income from selling the harvested produce can be used to pay for further inputs.

Fixed Capital: Money that is required to purchase assets that can be reused a number of times to produce several crops over a number of cycles. Money for stockyards, a tractor, fencing, a 4WD double cab, tools, ladders, etc., are all examples of fixed capital items.

Total Capital: The total of working capital and fixed capital that is needed to set up and operate an enterprise or business.

Hired Labour: Labour that is paid wages. Usually this labour is brought in from outside the farm and is used for tasks the need to be done when there is insufficient family labour available. Hired labour is a direct cost to the farm.

Family Labour: Unpaid (unwaged) labour that is supplied by family members for carrying out tasks in a farming operation.

For Samoan farm businesses, the farmer and other family members provide all or a large part of the labour and do not generally receive a cash wage. Because family members working on the farm do not directly receive a cash wage, the value of family labour is often overlooked or ignored.

The amount of labour required to produce and market a crop may well influence the decision as to whether to grow that crop. The level of family labour is included in the budgets in this manual to assist with this decision.

Profit: A business makes a profit if the total income is greater than all the costs of running that business, that is, both the direct and the fixed costs. The net result (that is, income less costs) is the profit. Profit should not be confused with profitable. A crop is profitable if the income is greater than the direct costs of growing that crop (that is, the gross margin is more than $0), but the farm business could still make a loss if the surplus from the crop cannot pay for all the fixed costs.

Steady State Production: The point of production where a long-term crop or enterprise, such as coconut, is no longer increasing in yield each year, and is said to be "mature". Generally, when an enterprise reaches steady state, the level of production and costs will be similar each year. This steady state of production will continue until the trees reach old age (senility) and the yield declines.

In the case of livestock, an enterprise reaches steady-state when the herd has developed to a size where herd numbers remain constant, that is, the number of animals sold equals the numbers retained, and the overall age structure of the herd does not change.

3. ROOT CROPS BUDGETS

3.1 Taro Palagi

Enterprise Background for Taro Palagi

This gross margin budget represents a 0.6 acre fully commercial taro palagi enterprise, selling 600 taro.

a) Production Information

Planting Material:
Head sets or young suckers (4-5 leaves) can be used for planting material. In this instance, suckers are used in preference to headsets, as they will reach maturity earlier than a head set.

Mortality Rate of Plants:
The mortality rate of Taro Palagi suckers is minimal, given the quality of planting material used and low pest and disease incidence.

Planting Density:
Approximately 600 suckers are planted into a 0.6 acre plot, at a plant spacing of 2 m x 2 m.

Cropping System:
Taro Palagi is grown as a monocrop.

Growth Period:
Taro Palagi has a 6-12 month growth period. On average, the growth period is 9 months.

Number of Months to Harvesting:
Harvesting commences during the sixth month of the growth period and generally continues up to the tenth month.

Planting Time:
The best yields are obtained when Taro Palagi is planted in the wet season (December-March).

Income

Harvestable/Saleable Yield:
Approximately 600 Taro Palagi are harvested, each of which produces 6 -8 taro, and these are sold in baskets. Each basket contains, on average, 20 taro. A total of 200 baskets are sold.

Price:
The price for Taro Palagi ranges from $8.00-$15.00/basket throughout the year. The average price is around $10.00/basket.

b) Direct Costs

Planting Material:
Suckers are purchased from other farmers for $20 per 100 (i.e. $0.20 each).

c) Labour

The farmer uses family labour for the following tasks.

[a] 8 harvests @ 2 hours/person/harvest = 16 hours (2 days)

Task	No. of workers	Time Spent per Worker (Days)	Total Labour Days
Slashing	4	1	4
Planting	4	1	4
Weeding/ Spraying	4	2	8
Harvesting	4	2[a]	8
Marketing	1	8	8

d) Capital Costs

There are no significant capital costs for the taro palagi enterprise.

Enterprise Budget for Taro Palagi

GROSS MARGIN BUDGET FOR TARO PALAGI

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	600
(B) Area (Acres):	0.6
Plant Spacing:	2m x 2m
Growth Period (months):	6-12
No. of taro harvested:	4000
No. of taro per basket:	20
© No. of basket sold:	200

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
taro palagi	200	basket @	$10.00	$2,000.00
(C) Total Income				**$2,000.00**

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
Planting Material (tiapula)	600	suckers @	$0.20	$120.00
Selling Costs				
Transport to market	8	trips	$10	$80.00
Hire of Stall	8	days	$10	$80.00
(D)Total Direct Costs				**$280.00**
(E)GROSS MARGIN $				$1,720.00
Gross margin per family labour day(E/G)				$55.00
Gross margin per plant(E/B)				$2.93
Gross margin per per acre(E/B)				$2,866.66

LABOUR INPUTS (days)

TASK	(F)HIRED LABOUR	(G)FAMILY LABOUR	TOTAL DAYS
Land Preparation(Slashing)		4	4
Planting		4	4
Handweding		8	8
Harvesting		8	8
Marketing		8	8
TOTAL LABOUR REQUIREMENTS-DAYS	**0**	**32**	**32**
(H)Average Wage Rate ($/day)			$21.69
Total Cost of hired labour (H*F)			
(I) Total Costs of Family labour (H*G)			$694.08
(T)Total family labour requirement (days)			32
GROSS MARGIN - including costs of family labour (F-J) (E-I)			**$1,025.92**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yield (no. of Baskets)	Price($/basket)		
	$8.00	$10.00	$15.00
100	$560.00	$760.00	$1,260.00
150	$960.00	$1,260.00	$2,010.00
200	$1,360.00	$1,760.00	$2,760.00

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

3.2LEAF BLIGHT TOLERANT (TLB) TARO (VAR. SAMOA 1 AND SAMOA 2)

Enterprise Background for TLB Tolerant Taro

This gross margin budget represents a one acre fully commercial taro (Taro Leaf Blight tolerant variety) enterprise, selling 4,000 taros.

a) Production Information

Planting Material:
Headsets or young suckers (4-5 leaves) can be used for planting material. In this instance, suckers are used in preference to headsets, as they will reach maturity earlier than a head set.

Mortality Rate of Plants:
The mortality rate of TLB tolerant taro is minimal, given the quality of planting material used.

Planting Density:
Approximately 4,000 suckers are planted into a one acre plot, at a plant spacing of 1 m x 1 m.

Cropping System
Taro is grown as a monocrop.

Number of Months to Harvesting:
Harvesting commences during the eight month of the growth period.

Planting Time:
The best yields are obtained when taro is planted in the wet season (December-March).

a) Income

Harvestable/Saleable Yield:
Approximately 4,000 taro are harvested and sold in baskets or piles. Each basket/pile contains, 12-15 taro. A total of 266 piles are sold.

Growth Period:
Taro has a 8-10 month growth period.

Price:
The price for TLB tolerant taro ranges from $15.00-$25.00/basket or pile throughout the year. The average price is $20.00/basket or pile

b) Direct Costs

Planting Material:
Suckers are purchased from other farmers for $20 per 100 (i.e. $0.20 each).

Weed Control:
The following product is applied during the production cycle to control weeds:

Product Name	No. of Applications /Cycle	Application Rate	Price
Gramoxone	2	2.5 litres / application	$48.00/litre

b) Labour

The farmer uses hired labour and family labour for the taro enterprise.

Hired Labour:

Hired labour is paid at a rate of $21.69/day for the following task.

Task	No. of workers	Time Spent per Worker (Days)	Total Labour Days
Slashing	4	2	8

Family Labour:

Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Days)	Total Labour Days
Planting	5	2	10
Weeding/Spraying	2	1	2
Harvesting	4	2[a]	8
Marketing	1	4	4

c) Capital Costs

There are no significant capital costs for the taro enterprise

Enterprise Budget for TLB Tolerant Taro

GROSS MARGIN BUDGET FOR TLB TOLERANT TARO

Variety	**Leaf Blight Tolerant**

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	4,000
(B) Area (Acres):	1
Plant Spacing:	1m x 1m
Growth Period (months):	8-10
No. of taro per basket (pile):	12-15
No. of taro per basket (piles sold):	266
© No. of working hours per day:	8

INCOME ($)	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
Taro	266	piles @	$20.00	$5,320.00
(D) Total Income				**$5,320.00**

DIRECT COSTS ($)	**QUANTITY**	**UNIT**	**UNIT PRICE**	**TOTAL**
Planting Material (tiapula)	4,000	Suckers @	$0.20	$800.00
Crops Husbandry				
Weed control				
Gramoxone	5	1 x 5 litre	$48.00	$185.00
Selling Costs				
Transport to market	4	trips	$10	$40.00
Hire of Stall	4	days	$10	$40.00
Labour				
Hired labour	8	days @	$21.69	$173.52
(E)Total Direct Costs				**$1,238.52**
(F) GROSS MARGIN ($)				**$4,081.48**
Gross margin per labour inputs(F/H)				**$170.06**
Gross margin per plants(F/A)				**$1.02**
Gross margin per acre(F/B)				**$4,081.48**

LABOUR INPUTS (days)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL DAYS
Land Preparation(Slashing)	8		8
Planting		10	10
Weed /Spraying		2	2
Harvesting		8	8
Marketing		4	4
TOTAL LABOUR REQUIREMENTS-DAYS	**8**	**24**	**32**
Average Wage Rate ($/hour)(I)			$21.69
Total Cost of hired labour (I*G)			$173.52
(J) Total Costs of Family labour (I*H)			$520.56
Total family labour requirement (days)			24
GROSS MARGIN - including costs of family labour cost (F-J)			**$3,560.92**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yield (no. of Basket)	Price($/basket or pile)		
	$15.00	$20.00	$25.00
100	$261.48	$761.48	$1,261.48
266	$2,751.48	$4,081.48	$5,411.48
300	$3,261.48	$4,761.48	$6,261.48

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

3.4 TA'AMU (GIANT TARO)

Enterprise Background for Ta'amu (Giant Taro)

This gross margin budget represents a 0.4 acre fully commercial Ta'amu (Giant Taro) enterprise, selling 700 plants.

a) Production Information

Planting Material:
Headsets or young suckers (4-5 leaves) can be used for planting material. In this instance, suckers are used in preference to headsets, as they will reach maturity earlier than a head set.

Mortality Rate of Plants:
The mortality rate of TLB tolerant taro is minimal, given the quality of planting material used.

Planting Density:
Approximately 700 ta'amu suckers are planted in a 0.4 acre plot at a spacing of 1.5m x 1.5m.

Cropping System:
Ta'amu can be intercropped with crops such as banana or coconut, however, in this instance;ta'amu is grown as a monocrop.

Growth Period:
Ta'amu has a 12 - 18 month growth period.

Number of Months to Harvesting:
Ta'amu is harvested from 12 to 18 months after planting, when corms reach approximately 2.5 ft in length.

Planting Time:
Ta'amu can be planted all year round, however, the best months for planting is during the wet season (November - April) when growing conditions are optimal.

b) Income

Harvestable/Saleable Yield:
Approximately 700 ta'amu corms are harvested and sold on a per corm basis.

Price:
The price of ta'amu ranges from $15.00-$30.00 per corm throughout the year, depending on corm size. The assumed price for the enterprise budget is $20.00/corm.

c) Direct Costs

Planting Material:
Ta'amu suckers are purchased from other farmers for $50/100 suckers (i.e. $0.50 each).

Pest and Disease Control:
Ta'amu is a hardy crop and is rarely affected by pests and disease; hence no pest and disease control measures are taken.

Weed Control:
The following product is applied during land preparation to control weeds:

Product Name	No. of Applications/Cycle	Application Rate	Price
Gramoxone	2	2.5 litres/application	$48/litre

Fertiliser:
No fertilizer is applied.

d) Labour

The farmer uses hired labour and family labour for the ta'amu enterprise.

Hired Labour:
Hired labour is paid at a rate of $21.69/day for the following task.

Task	No. of workers	Time Spent per Worker (Days)	Total Labour Days
Slashing	4	2	8

Family Labour:
Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Days)	Total Labour Days
Planting	4	1	4
Weeding/ Spraying	1	4	4
Harvesting	4	4	16
Marketing	1	16	16

[a] 8 harvests @ 4 hours/person/harvest = 32 (4 days)

e) Capital Costs

There are no significant capital costs for the ta'amu enterprise.

Enterprise Budget for Ta'amu (Giant Taro)

GROSS MARGIN BUDGET FOR TAAMU (GIANT TARO)

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	700
(B) Area (Acres):	0.4
Plant Spacing:	1.5m x 1.5m
Growth Period (months):	16
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
taro	700	corms @	$20.00	$14,000.00
(D) Total Income				**$14,000.00**

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
Planting Material (tiapula)	700	suckers @	$0.50	$350.00
Crops Husbandry				
Weed control				
Gramoxone	5	One 5 litre	$185.00	$185.00
Selling Costs				
Transport to market	8	trips	$10	$80.00
Hire of Stall	8	days	$10	$80.00
Labour				
Hired labour	8	days	$21.69	$173.52
(E)Total Direct Costs				**$868.52**
(F)GROSS MARGIN ($) (D-E)				***$13,131.48***
Gross margin per family labour day (F/H)				**$328.29**
Gross margin per plants(F/A)				**$18.76**
Gross margin per acre(F/B)				**$32,828.70**

LABOUR INPUTS (days)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL DAYS
Land Preparation(Slashing)	8	0	8
Planting		4	4
weed control		4	4
Harvesting		16	16
Marketing		16	16
TOTAL LABOUR REQUIREMENTS-DAYS	**8**	**40**	**48**
(I)Average Wage Rate ($/day)			$21.69
Total Cost of hired labour (I*G)			$173.52
(J) Total Costs of Family labour (I*H)			$867.60
Total family labour requirement (days)			40
GROSS MARGIN - including family labour cost (F-J)			**$12,263.88**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yield (no. of taamu)	Price($/corm)			
	$10.00	$15.00	$20.00	$25.00
600	$5,131.48	$6,690.00	$11,131.48	$14,131.48
700	$6,131.48	$8,190.00	$13,131.48	$16,631.48
800	$7,131.48	$9,690.00	$13,131.48	$19,131.48

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

VEGETABLE BUDGETS

4.1 Capsicum (Sweet Pepper)

Enterprise Background for Capsicum

This gross margin budget represents a 1 acre fully commercial Sweet Pepper enterprise.

The farmer plants 30,000 plants, of which 1,500 are assumed to not survive (5 per cent mortality).

Capsicums are harvested from 28,500 surviving plants and are sold in packets locally.

a) Production Information

Planting Material:

Sweet Pepper seedlings are ready to be transplanted after 6 to 8 weeks when the seedlings are 150 to 200 mm tall.

Mortality Rate of Plants:

Approximately 5 per cent of plants do not survive (1,500 plants).

Planting Density:

Approximately 30,000 seedlings are planted into a 1 acre plot, at a plant spacing of 0.4m x 0.3m.

Cropping System:

Capsicums are grown as a monocrop. In addition, staking and/or trellises are also recommended to avoid fruit losses when production per plant is high and the peppers are large.

Growth Period:

Capsicum has a 3-5 month growth period.

Number of Months to Harvesting:

Capsicums are harvested from 3 months (12 weeks) up to 5 months.

Planting Time:

Capsicum are planted all year round, however, the best yields are obtained in the dry season (April – October).However, in this season, bell peppers need to be irrigated; therefore, access to sufficient water and an efficient irrigation system are required

b) Income

Harvestable/Saleable Yield:

Capsicum for sale are harvested from approximately 28,500 plants, after taking into account a 5 per cent loss (1500 plants) due to non-germinating seeds and insect damage.

Capsicum are harvested into 12 kg containers, and then placed in 5" x 9" plastic packets for sale.

Approximately 27012kg containers are harvested, with 30 packets on average, per 12kg container. A total of 8,100 packets are sold.

Price:

Income	Item	Quantity
Expected yield	Harvested	750 12kg cartons per hectare 270 crates per acre
	Graded and packed	30 packages/carton 8,100 packages/acre

Rate	Price (SAT $)	Standard Budget
8,100 packets/acre	$6/packets	$48,600/acre
Gross Income		**$48,600/acre**

The price for capsicum ranges from $4.00-$8.00/packet throughout the year. The average price is $6.00/packet.

c) Direct Costs

Planting Material:

Sweet Pepper seedlings can be bought from Nu'u Crops Division (MAF) for $1 each.

Pest and Disease Control:

Capsicum are affected by Phytophthora blight, Damping-off, Bacterial wilt, TMV, thrips and mites.

The following products are used to control pests and disease:

Product Name	Quantity	Application Rate	Price
Cusol 7mls/ltr	105mls/459m2 925mls/acre 1 litre/acre	1 litre/acre	$40.00 / litre
Conqueror 15mls/ltr	225mls/459m2 926mls/acre 1 litre/acre	1 bottle/ 200mls 926mls/acr	$35/ bottle $175/ac
Slug Out	2.5kg/459m2	1bag(10 kg) 7.5kg/459m2 (3 times) 66kg/acre	$300/ 10kg $1800/ acre

Fertiliser:

Fertiliser is applied six times during the production cycle. One pre-planting application is placed into the hole where the seedlings will be planted (i.e. Chicken Manure). A second application is made around the plant (Urea) and two foliar fertilizers spraying once (1) the seeds have germinated and emerged above the soil surface and two (2) in the middle of the growing season.

The following product is used for fertilising:

Product Name	Quantity	Rate	Price
Orchid Foods -Liquid Fertilizer	18 bottle/500 ml	$25 / 500ml	$450.00
Chicken manure	96 bags	$10/10 kg bag	$960.00
Urea	1	40 kg bag / application	$160 / 40kg bag

Selling Costs:

The main cost associated with the selling of capsicum is the cost of Transport. The average cost of transporting capsicum produce to the marketplace for one month is $150. Hence, the harvesting period can last for three months.

	Quantity	Rate	Price
Transport	3 months	$150/month /acre	$450/3 months/acre

Packaging

A total of 4,230 packets are sold.

Item	Quantity	Rate	Price
Packaging	8,100 plastic bags	1 lb=100 plastic bags $10=1lb	$810/ acre

Irrigation

The average cost of providing irrigation for one acre is $50/month. It is also assumed that the farmer provides irrigation for 3-4 months after transplanting.

d) Labour

The farmer uses both hired labour and family labour for the tomato enterprise.

Hired Labour:

Hired labour is paid at a rate of $24/day for the following tasks. Hired labour are used mainly for land preparation and planting. Further, 8 hired labourers will only be used for 2 weeks.

Item	Quantity	Rate	Price
Hire	1 month/acre (4 weeks)	$24/day/acre $144/week/ 1 labourer	$2,304/acre

Family Labour:

Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours	Total Labour Days
Planting	2	24	48	6
Fertilising	1	8	8	1
Harvesting	3	40	120	15
Packing, Sorting	3	40	120	15
Marketing	1	240	240	30

a) Capital Costs

The following capital items are required for growing capsicum. These items would also be used for other cropping enterprises.

- Mist blower $2,300
- Knapsack sprayer $280

GROSS MARGIN BUDGET FOR CAPSICUM

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	30,000
(B) Area (Acres):	1
Plant Spacing:	0.4m x 0.3m
Growth Period (months):	3 - 5 MONTHS
Mortality (%)	5%
No. of plants harvested for sale:	28,500
No. of packets per carton:	30
average weight per packet(lbs)	1.4
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
CAPSICUM	8,100	packet @	$6.00	$48,600.00
(D) Total Income				**$48,600.00**

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT COST	TOTAL
Planting Material	30,000	capsicum seedling	$1.00	$30,000.00
Crops Husbandry				
Pest & Diseases				
Cusol	1 litre	1 litre	$40/1 litre	$40.00
Conquerer	1 litre	1 bottle/200mls	$35/bottle	$175.00
Slug Out	60 kg/acre	10kg bag	$300/10kg	$1,800.00
Fertilizer				
NPK (12:5:40)	1	40kg bag	$160/40kg	$160.00
Chicken Manure	23bags/acre	1bag/10kg	$10/1bag	$230
Irrigation				
Water	4 months	$50/monthly	$50.00	$200.00
Packaging				
	8,100 plastic bags	1 lb=100 bags	$10/ 1lb	$810.00
Selling Costs				
Transport (farmer)	3 months	monthly	$150	$450.00
Labour				
Hired Labour	8 labourers/2 wks	1 fortnight	$1,152/week	$2,304.00
(E)Total Directs Cost:				**$36,169.00**
(F) GROSS MARGIN ($) (D-F)				***$12,431.00***

Gross Margin per family labour input (F/H)

Gross Margin per plant (F/A)

LABOUR INPUTS (DAYS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation		2	8
Planting		2	4
Pest/Disease Control		1	1
Weed Control		1	1
Fertilising		2	2
Harvesting		3	3
Packing/Sorting		2	3
Marketing		1	1
TOTAL LABOUR REQUIREMENTS (DAYS)	**12**	**14**	**23**
Average Wage Rate ($/hour) (I)			$21.69
Total Cost of hired labour (I*G)			$173.52
(J) Total Costs of Family labour (I*H)			$303.66
Total family labour requirement (days) (H/C)			$5,007.57
GROSS MARGIN - including costs of family labour (F-J)			

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

	Price ($/packet)		
Yeild (no. of Packets)	$4.00	$6.00	$8.00
6,000	$24,000.00	$36,000.00	$48,000.00
8,100	$32,400.00	$48,600.00	$64,800.00
10,000	$40,000.00	$60,000.00	$80,000.00

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

4.2 Tomatoes

Enterprise Background for Tomatoes

This gross margin budget represents a 1 acre fully commercial tomato enterprise.

The farmer plants 14,400 plants, of which 720 are assumed to not survive (5 per cent mortality).

Tomatoes are harvested from 13,680 surviving plants and are sold in packets locally.

RECOMMENDED VARIETIES: **Heat-master,Big-beef, King-kong**

Area covered under walkways = 446m^2

e) Production Information

Planting Material:
Seedlings raised from the Nursery are transplanted directly into field beds.

Mortality Rate of Plants:
Approximately 5 per cent of plants do not survive (720 plants).

Planting Density:
Approximately 14,400 seeds are planted into a 1 acre plot, at a plant spacing of 0.5m x 0.5m.

Cropping System:
Tomatoes are grown as a monocrop.

Growth Period:
Tomatoes have a 5-6 months growth period.

Number of Months to Harvesting:
Tomatoes are harvested from 3 months (12 weeks) up to 5 months.

Planting Time:
Tomatoes are planted all year round; however, the best yields are obtained in the dry season (June-August).

f) Income

Harvestable/Saleable Yield:
Tomatoes for sale are harvested from approximately 13,680 plants, after taking into account a 5 per cent loss (720 plants) due to non-germinating seeds and insect damage.

Tomatoes are harvested into crates, and then placed in 5" x 9" plastic packets for sale.

Approximately 105crates are harvested, with 40 packets on average, per crate. A total of 4,230 packets are sold.

Price:

Income	Item	Quantity
Expected yield	Harvested	12 crates per 459 m^2 (4 crates/harvest) 105 crates per acre
	Graded and packed	40 packages/crate 480 packages/459m^2 4,230 packages/acre

Rate	Price (SAT $)	Standard Budget
2112kg/acre	$15/0.45kg Or $15/lb	$70,399
4,230packets/acre	$10/packets	$42,230/acre
Gross Income		**$42,300/acre**

g) Direct Costs

Planting Material:
Tomato seedlings can be bought from Nuu Crops Division (MAF) for $1 each.

Pest and Disease Control:
Tomatoes are affected by fungal leaf spot, powdery mildew, cluster caterpillars, ladybirds and the fruit piercing moth.

The following products are used to control pests and disease:

Product Name	Quantity	Application Rate	Price
Cusol 7mls/ltr	105mls/459m2 925mls/acre 1 litre/acre	1 litre/acre	$40.00 / litre
Conqueror 15mls/ltr	225mls/459m2 926mls/acre 1 litre/acre	1 bottle/ 200mls 926mls/acr	$35/ bottle $175/ac
Slug Out	2.5kg/459m2	1bag(10 kg) 7.5kg/459m2 (3 times) 66kg/acre	$300/ 10kg $1800/ acre

Fertiliser:
Fertiliser is applied twice during the production cycle. One pre-planting application is placed into the whole where the seedling will be planted. A second application is made around the plant, once the tomato seedlings have grown on the field for a month (4 weeks).

The following product is used for fertilising:

Product Name	Quantity	Rate	Price
Orchid Foods -Liquid Fertilizer	18 bottle/500ml	$25 / 500ml	$450.00
Chicken manure	96 bags	$10/10 kg bag	$960.00
Urea	1	40 kg bag / application	$160 / 40kg bag

Selling Costs:
The main cost associated with the selling of tomatoes is the cost of Transport. The average cost of transporting tomato produce to the marketplace for one month is $150. Hence, the harvesting period can last for three months.

	Quantity	Rate	Price
Transport	3 months	$150/month/acre	$450/3 months/acre

Packaging

A total of 4,230 packets are sold.

Item	Quantity	Rate	Price
Packaging	42,230 plastic bags	1 lb=100 plastic bags $10=1lb	$4223/ acre

Irrigation

The average cost of providing irrigation for one acre is $50/month. It is also assumed that the farmer provides irrigation for 3-4 months after transplanting.

h) Labour

The farmer uses both hired labour and family labour for the tomato enterprise.

Hired Labour:

Hired labour is paid at a rate of $24/day for the following tasks. Hired labour are used mainly for land preparation and planting. Further, 8 hired labourers will only be used for 2 weeks.

Item	Quantity	Rate	Price
Hire	1 month/acre (4 weeks)	$24/day/acre $144/week/ 1 labourer	$2,304/acre

Family Labour:

Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours	Total Labour Days
Planting	2	3	1	1
Fertilising	1	2	1	1
Harvesting	3	4	1	1
Packing, Sorting	2	3	1	1
Marketing	2			

i) Capital Costs

The following capital items are required for growing tomatoes. These items would also be used for other cropping enterprises.

- Mist blower $2,500
- Knapsack sprayer $280

GROSS MARGIN BUDGET FOR TOMATO

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	14,400
(B) Area (Acres):	1
Plant Spacing:	0.5m x 0.5m
Growth Period (months):	5-6
Mortality (%)	5%
No. of plants harvested for sale:	13,680
Average yield(barrels):	94
No. of packets per barrel:	40
average weight per packet(lbs)	1.4
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
TOMATOES	3,765	packet @	$10.00	$37,650.00
(D) Total Income				**$37,650.00**

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT COST	TOTAL
Planting Material	14,400	tomato seedling	$1.00	$14,400.00
Crops Husbandry				
Pest & Diseases				
Cusol	1 litre	1 litre	$40/1 litre	$40.00
Conquerer	1 litre	1 bottle/200mls	$35/bottle	$ 175.00
Slug Out	60 kg/acre	10kg bag	$300/10kg	$1,800.00
Fertilizer				
NPK (12:5:40)	1	40kg bag	$160/40kg	$160.00
Chicken Manure	23bags/acre	1bag/10kg	$10/1bag	$230
Irrigation				
Water	4 months	$50/monthly	$50.00	$200.00
Packaging				
	42,230 plastic bags	1 lb=100 bags	$10/ 1lb	$4,223.00
Selling Costs				
Transport (farmer)	3 months	monthly	$150	$450.00
Labour				
Hired Labour	8 labourers/2 wks	1 fortnight	$1,152/week	$2,304.00

(E)Total Directs Cost:	**$26,286.00**
(F) GROSS MARGIN ($) (D-F)	***$11,364.00***
Gross Margin per family labour input (F/H)	
Gross Margin per plant (F/A)	

LABOUR INPUTS (DAYS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation		2	8
Planting		2	4
Pest/Disease Control		1	1
Weed Control		1	1
Fertilising		2	2
Harvesting		3	3
Packing/Sorting		2	3
Marketing		1	1
TOTAL LABOUR REQUIREMENTS (DAYS)	**12**	**14**	**23**
Average Wage Rate ($/hour) (I)			$21.69
Total Cost of hired labour (I*G)			$173.52
(J) Total Costs of Family labour (I*H)			$303.66
Total family labour requirement (days) (H/C)			$5,007.57
GROSS MARGIN - including costs of family labour (F-J)			

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yeild (no. of Packets)	Price ($/packet)		
	$8.00	$10.00	$12.00
3,500	$28,000.00	$35,000.00	$42,000.00
3,765	$30,120.00	$37,650.00	$45,180.00
4,000	$32,000.00	$40,000.00	$48,000.00

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

4.3 Lettuce

Enterprise Background for Lettuce

This gross margin budget represents a 1 acre fully commercial Lettuce enterprise.

The farmer plants 120,000 plants, of which 6,000 are assumed to not survive (5 per cent mortality).

Lettuces are harvested from 114,000 surviving plants and are sold locally to markets available.

j) Production Information

Planting Material:

Seeds are planted in trays of compost and are raised in a nursery. Seedlings are transplanted into the plot after 3-4 weeks. Further, there are 3,088 seedling trays of lettuce that needs to cover 1 acre.

Mortality Rate of Plants:

Approximately 5 per cent of plants do not survive (6,000 plants).

Planting Density:

Approximately 114,000 seedlings are planted into a 1 acre plot, at a plant spacing of 0.15m x 0.2 m.

Cropping System:

Lettuces are grown as a monocrop.

Growth Period:

Lettuces have a 3 months growth period.

Number of Months to Harvesting:

Lettuces are harvested from Week 12 to Week 14 of the production Cycle (3 months).

Planting Time:

Lettuce are planted all year round, however, the best yields are obtained in the dry season (April – November).

k) Income

Harvestable/Saleable Yield:

Lettuces for sale are harvested from approximately 114,000 planlets after taking into account a 5 per cent loss (335 plants) due to non-germinating seeds and insect damage.

Lettuces are harvested into containers or crates, and then placed in5" x 9" plastic packets for sale.

Approximately 114,000 lettuces are harvested, with **10% of rejects or non-marketable yield**. A total of 102,600 lettuces are sold.

Price:

The price for lettuce ranges from $2.00-$4.00/packet throughout the year. The average price is $3.00/packet.

l) Direct Costs

Planting Material:

Packets of seeds are purchased from local farm supply stores (10 x 50 gram packets @ approx. $3.50 per packet).

Pest and Disease Control:

Lettuces are affected by fungal leaf spot, powdery mildew, cluster caterpillars, ladybirds and the fruit piercing moth.

The following products are used to control pests and disease:

Product Name	No. of Applications/ Cycle	Rate	Price
Cusol	1	15ml /15litre	$40.00 / litre

Fertiliser:

Fertiliser is applied six times during the production cycle. One pre-planting application is placed into the hole where the seedlings will be planted (i.e. Chicken Manure). A second application is made around the plant (Urea) and two foliar fertilizers spraying once (1) the seeds have germinated and emerged above the soil surface and two (2) in the middle of the growing season.

The following product is used for fertilising:

Product Name	Quantity	Rate	Price
Orchid Foods -Liquid Fertilizer	18 bottle/500 ml	$25 / 500ml	$450.00
Chicken manure	96 bags	$10/10 kg bag	$960.00
Urea	1	40 kg bag / application	$160 / 40kg bag

Selling Costs:

Lettuces are harvested once during the production cycle. Three trips to market are required for the harvest.

m) **Labour**

Hired labour is paid at a rate of $24/day for the following tasks. Hired labour are used mainly for land preparation and planting. Further, 8 hired labourers will only be used for 2 weeks.

Item	Quantity	Rate	Price
Hire	1 month/acre (4 weeks)	$24/day/acre $144/week/ 1 labourer	$2,304/acre

Family Labour:

Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours	Total Labour Days
Planting	1	8	8	1
Fertilising	1	8	8	1
Harvesting	3	8	24	1
Packing, Sorting	3	8	24	1
Marketing	1	72	72	3

b) Capital Costs

The following capital items are required for growing Lettuce. These items would also be used for other cropping enterprises.

- Knapsack sprayer $280

GROSS MARGIN BUDGET FOR LETTUCE

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	114,000
(B) Area (Acres):	1
Plant Spacing:	0.15m x 0.2m
Growth Period (months):	3
Mortality (%)	5%
No. of plants harvested for sale:	102,600
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
Lettuce	51,300	packet @	$3.00	$153,900.00
(D) Total Income				**$153,900.00**

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
Planting Material	3,088	trays	$13.00	$ 40,144.00
Crops Husbandry				
Peast & Diseases				
Cusol	1	1 litre	$40/litre	$ 40.00
Fertilizer				
Orchid Food-Liquid fertilizer	18	1 bottle/500ml	$25/500ml	$ 450.00
Chicken Manure	96	10kg bag/app	$10/10kg	$ 960.00
Urea	1	40kg bag/app	$160/40kg bag	$ 160.00
Selling Costs				
Transport (farmer)	30	trips	$10	$ 300.00
Labour				
Hired Labour	8 labors	12 days	$24.00	$ 2,304.00
CAPITAL COSTS ($)				
Knapsak Sprayer			$280	$ 280.00
Hiring of Excavator		1		***$ 7,000.00***
(E) Total Direct Costs ($)				***$ 51,638.00***

(F) GROSS MARGIN ($) (D-C)	**$102,262.00**
Gross Margin per family labour input (F/H)	**$213.74**

Gross Margin per plant (F/A)	**$3.18**
Gross Margin per acre (F/B)	**$35,800.68**

LABOUR INPUTS (HOURS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation	3		16
Planting		1	8
Fertilising		1	8
Harvesting		3	24
Packaging		3	24
Marketing		1	72
TOTAL LABOUR INPUTS	**3**	**9**	**152**
Average Wage Rate ($/hour) (I)			$2.71
Total Cost of hired labour (I*G)			$8.13
(J) Total Costs of Family labour (I*G)			$24.39
Total family labour requirement (days) (H/C)			$1.13
GROSS MARGIN - including costs of family labour (F-J)			**$36,326.00**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yeild (no. of Lettuce)	Price ($/packet)		
	$2.00	$3.00	$4.00
40,000	$80,000.00	$120,000.00	$160,000.00
51,300	$102,600.00	$153,900.00	$205,200.00
60,000	$120,000.00	$180,000.00	$240,000.00

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

4.4 Water Spinach (Kang Kong)

Enterprise Background for Water Spinach (Kang Kong)

This gross margin budget represents a 1 acre Water Spinach(Kang Kong) enterprise.

The farmer plants 14,400 plants, of which 720 are assumed to not survive (5 per cent mortality).

Water Spinach (Kang Kong)are harvested from 13,680 surviving plants and are sold in bundles at the local market.

n) Production Information

Planting Material:

Seeds are planted directly into seedbeds. It is also recommended to have 3 seeds in each hole.

Mortality Rate of Plants:

Approximately 5 per cent of plants do not survive (720 plants).

Planting Density:

Approximately 14,400 seeds are planted into a 1 acre plot, at a plant spacing of 0.5m x 0.5m.

Cropping System:

Water Spinach are grown as a monocrop.

Growth Period:

Water Spinach has a 3-5 month growth period.

Number of Months to Harvesting:

Water Spinach are harvested from 2 months (8 weeks) and then every other month afterwards (4 weeks) for up to 5 months.

Planting Time:

Water Spinachare planted all year round.

Income

Harvestable/Saleable Yield:

Water Spinach bundles for sale are harvested from approximately 13,680 plants, after taking into account a 5 per cent loss (720 plants) due to non-germinating seeds and insect damage.

Two Bundles are produced from the harvest of each plant. The tips (i.e. approx. 30cm) of Kang Kong are tied together using a string to get one bundle.

Approximately 1,520 plants are harvested, with 2 bundles on average, per plant. A total of 3,040 bundles are sold.

Price:

The price for Water Spinach ranges from $2.00-$4.00/bundles throughout the year. The average price is $3.00/bundle.

o) Direct Costs

Planting Material:

Cuttings of Water Spinach can be supplied by the Crops Division free of charge.

Pest and Disease Control:

Water Spinach is not affected by any major disease but it is highly vulnerable to the African Snail *Achatinafulica* especially in the early stages of growth.

The following product is used to control slugs and snails:

Product Name	No. of Applications/Cycle	Application Rate	Price
Slug Bait	2	10 kg sack	$300 / sack

Fertiliser:

Fertiliser is applied once during the production cycle. Chicken manure is applied during Land Preparation before planting.

The following product is used for fertilising:

Product Name	No. of Applications/Cycle	Application Rate	Price
Chicken Manure	2	10 kg bag / application	$10 / 10kg bag

p) Labour

Hired Labour:

Hired labour is paid at a rate of $24/day for the following tasks. Hired labour are used mainly for land preparation and planting. Further, 8 hired labourers will only be used for 2 weeks.

Item	Quantity	Rate	Price
Hire	**1 month/acre (4 weeks)**	**$24/day/acre $144/week/ 1 labourer**	**$2,304/acre**

Family Labour:

Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours	Total Labour Days
Planting	2	24	48	6
Harvesting	3	40	120	15
Packing, Sorting	3	40	120	15
Marketing	1	240	240	30

c) Capital Costs

The following capital items are required for growing Water Spinach. These items would also be used for other cropping enterprises.

- Knapsack sprayer $280
- Hiring of Excavator $7,000

GROSS MARGIN BUDGET FOR WATER SPINACH (KANG KONG)

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	14,400
(B) Area (Acres):	1
Plant Spacing:	0.5m x 0.5m
Growth Period (months):	5-Jan
Mortality (%)	5%
No. of plants harvested for sale:	13,680
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
WATER SPINCH	27,360	bundles @	$3.00	$82,080.00
(D) Total Income				***$82,080.00***

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
Planting Material	13,680	cuttings	free	$0.00
Crops Husbandry				
Peast& Diseases				
Slug Bait	2	10kg sack	$300	$600.00
Fertilizer				
Chicken Manure	10	10kg bag	$10/10kg	$100.00
Selling Costs				
Transport (farmer)	30	trips	$10	$300.00
Labour				
Hired Labour	8 labors	12 days	$24.00	$ 2,304.00
Capital Costs				
Knapsak Sprayer	1		$280	$280.00
Hiring of Excavator				$ 7,000.00
(E) Total Direct Costs ($)				***$10,584.00***
(F) GROSS MARGIN ($) (D-C)				***$71,496.00***
Gross Margin per family labour input (F/H)				
Gross Margin per plant (F/A)				
Gross Margin per acre (F/B)				

LABOUR INPUTS (HOURS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation	2		16
Planting	3	2	72
Harvesting		3	120
Hand weeding	1		4
Packing/Sorting		3	120
Marketing		1	240
TOTAL LABOUR INPUTS	**6**	**9**	**572**
Average Wage Rate ($/hour) (I)			$2.71
Total Cost of hired labour (I*G)			$16.26
(J) Total Costs of Family labour (I*H)			$24.39
Total family labour requirement (days) (H/C)			$1.13
GROSS MARGIN - including costs of family labour (F-J)			**$2,321.00**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yeild (no. of Water Spinach)	Price ($/packet)		
	$2.00	$3.00	$4.00
25,000	$50,000.00	$75,000.00	$100,000.00
27,360	$54,720.00	$82,080.00	$109,440.00
28,000	$56,000.00	$84,000.00	$112,000.00

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

4.5 Head Cabbage

Enterprise Background for Head Cabbage

This gross margin budget represents a 1 acre fully commercial Head cabbage enterprise.

The farmer plants 18,000 plants, of which 900 are assumed to not survive (5 per cent mortality).

Cabbages are harvested from 17,100 surviving plants and are soldlocally at available markets.

q) Production Information

Planting Material:

Seeds are planted in trays of compost and are raised in a nursery. Seedlings are transplanted into the plot after 3-4 weeks.

Mortality Rate of Plants:

Approximately 5 per cent of plants do not survive (900 plants).

Planting Density:

Approximately 18,000 seedlings are planted into a 1 acre plot, at a plant spacing of 0.4m x 0.5m.

Cropping System:

Head Cabbage is grown as a monocrop.

Growth Period:

Cabbages have a 3 months growth period.

Number of Months to Harvesting:

Head Cabbages are harvested from Week 12 to Week 14 of the production Cycle (3 months).

Planting Time:

Head Cabbage are planted all year round, however, the best yields are obtained in the dry season (April – November). Also, the best time for planting is early hours of the morning and late in the evening.

r) Income

Harvestable/Saleable Yield:

Head Cabbages for sale are harvested from approximately 17,100 plants, after taking into account a 5 per cent loss (900 plants) due to non-germinating seeds and insect damage.

Approximately 17,100 cabbages are harvested, with **10% of rejects or non-marketable yield**. A total of 15,390 cabbages are sold.

Head Cabbages are sold by each depending on the size and the weight.

Price:

The price for Head Cabbages ranges from $3.00-$8.00 depending on the size

throughout the year. The average price is $5.00/each.

s) Direct Costs

Planting Material:

Packets of seeds are purchased from local farm supply stores (10 x 50 gram packets @ approx. $3.50 per packet).

Pest and Disease Control:

Insects (i.e. Diamond-back moth, Large cabbage moth, Cabbage Centre Crub and Army Worm) are the most severe pests of Head Cabbage.

The following products are used to control pests and disease:

Product Name	Quantity	Application Rate	Price
Prevathon		1 litre/acre	$73.00 / 500g
Dipel 10g/10ltr			$197/500g
Attack 140ml/acr	70ml/2023m2		$50/200ml

Fertiliser:

The following product is used for fertilising:

Product Name	Quantity	Rate	Price
Orchid Foods -Liquid Fertilizer	18 bottle/500 ml	$25 / 500ml	$450.00
Chicken manure	96 bags	$10/10 kg bag	$960.00
Urea	1	40 kg bag / application	$160 / 40kg bag

Selling Costs:

Lettuces are harvested once during the production cycle. Three trips to market are required for the harvest.

The main cost associated with the selling of cabbages is the cost of Transport. The average cost of transporting tomato produce to the marketplace for one month is $150.

Irrigation

The average cost of providing irrigation for one acre is $50/month. It is also assumed that the farmer provides irrigation for 3-4 months after transplanting.

t) **Labour**

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours	Total Labour Days
Land preparation	2	8	16	2
Planting	3	24	72	3
Spraying	1	28	28	3.5
Hand weeding	2	1	4	0.5
Fertilising	1	12	12	1.5

Family Labour:

Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours	Total Labour Days
Planting	2	24	48	6
Fertilising	1	8	8	1
Harvesting	3	8	24	1
Packing, Sorting	3	8	24	1
Marketing	1	144	144	6

d) Capital Costs

The following capital items are required for growing cabbages. These items would also be used for other cropping enterprises.

- Mist blower $2,300
- Knapsack sprayer $280

GROSS MARGIN BUDGET FOR HEAD CABBAGE

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	2,529
(B) Area (Acres):	0.3
Plant Spacing:	0.8m x 0.6m
Growth Period (months):	3
Mortality (%)	5%
No. of plants harvested for sale:	2,400
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
HEAD CABBAGE	2,400	packet @	$3.00	$7,200.00
(D) Total Income				***$7,200.00***

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
Planting Material	10	50g	$3.50	$35.00
Crops Husbandry				
Peast& Diseases				
Orthene	1	50g pkt	$6/pkt	$42.00
Weed Control				
Sting	1	5 litre	$160/5 litres	$160.00
Fertilizer				
NPK (12:5:20)	1	40kg bag/app	$160/40kg	$160.00
Selling Costs				
Transport (farmer)	40	trips	$10	$400.00
Hire of Stall	30	days	$10	$300.00
Labour				
Hired Labour	9	days	$21.69	$195.00
				$1,292.00
Capital Costs				
Knapsak Sprayer			$280	$280.00
Mist blower			$2,300	$2,300.00
				$2,580.00
(F) GROSS MARGIN ($) (D-C)				***$3,872.00***
Gross Margin per family labour input (F/H)				**$332.78**
Gross Margin per plant (F/A)				**$1.31**
Gross Margin per acre (F/B)				**$12,907.00**

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LABOUR INPUTS (HOURS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation	2		16
Planting	3	2	120
Harvesting		3	24
Spraying	1		28
Hand weeding	2		4
Packing/Sorting		3	24
Fertilising	1	1	20
Marketing		1	144
TOTAL LABOUR INPUTS	**9**	**10**	**380**
Average Wage Rate ($/hour) (I)			$2.71
Total Cost of hired labour (I*G)			$24.39
(J) Total Costs of Family labour (I*H)			$27.10
Total family labour requirement (days) (H/C)			$1.25
GROSS MARGIN - including costs of family labour (F-J)			

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yeild (no. of Head Cabbage)	Price ($/packet)		
	$2.00	$3.00	$4.00
2,300	$1,272.00	$3,572.00	$5,872.00
2,400	$1,472.00	$3,872.00	$6,272.00
2,500	$1,672.00	$4,172.00	$6,672.00

4.6 Cucumber

Enterprise Background for Cucumber

This gross margin budget represents a 0.1 acre fully commercial cucumber (local variety) (kukama) enterprise.

The farmer plants 600 plants, of which 30 are assumed to not survive (5 per cent mortality).

Cucumbers are harvested from 570 surviving plants and are sold in packets at the Fugalei market.

a) Production Information

Planting Material:
Seeds are planted directly into seedbeds, using own-made seeds. Two seeds are planted per hole (300 holes).

Mortality Rate of Plants:
Approximately 5 per cent of plants do not survive (30 plants).

Planting Density:
Approximately 600 seeds are planted in 300 holes in a 0.1 acre plot, at a plant spacing of 4 ft x 4 ft.

Cropping System:
Cucumbers are grown as a monocrop.

Growth Period:
Cucumbers have 3 month growth period.

Number of Months to Harvesting:
Cucumbers are harvested from 2-3 months.

Planting Time:
Cucumbers are planted all year round, however, the best yields are obtained in the dry season (April – November).

b) Income

Harvestable/Saleable Yield:
Cucumbers are harvested from approximately 570 plants, after taking into account a 5 per cent loss (30 plants) due to non-germinating seeds and insect damage.

Cucumbers are harvested and then packed in plastic packets for sale.

Approximately 8 cucumbers are harvested per plant, with 5 cucumbers per packet. A total of 912 packets are sold.

Markets:
Packets of cucumbers are sold at the Fugalei, Taufusi and Vaitele Market.

Price:
The price for cucumbers ranges from $9.00-$12.00/packet throughout the year. The average price is $10.00/packet.

c) Direct Costs

Planting Material:
There is no cost of planting material as the farmer uses own-made seeds.

Pest and Disease Control:

The following products are used to control pests and disease:

Product Name	No. of Application s/Cycle	Application Rate	Price
Orthene (insecticide)	5	200 gram packet	$ 20.00 / packet
Slug Out	5	1 kg	$300/ 10kg
Talon (rodent control)	3	500 gram packet	$28.00 / packet

Weed Control:
The following product is applied during land preparation to control weeds:

Product Name	No. of Application s/Cycle	Application Rate	Price
Sting	1	3 litres	$42.00/litre

Fertiliser:
Fertiliser is applied twice during the production cycle. One pre-planting application is placed into the hole where the seed will be planted. A second application is made around the plant, once the tomato seeds have germinated and emerged above the soil surface.

The following product is used for fertilising:

Product Name	No. of Applications/Cycle	Application Rate	Price
NPK (12:5:20)	2	40 kg bag/application	$163/40kg bag

Selling Costs:
Cucumbers are harvested six times during the production cycle. During a production cycle, six trips are made to the Fugalei Market. The costs involved with selling to the market include transport to the market and hire of a market stall.

The fuel cost per return trip to the market it $10.00. It is assumed that the farmer also takes other agricultural produce to the market. Hence, $10.00 is estimated as a portion of the total cost of a return trip to the market. The total cost of travelling to the market is $60.00 (i.e. 6 trips @ $10.00).

The cost per day of hiring a market stall is $10.00/day. As mentioned, it is assumed that the farmer also sells other produce at this stall. In reality, the $10.00 cost would be spread across the other agricultural enterprises, however, given it is a nominal cost, for the purposes of this exercise, the full cost is attributed to the cucumber enterprise. The total cost of hiring a market stall is $60.00 (i.e. 6 days @ $10.00).

The farmer uses both hired labour and family labour for the cucumber enterprise.

d) Labour

Hired Labour:
Hired labour is paid at a rate of $2.71 per hour for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours
Land preparation	2	3	6
Planting	2	3.5	7
Spraying – pest & disease	1	2	2
Fertilising	2	3	6

Family Labour:
Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker (Hours)	Total Labour Hours
Harvesting/ Packing	1	18	18
Marketing	1	24	24

e) Capital Costs

The following capital items are required for growing cucumbers. These items would also be used for other cropping enterprises.

- Knapsack sprayer $280

Enterprise Budget for Cucumber

GROSS MARGIN BUDGET FOR CUCUMBER-LOCAL VARIETY

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	600	(2 seed/hole-300holes)
(B) Area (Acres):	0.1	
Plant Spacing:	4ft*4ft	
Growth Period (months):	3	
Mortality Rate (%)	5%	
No. of plants harvestable plants:	570	
Production per plant (no. of cucumbers)	5	
Total production plant (no. of cucumbers)	2,850	
No. of cucumbers per packet:	5	
No. of packets per plant:	2.4	
© No. of working hours per day:	8	

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
CUCUMBER	570	packet @	$10.00	$5,700.00
(D) Total Income				***$5,700.00***

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT COST	TOTAL
Planting Material	26	seeds pkt @	$3.50	$91.00
Land Preparation				
Sting	3	litres @	$40.00	$120.00
Crops Husbandry				
Peast& Diseases Control				
Orthene	5	15g pkt	$6.00	$35.00
Talon	3	500g pkt	$7.00	$84.00
Slug Out	1	10 kg bag	$300.00	$300.00
Fertilizer				
NPK (12:5:20)	2	40kg bag	$163/40kg	$326.00
Selling Costs				
Transport to market	6	trips	$10	$60.00
Hire of Market Stall	6	days	$10	$60.00
Labour				
Hired Labour	21	hours @	$2.71	$56.91
Other Costs				
Plastic Bags	10	lbs @	$6.60	$65.00
(E)Total Direct Costs:				**$1,197.10**
(F) GROSS MARGIN ($) (D-E)				***$4,502.90***
Gross Margin per family labour input (F/H)				**$107.21**
Gross Margin per plant (F/A)				**$7.50**
Gross Margin per acre (F/B)				**$45,029.00**

LABOUR INPUTS (DAYS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation	6		6
Planting	7		7
Pest/Disease Control	2		2
Fertilising	6		6
Harvesting/Packaging		18	18
Marketing		24	24
TOTAL LABOUR INPUT	**21**	**42**	**63**
Average Wage Rate ($/hour) (I)			$2.71
Total Cost of hired labour (I*G)			$56.91
(J) Total Costs of Family labour (I*H)			$113.82
Total family labour requirement (days) (H/C)			$5.25
GROSS MARGIN - including costs of family labour (F-J)			**$3,574.69**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yield (no. of cucumbers)	Price ($/packet)		
	$8.00	$10.00	$12.00
500	$2,803	$3,803	$4,803
570	$3,363	$4,503	$5,643
600	$3,603	$4,803	$6,003

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

4.7 Chinese Cabbage

Enterprise Background for Chinese cabbage

This gross margin budget represents a 0.3 acre fully commercial Chinese cabbage (Kapisisaina) enterprise.

The farmer plants 12,000 plants, of which 600 are assumed to not survive (5 per cent mortality).

The remaining 11,400 Chinese cabbage are sold at the Fugalei, Taufusi and Vaitele market.

a) Production Information

Planting Material:
Seeds are planted in boxes of compost and are raised in a nursery. Seedlings are transplanted into the plot after 3-4 weeks.

Mortality Rate of Plants:
Approximately 5 per cent of seedlings transplanted do not survive (600 plants).

Planting Density:
Approximately 12,000 seedlings are transplanted into a 0.3 acre plot, at a plant spacing of 1ft x 1ft.

Cropping System:
Chinese cabbage is grown as a monocrop.

Growth Period:
Once transplanted, Chinese cabbage have a three month (12 weeks) growth period. As mentioned, seedlings are raised in the nursery for three to four weeks prior to transplanting.

Number of Months to Harvesting:
Chinese cabbage are harvested from Week 7 to Week 12 of the production cycle.

Planting Time:
Chinese cabbage can be planted all year round, however, the best yields are obtained in the dry season (April – November), due to cooler temperatures resulting in reduced insect damage.

b) Income

Harvestable/Saleable Yield:
Approximately 11,400 Chinese cabbages are harvested and sold, after taking into account a 5 per cent loss (600 plants) due to insect damage.

Chinese cabbage are sold in bundles of four (i.e. 11,400 plants = 2,850 bundles).

Markets:
Bundles of Chinese cabbage are sold at the Fugalei, Taufusi and Vaitele Market.

Price:
The price for Chinese cabbage ranges from $2.00-$4.00/bundle throughout the year. The average price is $3.00/bundle.

c) Direct Costs

Planting Material:
Tins of seeds are purchased from local farm supply stores (1 x 100 gram tin @ approx. $25.00 per tin).

Pest and Disease Control:
Insects (i.e. diamond-back moth, cabbage moth and other caterpillars) are the most severe pests of Chinese Cabbage.

The following products are used to control pests and disease:

Product Name	No. of Applications /Cycle	Application Rate	Price
Match	1	500ml / 15 litres H^2O	$105.00 / 500ml

Weed Control:
The following product is applied during land preparation to control weeds:

Product Name	No. of Applications/Cycle	Application Rate	Price
Sting	1	5 litres	$155 / 5 litre bottle

Fertiliser:
Fertiliser is applied twice during the production cycle. One pre-transplanting application is placed into the whole where the seedling will be transplanted. A second application is made around the plant, once the Chinese cabbage seedlings have been transplanted.

The following product is used for fertilising:

Product Name	No. of Applications/Cycle	Application Rate	Price
NPK (12:5:20)	2	40 kg bag / application	$160 / 40kg bag

Selling Costs:
Chinese cabbages are sold at the Fugalei Market twice a week, over a 6 week period. The costs involved with selling to the market include transport to the market and hire of a market stall.

The fuel cost per return trip to the market it $10.00. It is assumed that the farmer also takes other agricultural produce to the market. Hence, $10.00 is estimated as a portion of the total cost of a return trip to the market. The total cost of travelling to the market is $120.00 (i.e. 2 trips/week for 6 weeks = 12 trips @ $10.00).

The cost per day of hiring a market stall is $10.00/day. As mentioned, it is assumed that the farmer also sells other produce at this stall. In reality, the $10.00 cost would be spread across the other agricultural enterprises, however, given it is a nominal cost, for the purposes of this exercise, the full cost is attributed to the Chinese cabbage enterprise. The total cost of hiring a market stall is $120.00 (i.e. 2 days/week for 6 weeks = 12 days @ $10.00).

d) Labour

The farmer uses both hired labour and family labour for the Chinese cabbage enterprise.

Hired Labour:
Hired labour is used for transplanting and is paid at a rate of $2.71 per hour.

Task	No. of workers	Time Spent per Worker	Total Hours
Transplanting	3	16	48

Family Labour:
Family labour is used for the following tasks.

Task	No. of workers	Time Spent per Worker	Total Hours
Land Preparation	1	4	4
Planting seedlings	1	2	2
Pest Control	1	8	8
Weeding	3	8	24
Fertilising	1	8	8
Harvesting	2	12	24
Sorting/Packing	2	12	24
Marketing	1	48	48
Total			**142**

e) Capital Costs

There are no significant capital items required specifically by the Chinese cabbage enterprise. A knapsack sprayer (estimated cost of $280) and other equipment (e.g. bush knives, planting sticks, etc.) would also be used for other enterprises.

Enterprise Budget for Chinese Cabbage

GROSS MARGIN BUDGET FOR CHINESE CABBAGE

ASSUMPTIONS-ONE PRODUCTION CYCLE

(A) Average number of plants:	12,000
(B) Area (Acres):	0.3
Plant Spacing:	1 ft x 1 ft
Growth Period (months):	3
Mortality (%)	5%
No. of plants sold:	11,400
No. of plants per bundle:	4
© No. of working hours per day:	8

INCOME ($)	QUANTITY	UNIT	UNIT PRICE	TOTAL
CHINESE CABBAGE	2,850	bundles @	$3.00	$8,550.00
(D) Total Income				**$8,550.00**

DIRECT COSTS ($)	QUANTITY	UNIT	UNIT COST	TOTAL
Seeds	1	100g tin @	$25.00	$25.00
Land Preparation				
Sting	1	5 litre bottle @	$160.00	$155.00
Crops Husbandry				
Pest & Diseases				
Insecticide (Match)	1	500ml bottle @	$110.00	$110.00
Fertilizer				
NPK (12:5:20)	2	40kg bag	$160/40kg	$320.00
Selling Costs				
Transport to market	12	trips	$10	$120.00
Hire of market stall	12	days	$10	$120.00
Labour				
Hired Labour	48	hours	$2.71	$130.00
(E)Total Directs Cost:				**$980.00**
(F) GROSS MARGIN ($) (D-E)				***$7,570.00***
Gross Margin per family labour input (F/H)				**$53.31**
Gross Margin per plant (F/A)				**$0.63**
Gross Margin per acre (1/B)*F				**$68,382.33**

LABOUR INPUTS (DAYS)

TASK	(G)HIRED LABOUR	(H)FAMILY LABOUR	TOTAL HOURS
Land Preparation		4	4
Planting seed in nursery box		2	2
Transplanting	48		48
Pest and Disease Control		8	8
Weeding		24	24
Fertilising		8	8
Harvesting		24	24
Processing/Packing		24	24
Marketing		48	48
TOTAL LABOUR REQUIREMENTS (DAYS)	**48**	**142**	**190**
Average Wage Rate ($/hour) (I)			$2.71
Total Cost of hired labour (I*G)			$120.00
(J) Total Costs of Family labour (I*H)			$384.82
Total family labour requirement (days) (H/C)			$18.00
GROSS MARGIN - including family labour cost(F-J)			**$7,184.10**

SENSITIVITY ANALYSIS - EXCLUDING COST OF FAMILY LABOUR

Yeild (no. of Plants)	Price ($/bundle)		
	$2.00	$3.00	$4.00
2,550	$4,120	$6,670	$9,220
2,850	$4,714	$7,570	$10,420
3,000	$5,014	$8,020	$11,020

Note: This is a generic budget which should be used as a **GUIDE** only. Farmer's should generate budgets based on their individual situations.

5. ENTERPRISE BUDGETS FOR TREE CROPS

5.1 Banana

Enterprise Background for Banana

This development budget represents a one acre fully commercial banana enterprise (Cavendish variety), growing 500 banana plants, over a four year period.

a) Production Information

Planting Material:
Corms (bull heads) are used as planting material and are specially selected from high yielding, strong mother plants and are free of bunchy top disease, nematodes and weevils.

Cropping System:
Cavendish bananas are grown as a monocrop.

Growth Period:
In this instance, Cavendish bananas are grown over a four year period (48 months). Following the plant crop, four ratoons are harvested, prior to plant removal.

Number of Months to Harvesting:
The first crop (plant crop) can be harvested after 12 months and is followed by ratoon crops harvested on a nine month cycle, giving five harvests in four years.

- Plant crop 1-12 months
- 1st ratoon 13-21 months
- 2nd ratoon 22-30 months
- 3rd ratoon 31-39 months
- 4th ratoon 40-48 months

Product Name	No. of Applications/Cycle	Application Rate	Price
Armistar	Yr 1: 7 apps. (2 sprays/app). Yr 2-4: 8 apps (2 sprays/app).	65ml/application	$560/ltr ($36.40/ app.)
Tilt	Yr 1: 6 apps. (2 sprays/app). Yr 2-4: 7 apps (2 sprays/app).	130ml/application	$256/ltr ($33.30/ app.)
Misting Oil	Yr1: 26 sprays Yr 2-4: 30 sprays	1.3 litres/spray	$14/ltr ($18.20/spray)

Planting Time:
Bananas can be planted all year round, however, the best yields are obtained in the wet season (November-March).

b) Income

Harvestable/Saleable Yield:

Each banana crop (plant crop and subsequent ratoon crops) yields around 450 bunches of bananas over the 48 month growth period. As the banana plants age, the number of bunches remains the same, while the number of bananas per bunch reduces.

In Year 1, the yield from the plant crop is harvested and sold (450 bunches). In Year 2, yield from the first ratoon is sold (450 bunches) plus half of the yield from the second ratoon (225 bunches). Similarly in Year 3, the remaining half of the second ratoon's yield (225 bunches) plus the yield from the third ratoon (450 bunches). In Year 4, the yield from the fourth ratoon (450 bunches) is harvested and sold.

Markets:
Bunches of Cavendish bananas are sold at the Fugalei, Taufusi and Vaitele Market.

Price:

The price for Cavendish bananas is $20.00 per bunch in Years 1 and 2, $18.00 per bunch in Year 3 and $15.00 per bunch in Year 4. The reduction in price over the production period reflects a decrease in the size of bunches.

c) Direct Costs

Planting Material:
Planting material is purchased from MAF-Crops Division for $1.00 per corm.

Pest and Disease Control:
Black leaf streak is one of the most serious problems affecting bananas. Production is also reduced by scab moth and bunchy top virus.

The following products are used to control Black leaf streak. A mist blower is used to spray the plot, with 2 spray loads per application.

The following product is used to control Scab Moth.

Product Name	No. of Applications/Year	Application Rate	Price
Tridex (Black leaf control)	1 (injected into plant)	Yr 1: 100ml/acre Yr 2-4: 200ml/acre	$45/litre

Weed Control:

The following product is applied using a knapsack sprayer prior to planting and during the growth period to control weeds:

Product Name	No. of Applications/Cycle	Application Rate	Price
Gramoxone	Yr 1: 3 apps. Yr 2: 2 apps.	4 litres/app.	$45/litre

Fertiliser:

The following product is used for fertilising:

Product Name	No. of Applications/ Cycle	Application Rate	Price
NPK (12:5:20)	Yr 1: 5 apps. Yr 2: 6 apps. Yr 3-4: 7 apps.	40 kg bag / application	$160 / 40kg bag

Selling Costs:

Cavendish bananas are sold at Fugalei Market. The costs involved with selling to the market include transport to the market and hire of a market stall.

The fuel cost per return trip to the market it $10.00. It is assumed that the farmer also takes other agricultural produce to the market. Hence, $10.00 is estimated as a portion of the total cost of a return trip to the market.

In Year 1, it is assumed that bananas are harvested over an eight week period and are sold at the market one day per week during this time. Hence, the cost of transport to market is ($80.00). In Years 2-4, bananas are harvested and taken to the market for sale fortnightly (i.e. one-day for 26 weeks).In these years, the cost of transport is $260.00.

The cost per day of hiring a market stall is $10.00/day. In Year 1, the cost of hiring a market stall is $80.00 (i.e. 8 days @ $10.00 per day). In Years 2-4, the cost is $260.00 (i.e. 26 days @ $10.00 per day).

d) Labour

The farmer uses both hired labour and family labour for the Cavendish banana enterprise for the following tasks.

Task	Year 1	Year 2	Year 3	Year 4
Land preparation	3 men x 1 day	-	-	-
Planting	3 men x 2 days	-	-	-
Re-planting	1 man x 0.25 days	-	-	-
Spraying – Black Leaf	1 man x 2hrs x 13 apps.	1 man x 2 hrs x 15 apps.	1 man x 2 hrs x 15 apps.	1 man x 2 hrs x 15 apps.
Scab Moth control	1 man x 4hrs x 8 weeks	1 man x 2hrs x 52 weeks x 2 times/week	1 man x 2hrs x 52 weeks x 2 times/week	1 man x 2hrs x 52 weeks x 2 times/week
Weed control	1 man x 1 day/spray x 2 sprays	1 man x 1 day/spray x 2 sprays	-	-
Fertilising	1 man x 0.5 days/app. x 4 apps.	1 man x 0.5 days/app. x 4 apps.	1 man x 0.5 days/app. x 4 apps.	1 man x 0.5 days/app. x 4 apps.
Desuckering	2 men x 0.5 days x 4 times/year	2 men x 0.5 days x 4 times/year	2 men x 0.5 days x 4 times/year	2 men x 0.5 days x 4 times/year
Deleafing	1 man x 0.5 days/month x 8 months	1 man x 0.5 days/month x 12 months	1 man x 0.5 days/month x 12 months	1 man x 0.5 days/month x 12 months

Propping	1 man x 0.5 days/ month x 8 months	1 man x 0.5 days/month x 12 months	1 man x 0.5 days/month x 12 months	1 man x 0.5 days/month x 12 months
Harvesting	2 men x 0.5 days x 8 harvests	2 men x 0.5 days x 12 harvests	2 men x 0.5 days x 12 harvests	2 men x 0.5 days x 12 harvests
Marketing	1 man x 8 days	1 man x 12 days	1 man x 12 days	1 man x 12 days

Hired labour is used for land preparation, planting, spraying for Black Leaf and de-suckering.

Family is used for the remaining tasks and is valued at the current market rate for hired agricultural labour, being $21.69 per day.

e) Capital Costs

The following capital items are required for growing Cavendish bananas. These items would also be used for other cropping enterprises.

- Mist blower $2,300
- Knapsack sprayer $280
- De-suckering tool $180 (2 @ $90.00 each)
- Spade $150 (2 @ $75.00 each)

Enterprise Budget for Banana

ASSUMPTIONS	
No. of trees per acre	289
Area (Acres)	1
Plant spacing	13.5ft x 14ft
Mortality (%)	5%
Growth period (months)	48
No. of ratoons	4
Plant crop (months)	1-12
1st ratoon (months)	13-21
2nd ratoon (months)	22-30
3rd ratoon (months)	31-39
4th ratoon (months)	40-48

INCOME ($)	Year 1	Year 2	Year 3	Year 4
Yield (No. of bunches)				
Plant crop	275			
1st ratoon		275		
2nd ratoon		121	275	
3rd ratoon			121	
4th ratoon				275
Total no of bunches sold	275	396	396	275
Price ($/bunch)	30	30	25	20
Sale of bananas	8,250	11,880	9,900	5,500
Total Income	**$8,250**	**$11,880**	**$9,900**	**$5,500**

DIRECT COSTS ($)				
Planting material (289 corms @ $1.00)	289	0	0	0
Crop husbandry				
Pest and disease control				
Tilt ($33.30/130ml application)	200	233	233	233
DCD Tron ($18.20/spray)	473	546	546	546
Tridex (100-200ml/acre @ $87.00/litre)	5	10	10	10
Weed control				
Round up ($122/litre)	122	0		0
Fertiliser				
	335		469	
Marketing				
	80		260	
Hire of market stall ($5.00/day)		130		130
Hired labour		160		160
	$2,382		**$2,099**	

GROSS MARGIN ($)		**$11,180**		**$4,651**

FIXED COSTS ($)				
	280		0	
Mist blower		0		0
	180	0	0	0
Spade	150	0	0	0
Total Fixed Costs	**$2,910**	**$0**	**$0**	**$0**

NET INCOME	**$4,908**	**$11,180**	**$10,051**	**$4,651**
Net Income per family labour input	**$157**	**$119**	**$109**	**$51**
Net Income per tree	**$9.82**	**$22.36**	**$20.10**	**$9.30**

Family Labour Inputs (Days)

Task	Year 1	Year 2	Year 3	Year 4
Land Preparation - spraying	3	0	0	0
Planting	6	0	0	0
Replanting	0.25	0	0	0
Pest and disease control - spraying				
Black Leaf Streak control	3	4	4	4
Scab Moth control	3	26	26	26
Weed control	2	2	0	0
Fertilising	2	2	2	2
Desuckering	3	4	4	4
Deleafing	4	6	6	6
Propping	4	6	6	6
Harvesting and packing	8	26	26	26
Marketing	8	26	26	26
Total labour requirements - days	**46**	**102**	**100**	**100**
Total no. of days - hired labour	15	8	8	8
Total no. of days - family labour	31	94	92	92
Average Wage Rate ($/unit) (days)	$21.69	$21.69	$21.69	$21.69
Total cost of family labour	$672.39	$2,038.86	$1,995.48	$1,995.48
NET INCOME - including family labour cost	**$4,235.61**	**$9,141.14**	**$8055.52**	**$2,655.52**

5.2 Papaya

Enterprise Background for Papaya

This development budget represents a 1.0 acre fully commercial papaya enterprise, growing 450 plants, over a three year period.

Papaya is produced for both local and export markets (Sunset variety).

a) Production Information

Planting Material:
Seedlings purchased from MAF-Crops Division are used for planting material.

Mortality Rate of Plants:
Due to the high quality of seedlings provided by MAF, plant mortality is minimal.

Planting Density:
Approximately 450 seedlings are planted into a 1.0 acre plot, at a plant spacing of 3m x 3m.

Cropping System:
Papaya is grown as a monocrop.

Growth Period:
Papaya is grown over a three year period (36 months).

Number of Months to Harvesting:
Saleable fruit can begin to be harvested nine months after planting, and are then harvested monthly for the remainder of the growing period.

Planting Time:
Papaya can be planted all year round, however, the best time to plant is in the wet season (November-March), when there will be quick growth of plants.

b) Income

Harvestable Yield:

In Year 1, papaya are harvested on a weekly basis for three months. Each tree yields, on average, 2.5 fruit per month. A total of 3,375 papaya are harvested in Year 1 (i.e. 2.5 fruit/plant x 450 plants x 3 months).

In Year 2, papaya are harvested weekly for the whole year (i.e. 52 weeks). Each tree yields 3 fruit per month. A total of 16,200 papaya are harvested in Year 2 (i.e. 3 fruit/plant x 450 plants x 12 months).

In Year 3, papaya continues to be harvested weekly for the whole year (i.e. 52 weeks). Each tree yields 2.5 fruit per month. A total of 13,500 papaya are harvested in Year 3 (i.e. 2.5 fruit/plant x 450 plants x 12 months).

Saleable Yield:
Ten percent of harvested fruit are not fit for sale because they are misshapen or damaged, hence, the total saleable yield is:

- Year 1 3,037 fruit
- Year 2 14,580 fruit
- Year 3 12,150 fruit

Markets:
Papaya are sold locally at the Fugalei Market.

Price:
The price of papaya sold locally ranges from $0.50-$1.00 per fruit throughout the year. The average price used for the purposes of the analysis is $0.65 per fruit.

c) Direct Costs

Planting Material:
Planting material is purchased from MAF-Crops Division for $1.00 per seedling. Both female and hermaphrodite seedlings are planted. Seventy per cent of seedlings are hermaphrodites and 30 per cent are female. Larger fruit harvested from hermaphrodite plants are sold for export. Smaller fruit from hermaphrodites and fruit from females are sold locally.

Pest and Disease Control:
The main disease affecting papaya production is the *Phytophorapalmivora*.

Weed Control:
Weeds are controlled by hand weeding.

Fertiliser:
The following product is used for fertilising:

Product Name	No. of Applications	Application Rate	Price
NPK (12:5:20)	4 apps./year	Yr 1: 2 x 40 kg bag/app. Yr 2: 3 x 40 kg bag/app. Yr 3: 3 x 40 kg bag/app.	$163 / 40kg bag

Selling Costs:
Papaya for local consumption is sold at Fugalei Market. The costs involved with selling to the market include transport to the market and hire of a market stall. The fuel cost per return trip to the market it $10.00. It is assumed that the farmer also takes other agricultural produce to the market. Hence, $10.00 is estimated as a portion of the total cost of a return trip to the market.

In Year 1, papaya is harvested weekly over a three month period (12 weeks) and is sold at the market one day per week during this time. Hence, the cost of transport to market is ($120.00). In Years 2-3, papaya are harvested and taken to the market for sale weekly (i.e. one day/week for 52 weeks). In these years, the cost of transport is $520.00.

The cost per day of hiring a market stall is $10.00/day. In Year 1, the cost of hiring a market stall is $120.00 (i.e. 12 days @ $10.00 per day). In Years 2-3, the cost is $520 (i.e. 52 days @ $10.00 per day).

d) Labour

The farmer uses both hired labour and family labour for the papaya enterprise. Total labour requirements (days) for the papaya enterprise is as follows.

Task	Year 1	Year 2	Year 3
Land preparation	2 people x 2 days (4 days)	-	-
Planting	2 people x 3 days (6 days)	-	-
Weeding	2 people x 3 days (6 days)	2 people x 3 days (6 days)	2 people x 3 days (6 days)
Thinning	2 people x 1 day x 2 months (4 days)	2 people x 1 day x 3 months (6 days)	2 people x 1 day x 3 months (6 days)
Fertilising	1 person x 2 days (2 days)	1 person x 2 days (2 days)	1 person x 2 days (2 days)
Harvesting	2 people x 1 hr x 2/week x 12 weeks (6 days)	2 people x 2hrs x 2/week x 52 weeks (52 days)	2 people x 2hrs x 2/week x 52 weeks (52 days)
Marketing	1 person x 12 days (12 days)	1 person x 52 days (52 days)	1 person x 52 days (52 days)

Hired labour
Hired labour is used for land preparation; planting and weed control (Yr 1 – 16 days, Yrs 2-3 – 6 days) at a cost of $21.69/day per person.

The remaining tasks are carried out by family labour (Yr 1 – 40 days, Yrs 2-3 – 118 days). Family labour is valued at the current market rate for hired agricultural labour, being $21.69 per day.

e) Capital Costs
The following capital items are required for growing papaya.

- Fruit collection bin $480 (5 bins @ $96/bin)
- Ladder $1,520 (2 ladders @ 760/ladder)

Enterprise Budget for Papaya

DEVELOPMENT BUDGET FOR PAPAYA

ASSUMPTIONS			
(A) No. of trees per acre:	450		
(B) Area (Acres):	1		
Plant spacing:	3m x 3m		
Growth period (months):	36		
No. of fruit harvested:			
Year 1	3,375 (2.5 fruit/plant/month for 3 months)		
Year 2	16,200 (3 fruit/plant/month for 12 months)		
Year 3	13,500 (2.5 fruit/plant/month for 12 months)		
Fruit Mortality (%)	10%		
Proportion sold locally:	100%		
Local price ($/fruit)	$0.65		
INCOME ($)	**Year 1**	**Year 2**	**Year 3**
Local Market			
No. of fruit sold	3,037	14,580	12,150
Sale of papaya	$1,974.05	$9,477	$7,897.50
(C) Total Income	**$1,974.05**	**$9,477**	**$7,897.50**
DIRECT COSTS ($)			
Planting material (450 seedlings @ $1.00)	450	0	0
Land preparation			
Sting (1 litre @ $40.00/litre)	40	0	0
Crop husbandry			
Fertiliser			
NPK (12:5:20) ($163/40kg bag)	1,304	1,956	1,956
Marketing			
Transport to market ($10/trip)	120	520	520
Hire of market stall ($10.00/day)	120	520	520
Labour			
Hired labour	347.04	130.14	130.14
(D) Total Direct Costs	**$2,381.04**	**$3,126.14**	**$3,126.14**
(E) GROSS MARGIN ($) (C-D)	**-$406.99**	**$6,350.86**	**$4,771.36**

FIXED COSTS ($)			
Bins (5 @ $96/bin)	480	0	0
Ladders (2 @ $760/ladder)	1,520	0	0
(F) Total Fixed Costs	**$2,000**	**$0**	**$0**
(G) NET INCOME ($) (E-F)	**-$2,406.99**	**$6,350.86**	**$4,771.36**
Net Income per family labour input (G/I)	**-$100.29**	**$61.17**	**$42.60**
Net Income per tree (G/A)	**$5.35**	**$14.11**	**$10.60**
Net Income per acre (G x (1/B))	**-$2,406.99**	**$6,350.86**	**$4,771.36**

Family Labour Inputs (Days)

Task	**Year 1**	**Year 2**	**Year 3**
Land Preparation - spraying & slashing	4	0	0
Planting	6	0	0
Weed control	6	6	6
Fertilising	2	2	2
Fruit thinning	4	6	6
Harvesting and packing	6	52	52
Marketing	12	52	52
Total labour requirements - days	**40**	**118**	**118**
Total no. of days - hired labour	16	6	6
Total no. of days - family labour	24	112	112
Average Wage Rate ($/unit) (days)	$21.69	$21.69	$21.69
Total cost of family labour	$867.60	$2,559.42	$2,559.42
NET INCOME - including family labour cost	**-$2,772.99**	**$3,791.44**	**$2,211.94**

Note: This is a generic budget and should be used as a GUIDE only. Farmers should compile budgets for their individual situations.

5.3 Coconuts

Enterprise Background for Coconuts

The following budgets represent four scenarios for a fully commercial coconut enterprise:

- Gross margin budget for one acre of Samoan Tall coconut trees (10 year old trees);
- Development budget for one acre of Samoan Tall coconut trees (10 year timeframe);
- Gross margin budget for one acre of hybrid coconut trees (10 year old trees);and
- Development budget for one acre of hybrid coconut trees (10 year timeframe).

In these budgets, coconuts are harvested from 50 trees (one acre).

For the gross margin scenarios, a number of market outlets are considered:

- Copra (sale to Pacific Oil);
- Mature whole coconuts (sale to Krissy Company);
- mature whole coconuts (sale at Fugalei Market).

Yield and price information used to compile these budgets was taken from a review of Samoa's coconut industry, conducted by MAF in 2004.

a) Production Information

Planting Material:
Seed nuts are germinated in nursery seedbeds and transplanted as seedlings in the field, about 30 weeks after germination when tree leaves have dropped. Seedlings are either produced on-farm or provided free of charge by MAF-Crops Division.

Planting Density:
Fifty seedlings are planted into a one acre plot, at a plant spacing of 9m x 9m.

Cropping System:
Intercropping is commonly practiced, with crops such as banana and cocoa planted under coconuts. Cattle are often grazed under coconuts as well.

Growth Period:
Coconut trees have a productive life of up to 60 years[1] and commence bearing nuts between 5-7 years after planting. Coconut palms generally reach full production at 15-20 years after planting.

Number of Years to Harvesting:
In the development budget, coconuts are first harvested in Year 6 for the Samoan Tall variety and Year 5 for the hybrid variety.

[1] For the purposes of this manual, development budgets for coconuts are only compiled for the first ten years of production, despite the productive life of coconuts being up to 60 years. The maximum planning timeframe for farmers would most likely be about ten years. Farmers would be unlikely to make farm business planning decisions based on the profitability of an enterprise beyond this timeframe.

b) Income

Harvestable/Saleable Yield:

The following yields are produced by the coconut enterprises during the first ten years of production.

No. of Nuts from One Acre of Coconuts (50 Trees) for 10 Years

Variety	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Samoan Tall	0	0	0	0	0	150	800	1,350	1,550	2,000
Hybrid	0	0	0	0	950	2,350	3,500	3,900	4,000	5,000

Note: Production on a per nut basis is estimated from copra production figures provided in MAF's Coconut Industry Review (2004), assuming 4.35 nuts produces 1kg of copra.

Markets and Prices:

As mentioned, a number of market outlets for coconuts are considered in the gross margins budgets.

Market Outlet	End Product	Price Paid to Farmer
Pacific Oil	Crude Coconut Oil	Grade 1: 90 sene/kilo Grade 2: 86 sene/kilo
	Copra Meal	Grade 3: 82 sene/kilo
	Coconut Cooking Oil	Grade 4: 67sene/kilo
Fugalei Market	Mature coconuts	$0.25/dehusked nut
Krissy Company	Coconut Cream	$0.20/dehusked nut

The grading which Copra (from farmers) undergoes when it reaches the Pacific Oil Company is as follows;

- Grade 1 copra – less than 8% H_2O (moisture) content
- Grade 2 copra –8.1% – 10% H_2O (moisture) content
- Grade 3 copra – 10.1% – 15% H_2O (moisture) content
- Grade 4 copra - > (more than)15.1% H_2O (moisture) content

Copra can be stored up to 12 months with its moisture content fluctuating between 4 and 6%. **Copra meal** is exported to New Zealand, Japan, USA but mainly Australia. The main product is the **Crude Coconut Oil** which is practically refined in New Zealand and it is packaged and label in Samoa as the **Coconut Cooking Oil**.

The development budgets are compiled for sale of mature coconuts at Fugalei Market.

c) Direct Costs

As coconut enterprises are traditionally low input, there are no costs incurred for pest and disease control, weed control or fertiliser.

In the case of copra and coconuts sold for coconut cream and desiccated coconut production, there are no associated marketing costs, as the buyer collects copra/nuts from the farm-gate.

For sale of coconuts at Fugalei market, the farmer incurs a cost for transporting coconuts to market ($10.00/return trip) and hire of a market stall ($10.00/day). It is assumed that the farmer sells approximately 250 coconuts per trip.

d) Labour

The farmer uses family labour for the coconut enterprise (refer to family labour inputs section of budgets for a breakdown of time spent on individual tasks). Family labour is valued at the current market rate for hired agricultural labour, being $21.71 per day.

For one family labour day, it is assumed that 500 nuts can be collected, 1000 nuts can be de-husked or 250 nuts can be sold at market.

e) Capital Costs

There are no significant capital costs for the coconut enterprise.

Budget for Mature Samoan Tall Coconut - Copra

GROSS MARGINS BUDGET FOR SAMOAN TALL COCONUT

ASSUMPTIONS		
(A) No. of trees per acre	50	
(B) Area (Acres)	1	
Plant spacing	9m x 9m	
Average growth period (years)	60	
Average age of trees (years)	10	
No. of nuts per tree/year	40	
Total nuts per acre	2000	
No. of nuts for 1 lb of copra	1.76	(4.35 nuts/kg copra)

Scenario: **Samoan Tall Coconuts - Copra Production**

INCOME ($)	Quantity	Unit	Unit Price	Total
Copra	1,136	lbs @	$0.40	$454.40
(C) Total Income				**$454.40**

DIRECT COSTS ($)	
Nil	$0.00
(D) Total Direct Costs	**$0.00**
(E) GROSS MARGIN ($)	**$454.40**
Gross Margin per family labour input (E/F)	**$14.20**
Gross Margin per plant	**$6.82**

Family Labour Inputs (Days)

Task	Total Days
Weeding	4.0
Collecting nuts	4.0
Dehusking and splitting	2.0
Removing flesh	8.0
Drying	4.0
Sorting and packing	2.0
(F) Total labour requirements - days	24.0
(G) Average Wage Rate ($/unit) (days)	$21.69
(H) Total cost of family labour (F x G)	$520.56
GROSS MARGIN - including family labour cost (E - H)	**-$66.16**

SENSITIVITY ANALYSIS (Gross Margin - excluding family labour cost)

Yield (Nuts/Acre)	Copra Price ($/lb)		
	$0.20	$0.30	$0.40
1,000	$114	$170	$227
1,500	$170	$256	$341
2,000	$227	$341	$455

Scenario: **Samoan Tall Coconuts**

Mature Coconuts for Coconut Cream Production

INCOME ($)	Quantity	Uni	Unit Price	Total
Coconut	2,000	nuts @	$0.20	$400.00
(C) Total Income				**$400.00**

DIRECT COSTS ($)	
Nil	$0.00
(D) Total Direct Costs	**$0.00**
(E) GROSS MARGIN ($)	**$400.00**
Gross Margin per family labour input (E/F)	**$40.00**
Gross Margin per plant (E/A)	**$8.00**

Family Labour Inputs (Days)

Task	Total Days
Weeding	4.0
Collecting nuts	4.0
Dehusking	2.0
(F) Total labour requirements - days	10.0
(G) Average Wage Rate ($/unit) (days)	$21.69
(H) Total cost of family labour (F x G)	$216.90
GROSS MARGIN - including family labour cost (E - H)	**$183.10**

SENSITIVITY ANALYSIS - excluding family labour cost

Yield (Nuts/Acre)	Coconut Price ($/nut)		
	$0.10	$0.12	$0.20
1,000	$100	$120	$200
1,500	$150	$180	$300
2,000	$200	$240	$400

Scenario: **Samoan Tall Coconuts -**
Mature Coconuts for Sale at Fugalei Market

INCOME ($)	Quantity	Unit		Unit Price	Total
Coconuts	2,000	nuts	@	$0.25	$500.00
(C) Total Income					

DIRECT COSTS ($)					
Transport to market	8	trips	@	$10.00	$80.00
Hire of market stall	8	days	@	$10.00	$80.00
(D) Total Direct Costs					**$160.00**
(E) GROSS MARGIN ($)					**$340.00**
Gross Margin per family labour input (E/F)					**$18.88**
Gross Margin per plant (E/A)					**$6.80**

Family Labour Inputs (Days)

Task	Total Days
Weeding	4.0
Collecting nuts	4.0
Dehusking	2.0
Marketing	8.0
(F) Total labour requirements - days	18.0
(G) Average Wage Rate ($/unit) (days)	$21.69
(H) Total cost of family labour (F x G)	$390.42
GROSS MARGIN - including family labour cost (E - H)	**-$50.42**

SENSITIVITY ANALYSIS - excluding family labour cost

Yield (Nuts/Acre)	Coconut Price ($/nut)		
	$0.20	$0.25	$0.30
1,000	$80	$130	$180
1,500	$180	$255	$330
2,000	$280	$380	$480

DEVELOPMENT BUDGET FOR SAMOAN TALL COCONUT

Scenario: **Mature Coconuts to Fugalei Market**

ASSUMPTIONS	
(A) No. of trees per acre	50
(B) Area (Acres)	1
Plant spacing	9m x 9m
Average growth period (years)	60
Price ($/nut)	$0.25
Cost per trip to market	$10.00
Cost per day for hire of market stall	$10.00

INCOME ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Yield (No. of nuts/tree)	0	0	0	0	0	3	16	27	31	40
Total Yield (No. of nuts)	0	0	0	0	0	150	800	1,350	1,550	2,000
Sale of mature coconuts	0	0	0	0	0	38	200	338	388	500
(C) Total Income	**$0**	**$0**	**$0**	**$0**	**$0**	**$38**	**$200**	**$338**	**$388**	**$500**

DIRECT COSTS ($)										
Transport to market										
No. of trips to market	0	0	0	0	0	1	3	5	6	8
Cost of transport to market	0	0	0	0	0	10	30	50	60	80
Hire of market stall										
No. of days	0	0	0	0	0	1	3	5	6	8
Cost of hire of market stall	0	0	0	0	0	10	30	50	60	80
(D) Total Direct Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$20**	**$60**	**$100**	**$120**	**$160**
(E) GROSS MARGIN ($) (C - D)	**$0**	**$0**	**$0**	**$0**	**$0**	**$18**	**$140**	**$238**	**$268**	**$340**

FIXED COSTS ($)										
Nil	0	0	0	0	0	0	0	0	0	0
(F) Total Fixed Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
(G) NET INCOME (E - F)	**$0**	**$0**	**$0**	**$0**	**$0**	**$18**	**$140**	**$238**	**$268**	**$340**
Net Income per family labour input (G/H)	**$0**	**$0**	**$0**	**$0**	**$0**	**$3**	**$17**	**$20**	**$21**	**$21**
Net Income per tree (G/A)	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$3**	**$5**	**$6**	**$8**

Family Labour Inputs (Days)

Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Land preparation - slashing	2	0	0	0	0	0	0	0	0	0
Planting	2	0	0	0	0	0	0	0	0	0
Weeding	5	5	5	5	5	5	4	4	4	4
Collecting nuts	0	0	0	0	0	0.5	1.5	3	3	4
Dehusking	0	0	0	0	0	0.25	0.5	1	1.5	2
Marketing	0	0	0	0	0	1	3	5	6	8
(H) Total labour requirements - days	**9**	**5**	**5**	**5**	**5**	**6.75**	**9**	**13**	**14.50**	**18**
(I) Average Wage Rate ($/unit) (days)	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69
(J) Total cost of family labour (H x I)	$195.21	$108.45	$108.45	$108.45	$108.45	$146.4	$195.21	$281.97	$314.50	$390.42
NET INCOME - incl. family labour cost (G - J)	**-$195.21**	**-$108.45**	**-$108.45**	**-$108.45**	**-$108.45**	**-$128.4**	**-$55.21**	**-$43.97**	**-$46.5**	**$50.42**

GROSS MARGINS BUDGET FOR HYBRID COCONUT

ASSUMPTIONS

(A) No. of trees per acre	50	
(B) Area (Acres)	1	
Plant spacing	9m x 9m	
Average growth period (years)	60	
Average age of trees (years)	10	
No. of nuts per tree/year	100	
Total nuts per acre	5000	
No. of nuts for 1 lb of copra	1.76	(4.35 nuts/kg copra)

Scenario: **Hybrid Coconut - Copra Production**

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Copra	2,841	lbs @	$0.40	$1136.40
(C) Total Income				**$1136.40**

DIRECT COSTS ($)	
Nil	$0.00
(D) Total Direct Costs	**$0.00**
(E) GROSS MARGIN ($)	**$1136.40**
Gross Margin per family labour input (E/F)	**$21.04**
Gross Margin per plant (E/A)	**$22.73**

Family Labour Inputs (Days)

Task	**Total Days**
Weeding	4
Collecting nuts	10
Dehusking and splitting	5
Removing flesh	20
Drying	10
Sorting and packing	5
(F) Total labour requirements - days	54
(G) Average Wage Rate ($/unit) (days)	$21.69
(H) Total cost of family labour (F x G)	$1,171.26
GROSS MARGIN - including family labour cost (E - H)	**-$34.86**

SENSITIVITY ANALYSIS - excluding family labour cost

Yield (Nuts/Acre)	Copra Price ($/lb)		
	$0.20	$0.30	$0.40
3,000	$341	$511	$682
4,000	$455	$682	$909
5,000	$568	$852	$1,136

Scenario: **Hybrid Coconuts -**
Mature Coconuts for Coconut Cream Production

INCOME ($)	Quantity	Unit		Unit Price	Total
Coconuts	5,000	nuts	@	$0.20	$1000.00
(C) Total Income					**$1000.00**

DIRECT COSTS ($)	
Nil	$0.00
(D) Total Direct Costs	**$0.00**

(E) GROSS MARGIN ($) (C-D)	**$1000.00**
Gross Margin per family labour input (E/F)	**$52.63**
Gross Margin per plant (E/A)	**$20.00**

Family Labour Inputs (Days)

Task	Total Days
Weeding	4.0
Collecting nuts	10.0
Dehusking	5.0
(F) Total labour requirements - days	19.0
(G) Average Wage Rate ($/unit) (days)	$21.69
(H) Total cost of family labour (F x G)	$412.11
GROSS MARGIN - including family labour cost (E - H)	**$587.89**

SENSITIVITY ANALYSIS - excluding family labour cost

Yield (Nuts/Acre)	Coconut Price ($/nut)		
	$0.10	$0.12	$0.20
3,000	$300	$360	$600
4,000	$400	$480	$800
5,000	$500	$600	$1,000

Scenario: **Hybrid Coconuts -**
Mature Coconuts for Sale at Fugalei Market

INCOME ($)	Quantity	Unit		Unit Price	Total
Coconuts	5,000	nuts	@	$0.25	$1,250.00
(C) Total Income					
DIRECT COSTS ($)					
Transport to market	20	trips	@	$10.00	$200.00
Hire of market stall	20	days	@	$10.00	$200.00
(D) Total Direct Costs					**$400.00**
(E) GROSS MARGIN ($)					**$850.00**
Gross Margin per family labour input (E/F)					**$21.79**
Gross Margin per plant (E/A)					**$17.00**

Family Labour Inputs (Days)

Task	Total Days
Weeding	4
Collecting nuts	10
Dehusking	5
Marketing	20
(F) Total labour requirements - days	39
(G) Average Wage Rate ($/unit) (days)	$21.69
(H) Total cost of family labour (F x G)	$845.91
GROSS MARGIN - including family labour cost (E - H)	**$4.1**

SENSITIVITY ANALYSIS - excluding family labour

Yield (Nuts/Acre)	Coconut Price ($/nut)		
	$0.20	$0.25	$0.30
3,000	$300	$450	$600
4,000	$500	$700	$900
5,000	$700	$950	$1,200

GROSS MARGINS BUDGET FOR HYBRID COCONUT

Scenario: **Mature Coconuts to Fugalei Market**

ASSUMPTIONS	
(A) No. of trees per acre	50
(B) Area (Acres)	1
Plant spacing	9m x 9m
Average growth period (years)	60
Price ($/nut)	$0.25
Cost per trip to market	$10.00
cost per day for hire of market stall	$10.00

INCOME ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Yield (No. of nuts/tree) [a]	0	0	0	0	19	47	70	78	80	100
Total Yield (No. of nuts)	0	0	0	0	950	2,350	3,500	3,900	4,000	5,000
Sale of mature coconuts	0	0	0	0	238	588	875	975	1,000	1,250
(C) Total Income	**$0**	**$0**	**$0**	**$0**	**$238**	**$588**	**$875**	**$975**	**$1,000**	**$1,250**
DIRECT COSTS ($)										
Transport to market										
No. of trips to market	0	0	0	0	0	2.5	7.5	12.5	15	20
Cost of transport to market	0	0	0	0	0	25	75	125	150	200
Hire of market stall										
No. of days	0	0	0	0	0	3	8	13	15	20
Cost of hire of market stall	0	0	0	0	0	30	80	130	150	200
(D) Total Direct Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$55**	**$155**	**$255**	**$300**	**$400**
(E) GROSS MARGIN ($) (C - D)	**$0**	**$0**	**$0**	**$0**	**$238**	**$533**	**$720**	**$720**	**$700**	**$850**

FIXED COSTS ($)										
Nil	0	0	0	0	0	0	0	0	0	0
(F) Total Fixed Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
(G) NET INCOME	**$0**	**$0**	**$0**	**$0**	**$238**	**$533**	**$720**	**$720**	**$700**	**$850**
Net Income per family labour input (G/H)	**$0**	**$0**	**$0**	**$0**	**$20.69**	**$23.68**	**$25.26**	**$22.5**	**$21.88**	**$21.79**
Net Income per tree (G/A)	**$0**	**$0**	**$0**	**$0**	**$4.76**	**$10.66**	**$14.4**	**$14.4**	**$14**	**$17**

Family Labour Inputs (Days)

Task	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Land preparation - slashing	2	0	0	0	0	0	0	0	0	0
Planting	2	0	0	0	0	0	0	0	0	0
Weeding	5	5	5	5	5	5	4	4	4	4
Collecting nuts	0	0	0	0	2	5	7	8	8	10
Dehusking	0	0	0	0	0.5	2.5	3.5	4	4	5
Marketing	0	0	0	0	4	10	14	16	16	20
(H) Total labour requirements - days	**9**	**5**	**5**	**5**	**11.5**	**22.5**	**28.5**	**32**	**32**	**39**
(I) Average Wage Rate ($/unit) (days)	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69
(J) Total cost of family labour	$195.21	$108.45	$108.45	$108.45	$249.44	$488.03	$618.17	$694.08	$694.08	$845.91
NET INCOME - incl. family labour cost (H x I)	**-$195.21**	**-$108.45**	**-$108.45**	**-$108.45**	**-$11.44**	**$44.97**	**$101.83**	**$25.92**	**$5.92**	**$4.09**

Enterprise Background for Virgin Organic Coconut Oil

The following gross margin budgets represent two scenarios for a fully commercial virgin organic coconut oil enterprise:

- Direct Micro Expelling (DME)[2] operation (100 litres per week).
- Cold pressed oil production using an olive oil press (200 litres per week).

Production information used to compile these budgets was provided by Samoa's Pure Coconut Oil Company and local organic virgin coconut oil processors.

a) Processing Information

A similar process is followed for both the DME and olive oil press operations. Coconuts are firstly de-husked and split, before the coconut meat is scraped out using small electric graters. The coconut meat is dried on stainless steel plates (heated by burning used husks and firewoods), prior to being pressed for coconut oil extraction using manually operated presses. Approximately 12 coconuts produce 1 litre of virgin coconut oil.

The major difference between the two techniques is throughput. A DME operation can process 3kg of dried meat per batch, while the olive oil press can process 15kg of dried meat.

In these budgets, the DME operation has a production capacity of 100 litres per week (4,800 litres per year), while the olive oil press produces 200 litres per week (9,600 litres per year).

b) Income

Women in Business Development buys virgin coconut oil from organic coconut producers for $8.00 per kg. Oil is sold in 20 litre barrels that are provided by Women in Business Development.

NOTE: The price originally offered for virgin organic coconut oil was $3.00 per kg, then increased to $6.00 per kg and recently the price had gone up to $8.00 per kg after major discussions between coconut producers, Women in Business Development and The Body Shop UK (Community Fair Trade market).

c) Direct Costs

Purchasing coconuts:
Coconut oil processors who cannot supply certified organic coconuts from their own farms purchase these from other certified organic coconut producers for $0.15-$0.25 cents per nut.
Coconut oil processors may produce their own nuts and then process these into organic virgin coconut oil, however, it is a requirement that the farm is certified organic. For the purposes of budgeting, a coconut growing enterprise and coconut oil processing enterprise need to be treated as separate enterprises.

Electricity:
Electricity is required to power the electric graters used for scraping coconut meat.
The cost of electricity is estimated to be $140.00 per month for the DME operation and $250.00 per month for the olive oil press.

Marketing:
There are no associated marketing costs, as the buyer collects coconut oil directly from the processor and handles all the logistics from collection to preparation of shipment to the UK and other niche markets.

d) Labour

Family labour is used for coconut oil production. Both the DME and olive oil press operations have similar labour requirements. Five people are required for five days per week (48 weeks per year) for de-husking and splitting nuts, shredding and drying meat and operating the oil press.

Family labour is valued at the current market rate for hired agricultural labour, being $21.69 per day.

e) Capital Costs

The processing equipment required for coconut oil production (i.e. electric grater and manual press) is supplied free of charge by Women in Business Development, in return for the processor agreeing to

[2] Direct Micro Expelling (DME) refers to a small-scale processing plant used on-farm for the production of virgin coconut oil.

exclusively supply Women in Business Development with virgin coconut oil.

The coconut oil processor is responsible for the following capital items:

- Oven for drying coconut meat (constructed using bricks, rebars and stainless steel sheets): up to $4,000.
- Shed for the processing operation: $2,500-$4,000 depending on availability of resources for building a shed e.g. local timber and used iron roofing.

ORGANIC VCO FLOW CHART

Gather organic coconuts

↓

Transport to production site

↓

Unload nuts into designated area

↓

Coconut Oil Processing

- Husk nuts
- Grate nuts
- Weigh grated wet coconut
- Spread on drier
- Weigh grated dry coconut
- Press & measure oil

↓

Pour oil into pails

↓

Label pails

↓

Store oil temporarily at site

↓

WIBDI Staff inspect oil quality and farmers' records, take samples for FFA testing.

(The number of the pail should match the number on sample bottle)

↓

Transport oil to packing site where oil is utilized for bottling (or in pails), after FFA testing transfer oil to new pails, take records and label bottles/pails for export

↓

Request export document from NASAA

↓

Combine oil pails to export pallet

↓

Label export pallet

↓

Combine all appropriate documents for export (including Quarantine inspection)

↓

Transport to wharf

Enterprise Budgets for Organic Virgin Coconut Oil Production

GROSS MARGINS BUDGET FOR ORGANIC VIRGIN COCONUT OIL PRODUCTION

Scenario: **Direct Micro Expelling (DME)**

ASSUMPTIONS	
Daily oil production (litres):	20
Weekly oil production (litres):	100
No. of production weeks	48
(A) Annual oil production (litres):	4,800
No of coconuts/litre of oil:	12
Total coconuts required:	57,600
Price of oil ($/litre)	$8.00
Imputed cost of certified organic coconuts ($/nut)	$0.25

INCOME ($)	Quantity	Unit		Unit Price	Total
Virgin Organic Coconut Oil	4,800	litres	@	$8.00	$38,400.00
(B) Total Income					**$38,400.00**

DIRECT COSTS ($)					
Coconuts	57,600	nuts	@	$0.25	$8,640.00
Electricity	12	months	@	$140.00	$1,680.00
(C) Total Direct Costs					**$10,320.00**
(D) GROSS MARGIN ($) (B - C)					**$28,080.00**
Gross Margin per family labour input (D/E)					**$117.00**
Gross Margin per litre of coconut oil (D/A)					**$5.85**

Family Labour Inputs (Days)

Task	No. Days/Week	No. of Persons	No. Weeks	Total Days
Dehusking, splitting nuts, shredding, pressing	5	5	48	240
(E) Total labour requirements - days				240
(F) Average Wage Rate ($/unit) (days)				$21.69
(G) Total cost of family labour (E x F)				$5,205.60
GROSS MARGIN - including family labour cost (D - G)				**$22,874.40**

SENSITIVITY ANALYSIS - excluding family labour cost

Annual Oil Production	Coconut Oil Price ($/litre)			
	$3.00	$4.00	$5.00	$6.00
2,800	$2,160	$4,960	$7,760	$10,560
3,800	$3,360	$7,160	$10,960	$14,760
4,800	$4,560	$9,360	$14,160	$18,960

Scenario: **Cold Pressed Oil Production (Using Olive Press)**

ASSUMPTIONS	
Daily oil production (litres):	40
Weekly oil production (litres):	200
No. of production weeks	48
(A) Annual oil production (litres):	9,600
No of coconuts/litre of oil:	12
Total coconuts required:	115,200
Price of oil ($/litre)	$8.00
Imputed cost of certified organic coconuts ($/nut)	$0.25

INCOME ($)	**Quantity**		**Unit**	**Unit Price**	**Total**
Virgin Organic Coconut Oil	9,600	litres	@	$8.00	$76,800.00
(B) Total Income					**$76,800.00**

DIRECT COSTS ($)					
Coconuts	115,200	nuts	@	$0.25	$28,800.00
Electricity for grater	12	months	@	$250.00	$3,000.00
(C) Total Direct Costs					**$31,800.00**
(D) GROSS MARGIN ($) (B - C)					**$45,000.00**
Gross Margin per family labour input (D /E)					**$187.50**
Gross Margin per litre of coconut oil (D/A)					**$4.69**

Family Labour Inputs (Days)

Task	**No. Days/Week**	**No. of Persons**	**No. Weeks**	**Total Days**
Splitting nuts, shredding, pressing	5	5	48	240
(E) Total labour requirements - days				240
(F) Average Wage Rate ($/unit) (days)				$21.69
(G) Total cost of family labour (E x F)				$5,205.60
GROSS MARGIN - including family labour cost (D - G)				**$39,794.40**

SENSITIVITY ANALYSIS (Gross Margin - excluding family labour cost)

Annual Oil Production	Coconut Oil Price ($/litre)			
	$3.00	$4.00	$5.00	$6.00
4,800	$3,360	$8,160	$12,960	$17,760
7,200	$6,240	$13,440	$20,640	$27,840
9,600	$9,120	$18,720	$28,320	$37,920

5.4 Cocoa

Enterprise Background for Cocoa

The following budgets represent two scenarios for a fully commercial cocoa enterprise:

- Gross margin budget for one acre (10 year old cocoa trees); and
- Development budget for one acre (10 year timeframe).

In these budgets, cocoa pods are harvested from 400 trees. The cocoa variety planted is Trinitario (Samoan koko). After cocoa beans are removed from the pods, they are fermented and dried, prior to sale at the Fugalei Market.

a) Production Information

Planting Material:
Seeds are germinated in seedbeds by MAF – Crops Division. Farmers are provided with 8-10 week old seedlings (6-8 leaves) by MAF, which are then transplanted into the farmer's plot.

Planting Density:
Four-hundred seedlings are planted into a one acre plot, at a plant spacing of 10ft x 10ft.

Cropping System:
While cocoa trees are often intercropped with coconuts, in this instance, cocoa is grown as a monocrop.

Growth Period:
Cocoa trees have a productive life of up to 50 years and commence bearing cocoa pods between 2-4 years after planting. Cocoa trees generally reach full production at 11-15 years.

Number of Years to Harvesting:
In the development budget, cocoa pods are first harvested in Year 4.

b) Income

Harvestable/Saleable Yield:

The following yields (lbs) are produced by the cocoa enterprise during the first ten years of production[3].

Year	1	2	3	4	5	6	7	8	9	10
Yield (lbs)	0	0	0	20	75	190	190	190	190	190

Note: Current cocoa yields in Samoa are well below achievable yields (MAF 2004).

Markets:
Dry cocoa beans are sold in packets (approx. 1lb) at the Fugalei Market.

NOTE: An export market exists for cocoa beans, however, at the time of compiling this manual, dry cocoa beans are only sold locally.

Price:
The price for packets of dry cocoa beans ranges from $3.00-$5.00/packet throughout the year. The average price is $4.00/packet.

c) Direct Costs

Planting Material:
Seedlings are provided free of charge from MAF-Crops Division.

Pest and Disease Control:
Cocoa is susceptible to black pod disease, particularly during the rainy season. The main method of control is hand removal of affected pods, which are then burnt or taken far away from the cocoa plot.

Selling Costs:
Cocoa pods are harvested from Year 4 onwards. In Year 4, one trip to the market is required, and two trips in Year 5. From Year 5-Year 10, four trips are required per year to market. The fuel cost per return trip to the market it $10.00. It is assumed that the farmer also takes other agricultural produce to the market. Hence, $10.00 is estimated as a portion of the total cost of a return trip to the market.

[3] For the purposes of this manual, development budgets for cocoa are only compiled for the first ten years of production, despite the productive life of cocoa being up to 50 years. The maximum planning timeframe for farmers would most likely be about ten years. Farmers would be unlikely to make farm business planning decisions based on the profitability of an enterprise beyond this timeframe.

The cost per day of hiring a market stall is $10.00/day. In reality, the $10.00 cost would be spread across the other agricultural enterprises, however, given it is a nominal cost, for the purposes of this exercise, the full cost is attributed to the cocoa enterprise.

d) Labour

The farmer uses family labour for the cocoa enterprise (refer to family labour inputs section of budgets for a breakdown of time spent on individual tasks). Family labour is valued at the current market rate for hired agricultural labour, being $21.69 per day.

e) Capital Costs

There are no significant capital costs for the cocoa enterprise.

GROSS MARGINS BUDGET FOR COCOA - TRINITARIO (SAMOAN COCOA)

ASSUMPTIONS	
(A) No. of trees per acre	400
Area (Acres)	1
Plant spacing	10ft x 10ft
Average age of trees (years)	10
Yield (lbs)[a]	190
No. of lbs per bag	1
No. of bags sold	190

INCOME ($)	Quantity	Unit	Unit Price	Total
Cocoa Beans	190	bags @	$4.00	$760.00
(B) Total Income				**$760.00**

DIRECT COSTS ($)				
Transport to market	4	trips @	$10.00	$40.00
Hire of market stall	4	days @	$10.00	$40.00
(C) Total Direct Costs				**$80.00**
(D) GROSS MARGIN ($) (B-C)				**$680.00**
Gross Margin per family labour input (D/E)				**$21.25**
Gross Margin per plant (D/A)				**$1.7**

Family Labour Inputs (Days)

Task	Total Days
Weeding	2
Pruning	5
Removing black pods	4
Harvesting	3
Pod breaking	3
Drying	5
Packaging	2
Transporting to market	4
Marketing	4
(E) Total labour requirements - days	32
(F) Average Wage Rate ($/unit) (days)	$21.69
(G) Total cost of family labour (E x F)	$694.08
GROSS MARGIN - including family labour cost (D-G)	**-$14.08**

[a] Yield estimate based on budgets developed for Cocoa Sector Review, MoA (2004)

SENSITIVITY ANALYSIS - excluding family labour cost

Yield (lbs/acre)	Cocoa Price ($/bag)		
	$3.00	$4.00	$5.00
100	$240	$340	$440
190	$510	$700	$890
380	$1,080	$1,460	$1,840

DEVELOPMENT BUDGET FOR COCOA - TRINITARIO (SAMOAN COCOA)

ASSUMPTIONS	
(A) No. of trees per acre	400
Area (Acres)	1
Plant spacing	10ft x 10ft
No. of lbs per bag	1
Price per bag ($/bag)	$4.00

INCOME ($)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Yield (Lbs/Acre) [a]	0	0	0	20	75	190	190	190	190	190
No. of bags sold	0	0	0	20	75	190	190	190	190	190
Sale of cocoa beans (@ $4.00/bag)	0	0	0	80	300	760	760	760	760	760
(B) Total Income	**$0**	**$0**	**$0**	**$80**	**$300**	**$760**	**$760**	**$760**	**$760**	**$760**

DIRECT COSTS ($)										
Planting material (seedlings)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Marketing										
Transport to market										
No. of trips to market	0	0	0	1	2	4	4	4	4	4
Cost of trips to market (@$10.00/trip)	0	0	0	10	20	40	40	40	40	40
Hire of market stall ($10.00/day)	0	0	0	10	20	40	40	40	40	40
(C) Total Direct Costs	**$0**	**$0**	**$0**	**$20**	**$40**	**$80**	**$80**	**$80**	**$80**	**$80**
(D) GROSS MARGIN ($) (B-C)	**$0**	**$0**	**$0**	**$60**	**$260**	**$680**	**$680**	**$680**	**$680**	**$680**

FIXED COSTS ($)										
Nil	0	0	0	0	0	0	0	0	0	0
(E) Total Fixed Costs	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
(F) NET INCOME ($) (D - E)	**$0**	**$0**	**$0**	**$60**	**$260**	**$680**	**$680**	**$680**	**$680**	**$680**
Net Income per family labour input (F/G)	**$0**	**$0**	**$0**	**$2.3**	**$9.29**	**$21.25**	**$21.25**	**$21.25**	**$21.25**	**$21.25**
Net Income per tree (F/A)	**$0.00**	**$0.00**	**$0.00**	**$0.15**	**$0.65**	**$1.70**	**$1.70**	**$1.70**	**$1.70**	**$1.70**

Family Labour Inputs (Days)

Task	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Land Preparation	10	0	0	0	0	0	0	0	0	0
Planting seedlings	2	0	0	0	0	0	0	0	0	0
Weeding	2	2	2	2	2	2	2	2	2	2
Pruning	3	3	3	5	5	5	5	5	5	5
Removing black pods	2	2	2	4	4	4	4	4	4	4
Harvesting	0	0	0	3	3	3	3	3	3	3
Pod breaking	0	0	0	3	3	3	3	3	3	3
Drying	0	0	0	5	5	5	5	5	5	5
Packaging	0	0	0	2	2	2	2	2	2	2
Transporting to market	0	0	0	1	2	4	4	4	4	4
Marketing	0	0	0	1	2	4	4	4	4	4
(G) Total labour requirements - days	19	7	7	26	28	32	32	32	32	32
(H) Average Wage Rate ($/unit) (days)	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69	$21.69
(I) Total cost of family labour (G x H)	$412.11	$151.83	$151.83	$563.94	$607.32	$694.08	$694.08	$694.08	$694.08	$694.08
NET INCOME - incl. family labour cost (F - I)	**-$412.11**	**-$151.83**	**-$151.83**	**-$503.94**	**-$347.32**	**-$14.38**	**-$14.38**	**-$14.38**	**-$14.38**	**-$14.38**

[a]

Enterprise Background for Cocoa Paste Production (kokoSamoa)

The following gross margin budget represents a fully commercial cocoa paste (kokoSamoa) enterprise, processing 190 lbs of dry cocoa beans (equivalent production from a one acre cocoa plot with 400 trees).

Production information used to compile this budget was taken from a review of Samoa's cocoa sector, conducted by MAF in 2004[4].

a) Processing Information

As mentioned, 190 lbs of cocoa beans are processed into cocoa paste. Fermented and dried cocoa beans are roasted and de-shelled, before being pounded into cocoa paste (kokoSamoa). Small plastic bags are filled with cocoa paste (200 gram net weight), which are then placed in polystyrene cups to cool and set, prior to sale.

The conversion rate of cocoa beans into cocoa paste is 0.8 (i.e. 0.8lbs of cocoa paste is produced from 1lb of dry cocoa beans). Hence, 152lbs of cocoa paste is produced from 190lbs of cocoa beans.

For each pound of cocoa paste processed, 2.27 styrofoam cups are produced. From 152 lbs of cocoa paste, 345 cups (200 grams) are produced.

b) Income

Koko Samoa is sold to a local middle-man for $5.50 per cup.

NOTE: An export market exists for cocoa paste, however, given the relatively small volumes produced by an enterprise of this scale, it is likely that only local markets would be supplied. Export markets in New Zealand are currently paying around SAT $5.50 per cup.

c) Direct Costs

Purchasing cocoa beans:
The cocoa paste processor purchases dry cocoa beans for $3.50/lb. This price estimate was taken from budgets compiled for the Cocoa Sector Review conducted by MAF.

A cocoa farmer may grow their own beans and then process these into cocoa paste. For the purposes of budgeting, a cocoa growing enterprise and cocoa paste processing enterprise need to be treated as separate enterprises. Hence, in this instance, an imputed price is used to estimate the cost of purchasing cocoa beans to the cocoa paste processing enterprise.

Packaging costs:
The cost of packaging (i.e. plastic bags, polystyrene cups and ties) is $0.10 per cup.

Selling Costs:
One trip is made to deliver cups to the middle-man. This return trip costs $30.00.

d) Labour

The cocoa paste processor uses family labour for the following tasks.

Task	No. of Cups/Person/Day	Total Days
Roasting beans	24	14
De-shelling beans	16	22
Pounding beans and filling bags	24	14
Delivery to buyer	345	1

Family labour is valued at the current market rate for hired agricultural labour, being $21.69per day.

4 MoA 2004, *The Feasibility of Reviving Cocoa as a Major Industry – Strategic Overview,* Policy, Planning and Communication Division, August.

e) Capital Costs

The capital costs for a small-scale cocoa paste enterprise are minimal. The necessary equipment would generally be already on hand or could be constructed from materials already owned (e.g. a roaster can be constructed from an old 44 gallon drum with a steel piping turning handle).

For a larger, export-scale enterprise processing much larger volumes of cocoa beans, the following capital items would need to purchased:

- Winnower for de-shelling
  $60,000
- Grinder
  $40,000
- Roaster
  $80,000
- Air-conditioned storage room
  $15,00

Enterprise Budget for Cocoa Paste Production

GROSS MARGIN BUDGET FOR COCOA PASTE PRODUCTION (KOKO SAMOA)

ASSUMPTIONS	
Cocoa beans processed (lbs):	190
Conversion rate: Cocoa beans: Cocoa Paste	0.8
Cocoa paste production (lbs):	152
No. of 200gram cups/lb of cocoa paste:	2.27
(A) No. of 200 gram cups:	345

INCOME ($)	**Quantity**	**Unit**		**Unit Price**	**Total**
Koko Samoa	345	cups	@	$5.50	$1,897.50
(B) Total Income					**$1,897.50**

DIRECT COSTS ($)					
Cocoa beans [a]	190	lbs	@	$3.50	$665
Plastic bags, ties and polystyrene cups	345	cups	@	$0.10	$34.50
Delivery to buyer	1	trip	@	$30.00	$30
(C) Total Direct Costs					**$729.50**
(D) GROSS MARGIN ($) (B - C)					**$1,168**
Gross Margin per family labour input (D/E)					**$22.90**
Gross Margin per 200g cup (D/A)					**$3.38**

Family Labour Inputs (Days)

Task	**No. of Cups/Person/Day**	**Total Days**
Roasting beans	24	14
Shelling beans	16	22
Pounding beans and filling bags	24	14
Delivery to buyer	345	1
(E) Total labour requirements - days		51
(F) Average Wage Rate ($/unit) (days)		$21.69
(G) Total cost of family labour (E x F)		$1106.19
GROSS MARGIN - incl. family labour cost (D - G)		**$61.81**

[a] Imputed price of cocoa beans used in budgets developed for Cocoa Sector Review, MoA (2004).

SENSITIVITY ANALYSIS - excluding family labour cost

Production (No. of Cups)	Koko Samoa Price ($/200g Cup)		
	$4.00	$5.50	$6.00
250	$1000	$1375	$1500
300	$1200	$1650	$1800
345	$1380	$1897.5	$2070

5.5 Tahitian Lime

2.6 Enterprise Background for Tahitian Lime

This gross margin budget represents a one acre fully commercial citrus (Tahitian lime variety) enterprise.

The following budgets represent three scenarios for a fully commercial Tahitian lime enterprise:

- Gross margin for one acre (10 year old Tahitian tree); and
- Development budget for one acre of orchard with field sanitation applied (12-year timeframe).
- Development budget for one acre without field control measures (12-year timeframe).

a) Production Information

Planting Material:

The farmer plants 130 plants, of which all plants assured to survive. Planting materials purchased from the MAF Crops Division.

All citrus requires well-drained soils or they will succumb to root rot problems. Citrus tends to perform best on slightly acidic soil and performs better in sub-tropical conditions.

Mortality Rate of Plants:

The mortality rate of Tahitian lime is minimal, given the quality of planting material used.

Planting Density:

Trees should be planted at a five to six meters (130-tree/1 acre) spacing. Like other citrus, Tahitian lime requires well-drained soils or they will succumb to root rot problems.

Cropping System:

Trees are mono-cropped.

Growth Period:

Tahitian limes are grown over a period of 16 years. Like other citrus, Tahitian lime, perform better at medium altitude in Samoa. Cool dry winters stimulate good flower production and fruit set with minimal fungal interference. Cool weather allows fruit de-greening to give higher market acceptance.

Number of Months to Harvesting:

The fruit matures six to nine months after flowering. A yield of 70-100 kg per tree expected from mature trees. Maturity can be judged by the size and colour of the fruit.

Planting Time:

Tahitian lime grows best in full sun once established. However, young trees will need shade for the first six months.

b) Income

Harvestable/Saleable Yield:

The following yields are produced by the Tahitian lime enterprise during the first 10 years of production.

Number.of Tahitian lime Yield (kg) from 1 acre of Tahitian lime (130 trees) for 10 years

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Without Field Sanitation	0	0	1,300	3,900	6,500	9,100	9,100	9,100	9,100	9,100
Field Sanitation	0	0	1,300	3,900	6,500	9,100	5,000	5,000	5,000	5,000

Price:

The price of saleable Tahitian lime fruit locally is $4.00 per 0.5 kg packet (average of 6 fruits) throughout the year. For the export market, the price is $10 per kilo.

c) Direct Costs

Planting Material:

Planting materials supplied from the MAF Crops Division is $5 per marcotted and grafted seedling.

Pest and Disease Control:

There are no serious pests or diseases affecting Tahitian lime production.

Weed Control:

Weeds controlled by hand weeding.

Fertilizer:

It would be appropriate to add one to two kg of finely crushed volcanic rock. On lower fertility soils 200 to 300 grams of NPK (12:5:20) should be added to the planting hole.

Selling Costs:

d) Labour

The farmer uses both hired labour and family labour for the Tahitian lime enterprise.

e) Capital Costs

There are no significant capital items required specifically by the Tahitian lime enterprise.

GROSS MARGIN FOR TAHITIAN LIME (10 YEAR OLD TREE)

Assumptions					
(A) Average number of plants	130				130
Area (acre)	1				1
Plant spacing	6 m x 5 m				6 m x 5 m
Average growth period (years)	16				16
No Field Sanitation					
Price ($/kg)	$10.00				$10.00
INCOME ($)	**Quantity**	**Unit**		**Unit Price**	**Total**
Marketable yield/tree (kg)	100				0
Marketable production (kg)	13,000	kg	@	$ 10.00	130,000
(B) Total Income					$130,000
DIRECT COSTS ($)					
Fertilizer -NPK (12:5:20) ($160/40kg bag)	325	kg	@	$4.00	$1,300.00
-Urea ($160/40kg bag)	208	kg	@	$4.00	$832.00
Harvesting and Pruning Equipment					
-Seceteurs	5		@	$50.00	$250.00
-Pruning saw	5		@	$35.00	$175.00
Labour					
-Hired labour	16	man days	@	$22.00	$352.00
(C) Total Direct Costs					$2,909.00
(D) GROSS MARGIN ($) (B-C)					$127,091.00
Net Income per family labour input (D/E)					$2,118.18
Net Income per tree (D/A)					$977.62
Family Labour Inputs (Days)					
Task					
Weed control					8
Pruning					13
Fertilizing application					18
Harvesting & packaging in field baskets (250 kgs/day)					13
Grading and packing for sale					8
(E)Total labour requirements - (Days)					60
(F) Average Wage Rate ($/unit) (days)					$22
(G) Total cost of family labour (E x F)					$1,320
NET GROSS MARGIN - incl.family labour cost (D-G)					125,771.00

SENSITIVITY ANALYSIS - excluding family labour cost

Yield (kg/1 acre)	Tahitian lime Price($/kg)		
	$8.00	$10.00	$12.00
3,000	$24,000	$30,000	$36,000
6,500	$52,000	$65,000	$78,000
13,000	$104,000	$130,000	$156,000

DEVELOPMENT BUDGET FOR TAHITIAN LIME

Assumptions	
(A) Average number of plants	50
(B) Area (ha)	0.20
Plant spacing	5 m x 7 m
Average growth period (years)	16
Field Sanitation	
Price ($/kg)	$3.00

INCOME ($)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**
Marketable yield/tree (kgs)	0	0	10	70	100	100	100	100	100	100	100	100
Marketable production (kgs)	0	0	50	1500	3500	5000	5000	5000	5000	5000	5000	5000
(C) Total Income	$0	$0	$150	$10,500	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
DIRECT COSTS ($)												
Planting materials (seedling 50 @ $5/each)	250											
Fertilizer												
NPK (12:5:20) ($132/40kg bag)	13	25	38	50	63	75	86	100	113	125	125	125
Value ($3.30/kg)	4.29	82.50	125.40	165.00	207.90	247.50	283.80	330.00	372.90	412.50	412.50	412.50
Urea ($108/40kg bag)	13	20	28	35	43	50	58	65	73	80	80	80
Value ($2.70/kg)	35.10	54.00	75.60	94.50	116.10	135.00	156.60	175.50	197.10	216.00	216.00	216.00
Sulphate of Zn & Mn (Kg)			4	4	4	4	4	4	4	4	4	4
Value ($2/kg)			112									
Knapsack spray			211						211			
Sub - Total ($)	49	85	447	160	199	234	270	309	560	384	384	384
Harvesting and Pruning Equipment												
Stick pickers (@300 each)						300			300			
Seceteurs (@$100 each)		100		200		200		200		200		200
Pruning Saw (@ $50 each)				50			100			100		
Pruning lopper				150					150			
Ladder (7 fts)(@ $612 each)							612					
Sub - Total ($)		100		400		500	712	200	450	300		200
Marketing												

transport to market ($10/trip)	0	0	0	40	80	100	120	140	160	160	160	160
hire of market stall ($5.00/day)	0	0	0	8	16	20	24	28	32	32	32	32
Labour - hired labour	320	120	120	120	120	120	120	120	120	120	120	120
(D) Total Direct Costs	658.39	541.50	880.00	8827.50	739.00	1356.00						
(E) GROSS MARGIN ($) (C-D)	-$658.39	-$541.50	-$730.00	$167.25	$14260	$13644.0						
FIXED COSTS ($)												
Nil	0	0	0	0	0	0	0	0	0	0	0	0
(F) Total Fixed Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
(G) NET INCOME ($) (E-F)	-$469	-$305	-$567	-$7,228	$2,085	$2,526	$3,754	$4,203	$3,678	$4,004	$4,304	$4,104
Net Income per family labour input (G/I)	-23.45	-15.23	-28.35	-361.38	104.26	126.28	187.70	210.14	183.92	200.19	215.19	205.19
Net Income per tree (G/A)	-$9.38	-$6.09	-$11.34	-$144.55	$41.70	$50.51	$75.08	$84.06	$73.57	$80.08	$86.08	$82.08
Net Income per acre (G x (1/B))												
Family Labour Inputs (Days)												
Task	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**
Land preparation - cutting & slashing	8											
Lining, digging holes	8											
Planting	2											
Weed control	7	7	7	4	4	4	4	4	3	3	3	3
Prunning	1	3	4	4	5	5	5	5	5	5	5	5
Fertilizing application	4	7	7	7	7	7	7	7	7	7	7	7
Building and repairing net				10	2	2	2	2	2	2	2	2
Harvesting & packaging in field baskets (250 kg/day)				2	3	4	5	5	5	5	5	5
Grading and packing for sale				2	3	4	5	5	5	5	5	5
(H)Total labour requirements - (Days)	30	17	18	29	24	26	28	28	27	27	27	27
(I) Average Wage Rate ($/unit) (days)	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20
(J) Total cost of family labour	$600	$340	$360	$580	$480	$520	$560	$560	$540	$540	$540	$540
NET INCOME - incl.family labour cost (H x I)	-$1,069	-$645	-$927	-$7,808	$1,605	$2,006	$3,194	$3,643	$3,138	$3,464	$3,764	$3,564

6. ENTERPRISE BUDGETS FOR LIVESTOCK

6.1 Dairy Cattle

Enterprise Background for Dairy Cattle

The following budgets represent two scenarios for a fully commercial dairy cattle enterprise:

- Development budget over a 15 year timeframe for a new dairy cattle enterprise starting with 3 weaner heifers (5-6 months old) and building to 16 cows (total herd size 37) , where six cows are milked daily;
- Gross margins budget for a steady-state dairy cattle enterprise (16 cows, 37 head in herd), milking six cows.

Both scenarios assume that the dairy herd is self-replacing (i.e. females are retained for developing the herd and once the herd reaches steady state, female calves are retained to replace cull cows).

Fifty acres of pasture are available for the dairy enterprise.

a) Production Information

Calving percentage:

The calving percentage is 70% (e.g. for every 10 cows joined, 6 calves will be born). It is assumed that for each calving, approximately 50 per cent of calves born are bulls and 50 per cent are heifers.

Mortality rate:

For calves aged 0-6 months, the mortality rate is 5 per cent (i.e. 1 calf in 20 calves born will not survive). For the remainder of the herd (i.e. animals over 6 months of age), the mortality rate is 2 per cent (i.e. 1 animal in 50 will not survive).

Breeding Life of Cows and Bulls:

Heifers are first mated at 16 -24 months of age and calve the following year (i.e. heifer weaners purchased in Year 1 will be joined in Year 2 and calve in Year 3).

Due to the small number of breeding cows available for developing the herd, cows are retained for a maximum breeding life of 7 years (culled at 10 years old).

Bulls are first joined at 16-24 months of age and are retained for five years (i.e. weaner bulls purchased in Year 1 will first be joined in Year 2 and will be culled in Year 5).

Stocking rate:

Fifty acres of pasture are available for the cattle enterprise, allowing 2 acres per livestock unit[5] (LSU) when the enterprise reaches steady state production (i.e. 6 cows milked daily).

The farmer commences a pasture improvement program in Year 1, improving 5 acres per year, by incorporating improved pasture species and legumes into the native pasture. This pasture improvement

[5] Livestock units are used to estimate the carrying capacity and stocking rate of grazing land, by recognizing that cattle of different age/size classes have varied nutritional requirements. To calculate livestock unit equivalents, the following weightings are used: Cow- 1.0, bull – 1.5, heifer-0.8, weaner-0.5, calf-0.3. In Samoa, the stocking rate recommended by MoA-Animal and Plant Health Divisions is 1 LSU/acre for improved pastures.

helps to increase the carrying capacity of the grazing area.

Milk production:

Daily milk production is ten litres per cow (i.e. 60 litres per day for six milking cows).

The average lactation period per cow is 100 days. Hence, when the enterprise reaches steady-state production, nine lactating cows are required (i.e. 16 breeding cows, with 70% calving percentage) to ensure that six cows are milked daily throughout the year.

Herd Structure:

For the development budget, the dairy herd is established in Year 1 with the purchase of 3 weaner heifers (5-6 months) and one weaner bull. The enterprise builds up to a steady state self-replacing herd of 16 cows, which enables six cows to be milked daily throughout the year (represented in gross margin budget). The herd structure over the 15 year period is presented over leaf.

All heifer calves are retained for herd development, until the dairy cattle enterprise has a breeding herd of 16 cows in Year 13. The oldest cows and poorest performers are then culled, to maintain cow numbers at 16 head.

Fifty per cent of bull calves are retained as steers until 18-24 months of age, and the remaining fifty per cent are retained as steers until three years of age.

Cull bulls are sold at 4-5 years from the purchase point of about 6-8 months old. This will take another 12 to 14 months before reaching puberty and takes another 24 to 30 months before his female progeny reach puberty and when it is considered for replacing.

b) Income

Markets:

Pasteurised whole and skim milk is sold to local shops and supermarkets in 750ml bottles. Milk is sold for an average price of $3.10/750 ml bottle.

Sale cattle are sold to the following markets:

- Steers (18-24 months): fa'alavelave - $1,000 per head.

- Steers (3 years old): retail butchers - $2,125 per head (250kg dressed weight[6] @ $8.50/kg retailing).
- Cull cows (9+years old): fa'alavelave - $1,100 per head. Average 220kg carcass weight at $5/kg retailing.
- Cull bulls (7 years old): retail butchers - $1,350 per head (300kg dressed weight @ $4.50/kg).

[6] Dressing percentage: 50 per cent.

STOCK RECONCILIATION FOR DAIRY CATTLE - SELF-REPLACING HERD: 6 MILKING COWS (3 COWS BUILDING TO 16 COWS)

ASSUMPTIONS

Age of purchased breeding stock:		Steer turn-off:		
Weaner heifers	5-6 months	18-24 months	50%	
Weaner bulls	5-6 months	36 months (3 years)	50%	
Age of first joining:		Mortality rate:		
Breeding heifers	16-24 months	Calves (0-6 months)	5%	(1 in 20)
Breeding bulls	16-24 months	Rest of herd (6+ months)	2%	(1 in 50)
Calving %:	60%	Lactation Period (Days)	260	
Sex of calves:				
Heifers	50%			
Bulls	50%			

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Opening Stock:	**0**	**4**	**4**	**6**	**7**	**9**	**10**	**13**	**14**	**18**	**20**	**24**	**28**	**32**	**36**
Purchases:	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**1**	**0**
Cows	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulls	1	0	1	0	0	0	0	1	0	0	1	0	0	1	0
Deaths:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cows	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Births:	**0**	**0**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**4**	**6**	**6**	**7**	**9**	**9**
Heifer Calves	0	0	1	0	1	1	2	2	2	2	3	3	4	4	5
Bull Calves	0	0	0	1	1	1	1	1	2	2	3	3	3	5	4
Sales:	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**3**	**0**	**2**	**3**	**2**	**3**	**6**	**8**
Steers (18-24 mths)	0	0	0	0	0	1	0	1	0	1	1	1	2	1	2
Steers (3 y.o)	0	0	0	0	0	0	0	1	0	1	1	1	1	1	2
Cull bulls	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0
Cull cows	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4
Weaner heifers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Closing Stock:	**4**	**4**	**6**	**7**	**9**	**10**	**13**	**14**	**18**	**20**	**24**	**28**	**32**	**36**	**37**

HERD STRUCTURE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Cows - 12 y.o													3		
Cows - 11 y.o												3		1	
Cows - 10 y.o											3		1		
Cows - 9 y.o										3		1		1	
Cows - 8 y.o									3		1		1	1	1
Cows - 7 y.o								3		1		1	1	2	1
Cows - 6 y.o							3		1		1	1	2	1	2
Cows - 5 y.o						3		1		1	1	2	1	2	2
Cows - 4 y.o					3		1		1	1	2	1	2	2	3
Cows - 3 y.o				3		1		1	1	2	1	2	2	3	3
Heifers - 2 y.o			3		1		1	1	2	1	2	2	3	3	4
Heifers - 1 y.o		3		1		1	1	2	1	2	2	3	3	4	4
Steers - 2 y.o							1		1	1	1	1	1	2	1
Steers - 1.y.o					1	1	1	1	2	2	2	3	3	3	5
Heifer Calves < 1 y.o	3		1		1	1	2	1	2	2	3	3	4	4	5
Bull Calves < 1 y.o			1	1	1	1	1	2	2	2	3	3	3	5	4
Bulls	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
TOTAL NO. HEAD	**4**	**4**	**6**	**7**	**9**	**10**	**13**	**14**	**18**	**20**	**24**	**28**	**32**	**36**	**37**
NO. BREEDING COWS	**0**	**0**	**3**	**3**	**4**	**4**	**5**	**6**	**8**	**9**	**11**	**13**	**16**	**16**	**16**
NO. OF LACTATING COWS	**0**	**0**	**1**	**1**	**2**	**2**	**3**	**3**	**4**	**5**	**6**	**7**	**9**	**9**	**9**
NO. OF MILKING DAYS/YEAR	**0**	**0**	**260**	**260**	**520**	**520**	**780**	**780**	**1040**	**1300**	**1560**	**1820**	**2340**	**2340**	**2340**
NO. COWS MILKED DAILY	**0**	**0**	**1**	**1**	**1**	**1**	**2**	**2**	**2**	**3**	**4**	**4**	**6**	**6**	**6**

c) Direct Costs

Supplementary feed:

Cattle are supplementary fed with silage made by the farmer, comprised of molasses, spent brewers' grain, copra meal and scraps from banana, ta'amu and cassava plants. The farmer purchases molasses for $95/44 gallon drum and copra meal for $40.00 per 40kg bag. Spent brewers' grain is obtained at $50.00 for a truckload from Vailima Brewery. One 44 gallon drum of molasses and three 40kg bags of copra are required per ten head of cattle each year.

For up to 10 head, two 44-gallon drums of silage are made per month. For 11-20 head, three drums and for 21-30 head, four drums are made per month. For over 30 head, 5 drums of silage are made per month.

Cattle are also supplementary fed with salt mineral blocks comprised of fine salt, copra meal, molasses and urea. Approximately six blocks are required per thirty head of cattle (i.e. 0.2 blocks/head) at a cost of around $75.00 per 20kg block.

Animal husbandry:

Animal husbandry costs are estimated to be $5.00 per head annually. This cost covers drenching, mastitis treatment and any other related animal husbandry costs.

Ear tags for stock identification are purchased for $8.00 per tag. Ear tags are purchased annually for new stock plus spares to replace any tags lost from existing cattle through the year.

Pasture improvement:

Five acres of pasture are improved annually, incorporating improved grass species (e.g. Batiki, Signal, Elephant) and legumes (e.g. Calliandra, Leuceana).

Farmers obtain planting material free of charge from neighbours and MAF-Animal Production and Health (APHD) Division.

Five litres of weedicide (Roundup) is purchased for land preparation ($250.00 per bottle) per five acres of pasture improvement.

Hired labour is used for land preparation and planting improved grass and legume species (see Labour section).

Milking supplies:

Prior to milking, cows' udders are cleaned with soap and dried with a cloth, as a means of reducing the risk of mastitis infection. A separate bar of soap and cloth is used for each cow. Five bars of soap ($6.00 per cow) and six cloths per lactating cow ($7.00/cow) are required annually.

A gas burner is used for pasteurising milk which requires a weekly gas bottle refill (10kg), at a cost of $80.00 per refill.

Large plastic bags are used to line drums for silage making @ $5.00 per bag

Packaging costs:

Milk is packaged in 750ml bottles which are purchased for $1.80 per bottle.
Printed labels are attached to the bottles. Each label costs $0.20.

Selling Costs:

In the first two years of the dairy cattle enterprise when milking is yet to commence, one trip per fortnight is

made for purchasing feed inputs etc. at $20.00 per trip.

The farmer is responsible for paying the Mobile Slaughter Unit at $50 per head.

d) Labour

The farmer uses both hired labour and family labour for the dairy enterprise.

Hired labour is used for the following tasks.

- Fencing: 10 men x 5 days/week x 3 weeks (Year 1)
- Pasture improvement: 5 men x 5 days (Years 1-6)
- Dairy operations: 1 man x 5 days/week x 52 weeks (Years 3-10)

2 men x 5 days/week x 52 weeks (Years 11-15)

Once milking commences, one full-time labourer is hired to carry out day-to day operations on the dairy farm (i.e. milking, herd monitoring, animal husbandry, maintaining fences, checking waters, slaughtering, delivering to butchers etc.). Hired labour are paid $20.00 per day ($100 per week).

Family labour is used for the following tasks:

- Building milking shed 3 men x 5 days (Year 1)
- Dairy operations: 1 man x 4hrs/day x all year round
- Milking on weekends: 1 man x 4 hours/day x 2 days/week (Years 3-15)
- Processing milk: 1 man x 8 hrs/day x 7 days/week (Years 3-15)

Family labour is valued at the market rate for hired agricultural labour of $20.00 per day ($2.50/hour).

e) Capital Costs

The following capital items are required for a cattle enterprise with 30 cows (total herd approximately 70 head).

- Breeding stock – weaner heifers and bulls (5-6 months old): $1,100/head, 200kg LW at $5.50/kg LW
- Fencing: $22,000
- Milking shed: $15,000 (50 head capacity)
- Temporary watering points (44 gallon drums): $100
- Permanent water supply (mains connection, pipes, troughs): $10,000
- Milking equipment (buckets, cans etc.):$1,000
- Pasteurising equipment (gas burner, pot, thermometer etc.): $600
- Silage making equipment (44 gallon drums): $150
- Refrigerator: $1,500

DEVELOPMENT BUDGET FOR DAIRY CATTLE

Scenario: **Self - Replacing Herd: 6 Milking Cows (3 Cows Building Up to 16 Cows)**

ASSUMPTIONS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
(A) No. of breeding cows:	0	0	3	3	4	4	5	6	8	9	11	13	16	16	16
No. of lactating cows:	0	0	1	1	2	2	3	3	4	5	6	7	9	9	9
No. of cows milked daily:	0	0	1	1	1	1	2	2	2	3	4	4	6	6	6
Total no. of cattle:	4	4	6	7	9	10	13	14	18	20	24	28	32	36	37
Milk production (Litres/Cow/Day):	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Lactation period/cow (No. of days):	260	260	260	260	260	260	260	260	260	260	260	260	260	260	260
Total milk production (litres)	0	0	1,300	1,300	2,600	2,600	3,900	3,900	5,200	6,500	7,800	9,100	11,700	11,700	11,700
No. of bottles sold (750 ml)	0	0	1,733	1,733	3,467	3,467	5,200	5,200	6,933	8,667	10,400	12,133	15,600	15,600	15,600
Price of milk (750ml bottles):	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10	$3.10
Total no. of cattle sold:															
Steers (18-24 mths)	0	0	0	0	0	1	0	1	0	1	1	1	2	1	2
Steers (3 years old)	0	0	0	0	0	0	0	1	0	1	1	1	1	1	2
Cull cows	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4
Cull bulls	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0
Cost of purchasing weaner heifers & bulls ($/head):	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Price of steers (3 y.o.)($/head):	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Price of steers (18-24 months)($/head):	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Price of cull cows ($/head):	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price of cull bulls ($/head):	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
(B) Area grazed (acres):	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Area of improved pasture (acres):	5	10	15	20	25	30	30	30	30	30	30	30	30	30	30

INCOME ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Milk Production															
Sale of milk (@$3.10/750ml bottle)	0	0	5,373	5,373	10,747	10,747	16,120	16,120	21,493	26,867	32,240	37,613	48,360	48,360	48,360
Livestock Sales - Fa'alavelave															
Steers (18-24 months old)(@$800/head)	0	0	0	0	0	800	0	800	0	800	800	800	1,600	800	1,600
Cull Cows (@$1,000/head)	0	0	0	0	0	0	0	0	0	0	0	0	0	3,000	4,000
Livestock Sales - Retail Butcher															
Steers (3 years old) (@$1500/head)	0	0	0	0	0	0	0	1,500	0	1,500	1,500	1,500	1,500	1,500	3,000
Cull Bulls (@$1,400/head)	0	0	0	0	0	0	0	1,400	0	0	1,400	0	0	1,400	0
(C) Total Income ($)	**$0**	**$0**	**$5,373**	**$5,373**	**$10,747**	**$11,547**	**$16,120**	**$19,820**	**$21,493**	**$29,167**	**$35,940**	**$39,913**	**$51,460**	**$55,060**	**$56,960**

DIRECT COSTS($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Supplementary Feed															
Salt mineral blocks (0.2 blocks/head@$60/block)	60	60	120	120	120	120	180	180	240	240	300	360	420	480	480
Copra meal (@$16.00/40 kg bag)	48	48	48	48	48	48	96	96	96	96	144	144	192	192	192
Molasses (@$200/44 gallon drum)	200	200	200	200	200	200	400	400	400	400	600	600	800	800	800
Animal Husbandry															
Animal health (i.e. drenching) ($5/head)	20	20	30	35	45	50	65	70	90	100	120	140	160	180	185
Ear tags (@$2.00/tag)	28	0	4	2	4	2	6	2	8	4	8	8	8	8	2
Pasture Improvement															
Tractor fuel (@$6.00/acre)	30	30	30	30	30	30	0	0	0	0	0	0	0	0	0
Weedicide (Sting)(1 x 5 litre bottle @$120/bottle)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Milking Supplies															
Soap (5 bars/cow/year @$2.50)	0	0	13	13	25	25	38	38	50	63	75	88	113	113	113
Cloths (6 cloths/cow/year @$2.00)	0	0	12	12	24	24	36	36	48	60	72	84	108	108	108
Gas - pastuerising ($40.00/refill)	0	0	480	480	960	960	1,440	1,440	1,440	1,920	1,920	1,920	1,920	1,920	1,920
Plastic bags - silage making	0	0	120	120	120	300	180	180	180	300	240	240	300	300	300
Packaging															
Bottles (750ml)(@$0.30 each)	0	0	520	520	1,040	1,040	1,560	1,560	2,080	2,600	3,120	3,640	4,680	4,680	4,680
Bottle caps ($0.10 each)	0	0	173	173	347	347	520	520	693	867	1,040	1,213	1,560	1,560	1,560
Labels (@$0.20 each)	0	0	347	347	693	693	1,040	1,040	1,387	1,733	2,080	2,427	3,120	3,120	3,120
Transport															
Purchasing feed inputs (1 trip/fortnight @$20.00/t	520	520	0	0	0	0	0	0	0	0	0	0	0	0	0
Delivery of milk (7 trips/fortnight @$20.00/trip)	0	0	3,640	3,640	3,640	3,640	3,640	3,640	3,640	3,640	3,640	3,640	3,640	3,640	3,640
Transport to retail butcher (@$20.00/trip)	0	0	0	0	0	0	0	40	0	20	40	20	20	40	40
Labour															
Hired Labour (@$20/day)	500	500	8,700	5,700	5,700	5,700	5,200	5,200	5,200	5,200	10,400	10,400	10,400	10,400	10,400
(D) Total Direct Costs	**1,526**	**1,498**	**14,557**	**11,560**	**13,116**	**13,299**	**14,521**	**14,562**	**15,672**	**17,363**	**23,919**	**25,044**	**27,561**	**27,661**	**27,660**
(E) GROSS MARGIN (C-D)	**-$1,526**	**-$1,498**	**-$9,183**	**-$6,186**	**-$2,369**	**-$1,752**	**$1,600**	**$5,259**	**$5,821**	**$11,804**	**$12,021**	**$14,870**	**$23,900**	**$27,400**	**$29,301**

FIXED COSTS ($)															
Capital Costs															
Stock purchases															
Weaner heifers (5-6 months) (3 head @ $500)	1500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weaner bulls (5-6 months) (1 head @ $500)	500	0	500	0	0	0	0	500	0	0	500	0	0	500	0
Fencing	0	0	21,000	0	0	0	0	0	0	0	0	0	0	0	0
Milking shed	0	0	5,000	0	0	0	0	0	0	0	0	0	0	0	0
Watering Points	100	0	0	3,500	0	0	0	0	0	0	0	0	0	0	0
Milking equipment (buckets, cans etc.)	0	1,000	0	0	0	0	0	0	0	0	0	0	0	0	0
Pastuerising equipment (gas burner, pot, themometer	0	400	0	0	0	0	0	0	0	0	0	0	0	0	0
Silage making equipment	150		0	0	0	0	0	0	0	0	0	0	0	0	0
Refridgerator	0	1,500	0	0	0	0	0	0	0	0	0	0	0	0	0
(F) Total Fixed Costs	**$2,250**	**$2,900**	**$26,500**	**$3,500**	**$0**	**$0**	**$0**	**$500**	**$0**	**$0**	**$500**	**$0**	**$0**	**$500**	**$0**
(G) NET INCOME ($) (E-F)	**-$3,776**	**-$4,398**	**-$35,683**	**-$9,686**	**-$2,369**	**-$1,752**	**$1,600**	**$4,759**	**$5,821**	**$11,804**	**$11,521**	**$14,870**	**$23,900**	**$26,900**	**$29,301**
Net Income per breeding cow (G/A)	**n.a**	**n.a**	**-$11,894**	**-$3,229**	**-$592**	**-$438**	**$320**	**$793**	**$728**	**$1,312**	**$1,047**	**$1,144**	**$1,494**	**$1,681**	**$1,831**
Net Income per family labour day (G/H)	**-$36**	**-$48**	**-$207**	**-$56**	**-$14**	**-$10**	**$9**	**$28**	**$34**	**$68**	**$67**	**$86**	**$139**	**$156**	**$170**
Net Income per acre (G/B)	**-$94**	**-$110**	**-$297**	**-$81**	**-$15**	**-$11**	**$8**	**$20**	**$18**	**$33**	**$26**	**$29**	**$37**	**$42**	**$46**
Cumulative Net Income	**-$3,776**	**-$8,174**	**-$43,857**	**-$53,543**	**-$55,913**	**-$57,665**	**-$56,066**	**-$51,307**	**-$45,486**	**-$33,682**	**-$22,161**	**-$7,291**	**$16,609**	**$43,508**	**$72,809**

Labour Inputs (Days)															
Task	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**
Hired labour:															
Fencing	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0
Pasture Improvement	25	25	25	25	25	25	0	0	0	0	0	0	0	0	0
Dairy operations	0	0	260	260	260	260	260	260	260	260	520	520	520	520	520
Family labour:															
Building milking shed	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feeding, herd monitoring etc.	91	91	0	0	0	0	0	0	0	0	0	0	0	0	0
Processing milk	0	0	91	91	91	91	91	91	91	91	91	91	91	91	91
Delivering milk	0	0	68	68	68	68	68	68	68	68	68	68	68	68	68
Milking on weekends	0	0	13	13	13	13	13	13	13	13	13	13	13	13	13
Total Labour Days	**131**	**116**	**608**	**458**	**458**	**458**	**433**	**433**	**433**	**433**	**693**	**693**	**693**	**693**	**693**
Total number of labour days - hired labour	25	25	435	285	285	285	260	260	260	260	520	520	520	520	520
Total number of labour days - family labour	106	91	173	173	173	173	173	173	173	173	173	173	173	173	173
Average wage rate ($/day)	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20
Total cost of hired labour	$500	$500	$8,700	$5,700	$5,700	$5,700	$5,200	$5,200	$5,200	$5,200	$10,400	$10,400	$10,400	$10,400	$10,400
Total cost of unpaid family labour	$2,125	$1,825	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450	$3,450
NET INCOME - Including cost of family labour	**-$5,901**	**-$6,223**	**-$39,133**	**-$13,136**	**-$5,819**	**-$5,202**	**-$1,851**	**$1,309**	**$2,371**	**$8,354**	**$8,071**	**$11,420**	**$20,450**	**$23,450**	**$25,851**
CUM. NET INCOME - incl. cost of family labour	**-$5,901**	**-$12,124**	**-$51,257**	**-$64,393**	**-$70,213**	**-$75,415**	**-$77,266**	**-$75,957**	**-$73,586**	**-$65,232**	**-$57,161**	**-$45,741**	**-$25,291**	**-$1,842**	**$24,009**

GROSS MARGIN BUDGET FOR DAIRY CATTLE

Scenario: **6 Milking Cows (30 Head Herd)**

Production Assumptions	
(A) No. of cows milked daily:	6
No. lactating cows:	9
No. breeding cows:	15
Total no of head in milking herd:	30
Daily milk production - litres/cow/day:	5
Lactation period per cow (days):	260
Total milk production (litres):	10,950
(B) Area grazed (acres) :	50
Area of improved pasture (acres):	30

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Milk				
Sale of milk (750ml bottles)	14,600	bottles @	$3.10	$45,260
Livestock Sales				
Weaner bulls	2	head @	$500	$1,000
Steers (18-24 month old)	3	head @	$800	$2,400
Cull cows	2	head @	$1,000	$2,000
(C) Total Income ($)				**$50,660.00**

COSTS($)				
Supplementary Feed				
Salt mineral blocks (20kg/block)	15	blocks @	$60.00	$900
Copra meal (40kg/bag)	12	bags @	$16.00	$192
Molasses (44 gallon drum)	2	drums @	$200.00	$400
Animal Husbandry				
Animal health (i.e. drenching, vaccines etc.)	30	head @	$5.00	$150
Ear tags	12	tags @	$2.00	$24
Pasture Improvement				
Weedicide (Sting)	1	5 litre bottle @	$120.00	$120
Milking Supplies				
Soap (5 bars/lactating cow)	45	bars @	$2.50	$113
Cloths (6 cloths/lactating cow)	54	cloths @	$2.00	$108
Gas - pastuerising	52	refills @	$40.00	$2,080
Plastic bags - silage making	60	bags @	$5.00	$300
Packaging				
Bottles (750ml)	14,600	bottles @	$0.30	$4,380
Bottle caps	14,600	caps @	$0.10	$1,460
Labels	14,600	labels @	$0.20	$2,920
Transport				
Delivery of milk (7 trips/fortnight)	182	trips @	$30.00	$5,460
Labour				
Hired Labour (2 men x 52 weeks)	520	days @	$20.00	$10,400
(D) Total Costs				**$29,007**

(E) GROSS MARGIN (C-D)	**$21,654**
Gross Margin/Labour Day (E/G)	**$125**
Gross Margin/Cow Milked (E/A)	**$3,609**
Gross Margin/Acre (E/B)	**$433**

Labour Inputs (Days)

Task	(F) Hired Labour	(G) Family Labour	Total
Dairy operations - feeding, milking, herd monitoring etc.	520		520
Processing milk		90	90
Delivering milk		70	70
Milking on weekends		13	13
Total Labour Days	**520**	**173**	**693**
(H) Daily wage rate ($/day)			$20
(I) Total cost of hired labour (F x H)			$10,400
(J) Total cost of family labour (G x H)			$3,460
GROSS MARGIN - Including cost of family labour (E - J)			**$18,194**

SENSITIVITY ANALYSIS - excluding cost of family labour

No. of Litres Sold	Price ($/750ml bottle)		
	$2.50	$3.10	$4.00
6,000	-$3,607	$1,194	$8,394
8,000	$3,060	$9,460	$19,060
10,950	$12,894	$21,654	$34,794

6.2 Beef Cattle

Enterprise Background for Beef Cattle – 10 Cows Building to 30 Cows

The following budgets represent two scenarios for a fully commercial beef cattle enterprise:

- Development budget for a new beef herd starting with 10 weaner heifers (5-6 months old) and building to 30 cows (approx. herd size - 70 head) over a 15-year timeframe;
- Gross margins budget for a 30 cow herd (approx. herd size - 70 head);

Both scenarios assumes that the beef herd is self-replacing (i.e. females are retained for developing the herd and once the herd reaches steady state, female calves are retained to replace cull cows).

Eighty acres of pasture are available for the cattle enterprise (i.e. the carrying capacity of 80 LSU).

a) Production Information

Calving percentage:

The calving percentage is 60% (e.g. for every 10 cows joined, 6 calves will be born). It is assumed that for each calving, approximately 50 per cent of calf born are bulls and 50 per cent are heifers.

Mortality rate:

For calves aged 0-6 months, the mortality rate is 5 per cent (i.e. 1 calf in 20 calves born will not survive). For the remainder of the herd (i.e. animals over 6 months of age), the mortality rate is 2 per cent (i.e. 1 animal in 50 will not survive).

Breeding Life of Cows and Bulls:

Heifers are first mated at 16 -24 months of age and calve the following year (i.e. heifer weaners purchased in Year 1 will be joined in Year 2 and calve in Year 3).

Due to the small number of breeding cows available for developing the herd, cows are retained for a maximum breeding life of 10 years (culled at 14 years old).

Bulls are first joined at 16-24 months of age and are retained for five years (i.e. weaner bulls purchased in Year 1 will first be joined in Year 2 and will be culled in Year 3 to avoid the risk of inbreeding). Bulls should be replaced every 2 years after the birth of the F1 female progeny.

Stocking rate:

Eighty acres of pasture are available for the cattle enterprise, allowing 2 acres per livestock unit[7] (LSU) when the enterprise reaches steady state production (i.e. 30 cows).

The farmer commences a pasture improvement program in Year 1, improving 5 acres per year, by incorporating improved pasture species and legumes into the native pasture. This pasture improvement helps to increase the carrying capacity of the grazing area.

[7] Livestock units are used to estimate the carrying capacity and stocking rate of grazing land, by recognizing that cattle of different age/size classes have varied nutritional requirements. To calculate livestock unit equivalents, the following weightings are used: Cow- 1.0, bull – 1.5, heifer-0.8, weaner-0.5, calf-0.3. In Samoa, the stocking rate recommended by MoA-Animal and Plant Health Divisions is 1 LSU/acre for improved pastures.

Herd Structure:

For the development budget, the beef cattle herd is established in Year 1 with the purchase of 10 weaner heifers (5-6 months) and one weaner bull. The enterprise builds up to a steady state self-replacing herd of 30 cows (represented in gross margin budget). The herd structure over the 15 year period is presented over leaf.

All heifer calves are retained for herd development, until the beef cattle enterprise has a breeding herd of 30 cows in Year 10. The oldest cows and poorest performers are then culled, to maintain cow numbers at 30 head.

Hundred per cent of bull calves are retained as steers until 18-24 months of age, and the remaining fifty per cent are retained as steers until three years of age.

Cull bulls are sold at three years of age.

b) Income

Markets:

Sale cattle are sold to the following markets:

- Steers (18-24 months): retailing - $1,700 per head of 200kg at $8.50/kg.
- Steers (3 years old): retail butchers - $1,500 per head (250 kg carcass dressed weight[8] @ $8.50/kg).
- Cull cows (9+years old): fa'alavelave - $1,100 per head. Average 220kg carcass weight @ $5/kg retailing.
- Cull bulls (7 years old): retail butchers - $1,350 per head (300 kg dressed weight @ $4.50/kg).

a) Direct Costs

Supplementary feed:

Cattle are supplementary fed with salt mineral blocks comprised of fine salt (i.e. only during drought season), copra meal, molasses and urea. Approximately six blocks are required per thirty head of cattle (i.e. 0.2 blocks/head) at a cost of $75.00 per 20kg block.

[8] Dressing percentage: 50 per cent.

STOCK RECONCILIATION FOR BEEF CATTLE - 10 COWS BUILDING UP TO 30 COWS (SELF-REPLACING HERD)

ASSUMPTIONS

Age of purchased breeding stock:		Steer turn-off:		
Weaner heifers	5-6 months	18-24 months	50%	
Weaner bulls	5-6 months	36 months (3 years)	50%	
Age of first joining:		Mortality rate:		
Breeding heifers	16-24 months	Calves (0-6 months)	5%	(1 in 20)
Breeding bulls	16-24 months	Rest of herd (6+ months)	2%	(1 in 50)
Calving %:	60%			
Sex of calves:				
Heifers	50%			
Bulls	50%			

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Opening Stock:	**0**	**11**	**11**	**18**	**24**	**29**	**32**	**39**	**47**	**57**	**64**	**71**	**73**	**73**	**74**
Purchases:	**11**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
Cows	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bulls	1	0	1	0	0	0	0	2	0	1	0	0	0	0	0
Deaths:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**	**1**
Cows	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
Calves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Births:	**0**	**0**	**6**	**6**	**6**	**7**	**9**	**11**	**13**	**16**	**18**	**18**	**18**	**18**	**18**
Heifer Calves	0	0	3	3	3	4	4	6	6	8	9	9	9	9	9
Bull Calves	0	0	3	3	3	3	5	5	7	8	9	9	9	9	9
Sales:	**0**	**0**	**0**	**0**	**1**	**4**	**2**	**5**	**3**	**10**	**10**	**15**	**17**	**16**	**18**
Steers (18-24 mths)	0	0	0	0	1	2	1	2	2	3	3	4	5	4	5
Steers (3 y.o)	0	0	0	0	0	2	1	2	1	3	2	4	4	4	5
Cull bulls	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Cull cows	0	0	0	0	0	0	0	0	0	3	5	7	8	8	8
Closing Stock:	**11**	**11**	**18**	**24**	**29**	**32**	**39**	**47**	**57**	**64**	**71**	**73**	**73**	**74**	**73**

HERD STRUCTURE	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Cows - 10 y.o											1				
Cows - 9 y.o										7					
Cows - 8 y.o									10		3	3	3	3	3
Cows - 7 y.o								10		3	3	3	3	3	4
Cows - 6 y.o							10		3	3	3	3	3	4	4
Cows - 5 y.o						10		3	3	3	4	3	4	4	4
Cows - 4 y.o					10		3	3	3	4	4	5	4	4	4
Cows - 3 y.o				10		3	3	3	4	4	6	5	4	6	4
Heifers - 2 y.o			10		3	3	3	4	4	6	6	8	9	6	7
Heifers - 1 y.o		10		3	3	3	4	4	6	6	8	9	9	9	9
Steers - 2 y.o					2	1	2	1	3	2	4	4	4	5	4
Steers - 1.y.o				3	3	3	3	5	5	7	8	9	9	9	9
Heifer Calves < 1 y.o	10		3	3	3	4	4	6	6	8	9	9	9	9	9
Bull Calves < 1 y.o	1		4	3	3	3	5	5	7	8	9	9	9	9	9
Bulls		1	1	2	2	2	2	3	3	3	3	3	3	3	3
TOTAL	**11**	**11**	**18**	**24**	**29**	**32**	**39**	**47**	**57**	**64**	**71**	**73**	**73**	**74**	**73**
NO. BREEDING COWS	**0**	**0**	**10**	**10**	**13**	**16**	**19**	**23**	**27**	**30**	**30**	**30**	**30**	**30**	**30**

Animal husbandry:

Muster Package offered by MAF for Animal husbandry is $100. This cost includes castration, drenching and tagging but drench and tags are provided by the farmer.

Cattle Vaccinations for tuberculosis and brucellosis are no longer provided by MAF-Animal Production and Health Division.

Pasture improvement:

Five acres of pasture are improved annually, incorporating improved grass species (e.g. Batiki, Signal, Elephant) and legumes (e.g. Calliandra, Leuceana).

Planting material is sourced free of charge from neighbours and MAF-Animal Production and Health Division.

Weedicide is purchased for weed control (1 x 5 litre bottle Roundup /per 5 acres @ $250.00).

Selling Costs:

Utilizing the Mobile Slaughter unit and ensuring compliance with the Slaughter and Meat Supply Act 2015, the slaughter and supply of carcasses for retail will cost the farmer $50 per head.

b) Labour

The farmer uses both hired labour and family labour for the cattle enterprise.

Hired labour is used for the following tasks.

- Fencing: 10 men x 5 days/week x 3 weeks (Year 1)
- Pasture improvement: 5 men x 5 days (Years 1-10)

Hired labourers are paid $20.00 per day.

Family labour is used for day-to-day operation of the beef enterprise (e.g. herd monitoring, animal husbandry, maintaining fences, checking water, slaughtering, delivery to market etc).

- Herd monitoring, maintaining fences, water etc: 3 hours/day (5 days/week)
- Slaughtering: 3 men x 4 hours/animal
- Delivery to butchers: 1 man x 4 hours/return trip

Family labour is valued at the market rate for hired agricultural labour of $20.00 per day ($2.50/hour).

c) Capital Costs

The following capital items are required for a cattle enterprise with 30 cows (total herd approximately 70 head).

- Breeding stock – weaner heifers and bulls (5-6 months old): $500/head
- Fencing (4 rows of barbed wire and wooden posts): $35,200/12 sub division
- Stockyards (50 head capacity): $10,000
- Temporary watering points (44 gallon drums): $800
- Permanent water supply (mains connection, pipes, troughs, water tanks): $10,000

Enterprise Budget for Beef Cattle – 10 Cows Building to 30 Cows

DEVELOPMENT BUDGET FOR BEEF CATTLE

Scenario: **10 Cow Herd Building Up to 30 Cows**

Production Assumptions	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
(A) No. of breeding cows	0	0	10	10	13	16	19	23	27	30	30	30	30	30	30
Total no. of cattle	11	11	18	24	29	32	39	47	57	64	71	73	73	74	73
Total no. of cattle sold:															
Steers (18-24 mths)	0	0	0	0	1	2	1	2	2	3	3	4	5	4	5
Steers (3 years old)	0	0	0	0	0	2	1	2	1	3	2	4	4	4	5
Cull Cows	0	0	0	0	0	0	0	0	0	3	5	7	8	8	8
Cull bulls	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Cost of purchasing weaner heifers & bulls ($/head)	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Price of steers (3 y.o.)($/head)	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Price of steers (18-24 months)($/head)	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Price of cull cows ($/head)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Price of cull bulls ($/head)	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400
(B) Area grazed (acres)	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Area of improved pasture (acres)	5	10	15	20	25	30	35	40	45	50	50	50	50	50	50

INCOME ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Livestock Sales - Fa'alavelave															
Steers (18-24 months old)(@$800/head)	0	0	0	0	800	1,600	800	1,600	1,600	2,400	2,400	3,200	4,000	3,200	4,000
Cull Cows (@$1,000/head)	0	0	0	0	0	0	0	0	0	3,000	5,000	7,000	8,000	8,000	8,000
Livestock Sales - Retail Butcher															
Steers (3 years old) (@$1500/head)	0	0	0	0	0	3,000	1,500	3,000	1,500	4,500	3,000	6,000	6,000	6,000	7,500
Cull Cows (@$1,400/head)	0	0	0	0	0	0	0	1,400	0	1,400	0	0	0	0	0
(C) Total Income ($)	**$0**	**$0**	**$0**	**$0**	**$800**	**$4,600**	**$2,300**	**$6,000**	**$3,100**	**$11,300**	**$10,400**	**$16,200**	**$18,000**	**$17,200**	**$19,500**

COSTS($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Supplementary Feed															
Salt mineral blocks (0.2 blocks/head@$60/block)	180	180	240	300	360	420	480	600	720	780	900	900	900	900	900
Animal Husbandry															
Animal health (i.e. drenching) ($5/head)	55	55	90	120	145	160	195	235	285	320	355	365	365	370	365
Ear tags (@$2.00/tag)	32	10	24	22	20	16	24	26	30	24	24	14	10	12	8
Pasture Improvement															
Sting (2 x 5 litre bottles/year @$120.00/bottle)	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
Transport															
Transport to retail butcher (@$20.00/trip)	0	0	0	0	0	40	20	60	20	80	40	80	80	80	100
Labour															
Hired Labour (@$20/day)	500	500	3,500	500	500	500	500	500	500	5,700	5,200	5,200	5,200	5,200	5,200
(D) Total Costs	1,007	985	4,094	1,182	1,265	1,376	1,459	1,661	1,795	7,144	6,759	6,799	6,795	6,802	6,813
(E) GROSS MARGIN (C-D)	**-$1,007**	**-$985**	**-$4,094**	**-$1,182**	**-$465**	**$3,224**	**$841**	**$4,339**	**$1,305**	**$4,156**	**$3,641**	**$9,401**	**$11,205**	**$10,398**	**$12,687**

FIXED COSTS ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Capital Costs															
Stock purchases															
Weaner heifers (5-6 months)(@$500/head)	5000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Weaner bulls (5-6 months)(@$500/head)	500	0	500	0	0	0	0	1000	0	500	0	0	0	0	0
Fencing	0	0	21,000	0	0	0	0	0	0	0	0	0	0	0	0
Stockyards	0	0	5,000	0	0	0	0	0	0	0	0	0	0	0	0
Watering Points	200	0	0	10,000	0	0	0	0	0	0	0	0	0	0	0
(F) Total Fixed Costs	**$5,700**	**$0**	**$26,500**	**$10,000**	**$0**	**$0**	**$0**	**$1,000**	**$0**	**$500**	**$0**	**$0**	**$0**	**$0**	**$0**
(G) NET INCOME ($) (E-F)	**-$6,707**	**-$985**	**-$30,594**	**-$11,182**	**-$465**	**$3,224**	**$841**	**$3,339**	**$1,305**	**$3,656**	**$3,641**	**$9,401**	**$11,205**	**$10,398**	**$12,687**
Net Income per breeding cow (G/A)	**n.a**	**n.a**	**-$3,059**	**-$1,118**	**-$36**	**$202**	**$44**	**$145**	**$48**	**$122**	**$121**	**$313**	**$374**	**$347**	**$423**
Net Income per family labour day (G/H)	**-$67**	**-$10**	**-$306**	**-$112**	**-$5**	**$30**	**$8**	**$30**	**$12**	**$30**	**$30**	**$72**	**$84**	**$79**	**$93**
Net Income per acre (G/B)	**-$84**	**-$12**	**-$38**	**-$14**	**$0**	**$3**	**$1**	**$2**	**$1**	**$2**	**$2**	**$4**	**$5**	**$4**	**$5**
Cumulative Net Income	**-$6,707**	**-$7,692**	**-$38,286**	**-$49,468**	**-$49,933**	**-$46,709**	**-$45,868**	**-$42,529**	**-$41,224**	**-$37,568**	**-$33,927**	**-$24,526**	**-$13,321**	**-$2,923**	**$9,764**

Labour Inputs (Days)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Task															
Hired labour															
Herd monitoring, husbandry, checking waters etc.	0	0	0	0	0	0	0	0	0	260	260	260	260	260	260
Fencing	0	0	150	0	0	0	0	0	0	0	0	0	0	0	0
Pasture Improvement	25	25	25	25	25	25	25	25	25	25	0	0	0	0	0
Family labour:															
Herd monitoring, husbandry, checking waters etc.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Slaughtering	0	0	0	0	1.5	6	3	7.5	4.5	15	15	22.5	25.5	24	27
Transport to market	0	0	0	0	0.5	2	1	2.5	1.5	5	5	7.5	8.5	8	9
Total Labour Days	**125**	**125**	**275**	**125**	**127**	**133**	**129**	**135**	**131**	**145**	**120**	**130**	**134**	**132**	**136**
(H) Total number of labour days - hired labour	25	25	175	25	25	25	25	25	25	285	260	260	260	260	260
(I) Total number of labour days - family labour	100	100	100	100	102	108	104	110	106	120	120	130	134	132	136
(J) Average wage rate ($ / day)	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20
(K) Total cost of hired labour (H × J)	$500	$500	$3,500	$500	$500	$500	$500	$500	$500	$5,700	$5,200	$5,200	$5,200	$5,200	$5,200
(L) Total cost of unpaid family labour (I × J)	$2,000	$2,000	$2,000	$2,000	$2,040	$2,160	$2,080	$2,200	$2,120	$2,400	$2,400	$2,600	$2,680	$2,640	$2,720
NET INCOME - Including cost of family labour (G-L)	**-$8,707**	**-$2,985**	**-$32,594**	**-$13,182**	**-$2,505**	**$1,064**	**-$1,239**	**$1,139**	**-$815**	**$1,256**	**$1,241**	**$6,801**	**$8,525**	**$7,758**	**$9,967**
CUM. NET INCOME - incl. cost of family labour	**-$8,707**	**-$11,692**	**-$44,286**	**-$57,468**	**-$59,973**	**-$58,909**	**-$60,148**	**-$59,009**	**-$59,824**	**-$58,568**	**-$57,327**	**-$50,526**	**-$42,001**	**-$34,243**	**-$24,276**

GROSS MARGIN BUDGET FOR BEEF CATTLE

Scenario: **30 Breeding Cows (Self-Replacing Herd)**

ASSUMPTIONS

(A) No. of breeding cows:	30
Total no. of cattle:	73
Calving %:	60%
(B) Area grazed (acres):	80
Area of improved pasture (acres):	50
Total no. of head sold:	18

INCOME ($)	Quantity	Unit	Unit Price	Total
Livestock Sales - Faalavelave				
Cull cows	8	head @	1,000	8,000
Steers (18-24 month old)	5	head @	800	4,000
Livestock Sales - Retail Butcher				
Steers (3 years old)	5	head @	1,500	7,500
(C) Total Income ($)				**$19,500**

COSTS($)	Quantity	Unit	Unit Cost	Total
Supplementary Feed				
Salt mineral blocks	15	blocks @	$60.00	$900.00
Animal Husbandry				
Animal health (e.g. drench)	73	head @	$5.00	$365.00
Ear tags	10	tag @	$2.00	$20.00
Pasture Improvement				
Sting	1	5 litre bottles @	$120.00	$120.00
Transport				
Retail butcher	5	trips @	$20.00	$100.00
Labour				
Hired labour	25	man days @	$20.00	$500.00
(D) Total Costs				**$2,005.00**
(E) GROSS MARGIN (C-D)				**$17,495.00**
Gross Margin/Breeding Cow (E/A)				**$583.17**
Gross Margin/Family Labour Day (E/F)				**$155.51**
Gross Margin/Acre (E/B)				**$218.69**

Labour Inputs (Days)

Task	(F) Hired Labour	(G) Family Labour	Total
Pasture improvement	25		25
Beef enterprise operation		100	100
Slaughtering		7.5	7.5
Transport to market		5	5
Total Labour Days	**25**	**112.5**	**137.5**
(H) Average Wage Rate ($/hour)			$20.00
(I) Total cost of hired labour			$500.00
(J) Total cost of family labour			$2,250.00
(K) Total family labour requirement (days)			112.5
GROSS MARGIN - including cost of family labour (G - K)			**$15,245.00**

SENSITIVITY ANALYSIS - excluding cost of family labour

No. of Head Sold	% Price Change		
	-20%	0%	20%
8	$4,815	$6,535	$8,255
10	$6,635	$8,815	$10,995
18	$13,475	$17,375	$21,275

Enterprise Background for Beef Cattle – 100 Cows

This gross margin budget represents a fully commercial beef cattle enterprise running a self-replacing herd with 100 cows (245 head in herd). Cattle are grazed on 350 acres.

a) Production Information

Calving percentage:

The calving percentage is 70% (e.g. for every 10 cows joined, 7 calves will be born). For every 14 months, there will be calves born. It is assumed that for each calving, approximately 50 per cent of calves born are bulls and 50 per cent are heifers.

Mortality rate:

For calves aged 0-6 months, the mortality rate is 5 per cent (i.e. 1 calf in 20 calves born will not survive). For the remainder of the herd (i.e. animals over 6 months of age), the mortality rate is 2 per cent (i.e. 1 animal in 50 will not survive).

Breeding Life of Cows and Bulls:

Heifers are first mated at 16 -24 months of age and calve the following year . Cows are retained for a 7 calvings. Bulls are first joined at 16-24 months of age and are retained for five years.

Stocking rate:

The stocking rate is one adult beef animal for one acre of 70% improved grass and 30% legumes.

The farmer has commenced a pasture improvement program, improving 15 acres per year, by incorporating improved pasture species and legumes into the native pasture. This pasture improvement helps to increase the carrying capacity of the grazing area.

Herd Structure:

Ninety nine per cent of bull calves are retained as steers until three years of age, and the remaining one per cent is retained for bull retention.

Cull bulls are sold at five years from birth.

b) Income

Markets:

Sale cattle are sold to the following markets:

- Steers (18-24 months): Retailing - $1,700 per head (prime meat so about 200kg dressed at $8.50/kg).
- Steers (3 years old): retail butchers - $2,125 per head (250 kgs dressed weight[9] @ $8.50/kg).
- Cull cows (9+years old): - $1,000 per head (Average 220kg carcass weight at $5/kg retailing).
- Cull bulls (7 years old): retail butchers - $1,400 per head (300 kgs dressed weight @ $4.50/kg).

c) Direct Costs

Supplementary feed:

Cattle are supplementary fed with salt mineral blocks comprised of fine salt, copra meal, molasses and urea. Approximately six blocks are required per thirty head of cattle (i.e. 0.2 blocks/head) at a cost of $75.00 per 20kg block.

Animal husbandry:

Muster package offered by MAF: ($100 which includes castration, drenching and tagging but drench and tags are provided by the farmer).

Cattle vaccinations for tuberculosis and brucellosis are no longer provided by the MAF-Animal Production and Health Division.

Pasture improvement:

Fifteen acres of pasture are improved, incorporating improved grass species (e.g. Batiki, Signal, Elephant) and legumes (e.g. Calliandra, Leuceana).

Planting material is sourced free of charge from neighbours and MAF-Animal Production and Health Division.

Weedicide is purchased for weed control (1 x 5 litre bottle Roundup/per 5 acres @ $250.00).

Selling Costs:

Utilizing the Mobile Slaughter unit and ensuring compliance with the Slaughter and Meat Supply Act 2015, the slaughter and supply of carcasses for retail will cost the farmer $50 per head.

d) Labour

The farmer uses both hired labour and family labour for the cattle enterprise.

Hired labour is used for the following tasks.

- Day-to-day operations: 2 men x 5 days/week/52 weeks
- Fencing: 10 men x 5 days/week x 3 weeks (Year 1)
- Pasture improvement: 5 men x 5 days (Years 1-10)

Hired labourers are paid $20.00 per day.

Family labour is also used for day-to-day operation of the beef enterprise (e.g. herd monitoring, animal husbandry, maintaining fences, checking water, slaughtering, delivery to market etc).

[9] Dressing percentage: 50 per cent.

- Herd monitoring, maintaining fences, water etc: 3 hours/day (5 days/week)
- Slaughtering: 3 men x 4 hours/animal

Family labour is valued at the market rate for hired agricultural labour of $20.00 per day ($2.50/hour).

e) Capital Costs

The following capital items are required for a cattle enterprise with 100 cows (total herd approximately 245 head).

- Breeding stock – weaner heifers and bulls (5-6 months old): $1,10000/head (i.e. $5.50kg @ 200kg LW)
- Fencing (4 rows of barbed wire and wooden posts): $44,000 - 16 sub divisions
- Stockyards (50 head capacity):
- Temporary watering points (44 gallon drums):
- Permanent water supply (mains connection, water tanks, pipes, troughs):$10,000

GROSS MARGIN BUDGET FOR BEEF CATTLE

Scenario: **100 Breeding Cows (Self-Replacing Herd)**

ASSUMPTIONS

(A) No. of breeding cows:	100
Total no. of cattle:	245
Calving %:	60%
(B) Area grazed (acres):	350
Area of improved pasture (acres):	50
Total no. of head sold:	40

INCOME ($)	Quantity	Unit	Unit Price	Total
Livestock Sales - Faalavelave				
Cull cows	10	head @	1,000	10,000
Steers (18-24 month old)	10	head @	800	8,000
Livestock Sales - Retail Butcher				
Steers (3 years old)	20	head @	1,500	30,000
(C) Total Income ($)				**$48,000**

COSTS($)	Quantity	Unit	Unit Cost	Total
Supplementary Feed				
Salt mineral blocks	50	blocks @	$60.00	$3,000.00
Animal Husbandry				
Animal health (e.g. drench)	245	head @	$5.00	$1,225.00
Ear tags	80	tags @	$2.00	$160.00
Pasture Improvement				
Sting	3	5 litre bottles @	$120.00	$360.00
Transport				
Retail butcher	20	trips @	$20.00	$400.00
Labour				
Hired labour	295	man days @	$20.00	$5,900.00
(D) Total Costs				**$11,045.00**
(E) GROSS MARGIN (C-D)				**$36,955.00**
Gross Margin/Breeding Cow (E/A)				**$369.55**
Gross Margin/Family Labour Day (E/F)				**$307.96**
Gross Margin/Acre (E/B)				**$105.59**

Labour Inputs (Days)

Task	Hired Labour	(F) Family Labour	Total
Pasture improvement	75		75
Beef enterprise operation	160	100	260
Slaughtering	60		60
Transport to market		20	20
Total Labour Days	**295**	**120**	**415**
Average Wage Rate ($/hour)			$20.00
Total cost of hired labour			$5,900.00
Total cost of family labour			$2,400.00
Total family labour requirement (days)			120.0
GROSS MARGIN - including cost of family labour			**$34,555.00**

SENSITIVITY ANALYSIS - excluding cost of family labour

No. of Head Sold	% Price Change		
	-20%	0%	20%
20	$4,155	$8,955	$13,775
30	$13,735	$20,995	$28,175
40	$23,155	$32,755	$42,355

6.3 Chickens – Permaculture Unit

Enterprise Background for Meat Chickens – 20 Chickens

This gross margin budget represents a commercial village-scale chicken enterprise, consisting of 20 hens. The enterprise sells 60 meat chickens per production cycle (12 weeks).

Chickens roam freely inside the fence (i.e. fenced system) and forage for food in the surrounding environment (e.g. insects, grass, seeds etc). Chickens are supplementary fed with kitchen scraps, rice, ripe fruits and fresh coconuts. Also there should be a small house to house the nesting boxes.

Note: It is likely that families with village-based chicken enterprises of this scale would retain a number of chickens for home consumption.

a) Production Information

The chicken enterprise consists of 20 brood hens and one improved Indian Game bred rooster. These chickens are locally bred chickens (Moa Samoa).

Each production cycle takes approximately 12 weeks (i.e. from laying of eggs to turning off chickens for sale). The egg incubation period is 21 days.

On average, each hen hatches 10 chicks (i.e. 200 chicks). However, only 60 per cent of chicks survive (i.e. 120 chicks) until the time of slaughter, due to a high mortality rate (40 per cent).

The chickens are slaughtered at around 6 months or 24 weeks of age.

b) Income

Chickens are sold to family and friends in the farmer's village and other nearby villages for an average of $15.00 each.

c) Direct Costs

This is a permaculture set up where 4 x 50m rolls chicken wires are required, $5000 for shelter with feed and water troughs inclusive. Cassava based ration costs $0.50/kg and feed intake is average at 80g/hen + chicks.

There are no supplementary feeding or animal husbandry costs associated with the chicken enterprise.

d) Labour

This is a one man labour enterprise. One labour can carry out feeding, slaughtering and carcass delivery one hour daily all throughout the year.

e) Capital Costs

The cost of setting up a shed plus costs of feed and water troughs is estimated at $5,000.

Brood stock (hens and roosters) are purchased live for $20.00. Initially, a farmer would most likely only purchase a few hens and one rooster to develop his own breeding flock.

Enterprise Budget for Meat Chickens – 20 Hens

GROSS MARGIN BUDGET FOR CHICKENS - MEAT

Scenario: **20 Hens (Village-Scale Free-Range Enterprise)**

PRODUCTION ASSUMPTIONS

(A) No. of hens:	20
Number of chicks/hen:	10
Total number of chicks hatched:	200
Mortality rate of chicks (%):	70%
Total number of chicks sold:	60
Production period (wks)	12 Weeks
(B) No. of working hours per day	8

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Meat chickens	60	chickens @	10.00	$600.00
(C) Total Income ($)				**$600.00**

COSTS($)				
Transport				
Carcass Delivery (1 chicken/trip)	30	trips @	2.00	$60.00
(D) Total Costs				**$60.00**
(E) GROSS MARGIN (B-C)				**$540.00**
Gross Margin/Hen (E/A)				**$27.00**
Gross Margin/Family Labour Days (E/I)				**$24.83**

Family Labour Input (Hours)

Task	**Total Hours**
Feeding (1 hour/day)	84
Slaughtering/Preparing (0.5 hours/chicken)	30
Delivery (60 Trips @ 2 hours/trip)	60
(F) Total Family Labour Input (Hours)	**174**
(G) Average Wage Rate ($/hour)	$2.50
(H) Total cost of family labour (F x G))	$435.00
(I) Total family labour requirement (days) (F/B)	22
GROSS MARGIN - Including cost of family labour (E - H)	**$105.00**

SENSITIVITY ANALYSIS - excluding cost of family labour

No. of Chickens Sold	Price Change		
	$6.00	$8.00	$10.00
20	$60.00	$100.00	$140.00
40	$180.00	$260.00	$340.00
60	$300.00	$420.00	$540.00

Enterprise Background for Meat Chickens – 100 Broiler Chickens

The following budgets represent two scenarios for a fully commercial meat chicken enterprise:

- Gross margins budget for a 200 imported day old chicks operation (85 days cycle aiming to reach 2kg LW to slaughter); and
- Development budget for a 100 hen free-range meat chicken operation (3 year timeframe).

In these budgets, meat chickens are produced from a 100 hen brood.

200 Cobb day old chicks are imported from New Zealand.

Chickens are fed with Broiler Starter ration at $2.50/kg imported. Housing is provided for nesting and shelter.

a) Production Information

Flock structure:

The chicken enterprise consists of 200 day old Cobb chicks imported.

Production cycle:

Each production cycle takes approximately 85 days.

200 Day Old chicks are imported from New Zealand.

Mortality rate:

The mortality rate of chicks is 2 per cent. This is mainly at brooding due to not sufficient heat.

196 chicks survive to slaughtering in one production cycle.

b) Income

Chickens are sold to families and local retail outlets (shops, restaurants etc.) for $5.00 per lb. Each chicken weighs approximately 3lb ($15.00 per chicken).

Manure is retained for on-farm use as fertiliser.

c) Direct Costs

Supplementary feed:

Chickens are supplementary fed with Broiler Starter ration at $2.50/kg imported.
.

Housing and enclosure maintenance:

Sand is used as litter material in the chicken house. Sand aids bacterial growth for the break down of manure. In addition, chickens ingest some of the sand which aids digestion and formulation of egg shells. Around 250kg of sand is required per production cycle at a cost of $20.00.
Grass growing in the enclosure is cut once a month (3 times per production cycle). Ten litres of fuel mixed with two-stroke oil is required for each mowing (@ $2.00 per litre).

Packaging:

Once slaughtered, de-feathered and cleaned, each chicken carcass is wrapped in plastic and a label is attached. Each chicken requires 0.5 metres of plastic wrap (250 metres per 500 birds @ $0.75 per metre). Labels cost $0.20 each.
Eggs are packed in recycled egg carton which are purchased for $0.10 each.

Delivery:

One trip per week is made to deliver chicken carcasses and eggs (12 trips per production cycle). Each return trip costs around $30.00.

d) Labour

Family labour is used for the operation of the chicken enterprise for the following tasks.

Task	Description	No. Hours	No. Days
Feeding	1 man x 1 hour/day @ 84 days	84	10.5
Mowing enclosure	1 man x 1 day/month @ 3 months	24	3
Maintaining housing	1 man x 1 hour/week @ 12 weeks	12	1.5
Slaughtering/carcass preparation	1 man x 0.5 hours/chicken @ 500 chickens	250	31.25
Carcass delivery	12 trips @ 4 hours/trip	48	6

Family labour is valued at the average wage rate for hired agricultural labour of $2.50 per hour.

e) Capital Costs

The following capital costs are associated with establishing the chicken enterprise:

- 200 x day old chick @ $4.10/head
  $820.00
- 250 metres chicken wire @ $300/50m roll
  $1,500
- Timber fence posts (from on-farm materials)
  No cost
- Housing:
  $10,000 for 2 houses, one for brooding and the other for fattening/growing.

DEVELOPMENT BUDGET FOR CHICKENS - MEAT

Scenario: **100 Hens (Medium-Scale Free-Range Ent.)**

ASSUMPTIONS - ONE PRODUCTION CYCLE

Production period (weeks)	12
No. of production cycles/year:	
Year 1	1
Year 2	2
Year 3	3
(A) No. of hens:	100
No. of roosters:	5
Breeding life of hens and roosters (years):	2
No. eggs laid/hen:	15
No. eggs hatched/hen:	10
Total no. of eggs hatched:	1,000
Mortality rate of chicks (%):	50%
Total number of chickens sold:	500
Total number of eggs sold (dozen):	40
No. of roosters:	5
Area of free-range enclosure:	1 acre
(B) No. of working hours per day:	8
Price of chickens ($/lb liveweight):	$5.00
Average weight/chicken (lbs):	3.0
Price of eggs ($/dozen):	$5.00
Price of cull chickens ($/head):	$6.50

INCOME ($)	**Year 1**	**Year 2**	**Year 3**
Chickens (@ $15.00/chicken)	$7,500	$15,000	$22,500
Eggs (@ $5.00/dozen)	$200	$400	$600
Cull chickens (@ $6.50/chicken)	$0	$683	$0
(B) Total Income ($)	**$7,700**	**$16,083**	**$23,100**

DIRECT COSTS($)	Year 1	Year 2	Year 3
Supplementary Feed			
Custom Grower Feed (6 bags/cycle @ $78.00/bag)	468	936	1,404
Fowl Wheat (3 bags/cycle @ $87.00/bag)	261	522	783
Coconuts (1,000/cycle @ $0.10/nut)	100	200	300
Housing & Enclosure Maintenance			
Litter material (sand) (1 x 250kg load/cycle @ $20.00/lo	20	40	60
Mowing enclosure (Fuel) (30 litres/cycle @ $2.00/litre)	60	120	180
Packaging			
Plastic wrap (0.5m/chicken @ $0.75/metre)	188	414	563
Labels (500 lables per cycle @ $0.20/label)	100	221	300
Egg cartons (40 cartons/cycle @ $0.10/carton)	4	8	24
Transport			
Delivery of chickens & eggs (12 trips/cycle @ $30.00/tri	360	720	1,080
Labour			
Hired labour	0	0	0
(C) Total Direct Costs	**$1,561**	**$3,181**	**$4,694**
(D) GROSS MARGIN (B-C)	**$6,140**	**$12,901**	**$18,407**

FIXED COSTS ($)	Year 1	Year 2	Year 3
Chicken flock:			
Hens (100@$ 10.00 each)	1000	0	1000
Roosters (5@ $20.00 each)	100	0	100
Housing	2,500	0	0
Fencing (250 metres)	1,500	0	0
Mower	2,000	0	0
(E) Total Fixed Costs ($)	**$7,100**	**$0**	**$1,100**
(F) NET INCOME ($)	**-$961**	**$12,901**	**$17,307**
Net Income/Hen (F/A)	**-$10**	**$129**	**$173**
Net Income/Family Labour Day (F/G)	**-$14.28**	**$116.16**	**$110.41**
Cumulative Net Income ($)	**-$961**	**$11,941**	**$29,247**

Labour Inputs (Hours)

Task	Year 1	Year 2	Year 3
Building enclosure & housing	15	0	0
Feeding	10.5	21	31.5
Slaughtering & packaging	31.25	69	93.75
Mowing enclosure	3	6	9
Maintaining housing	1.5	3	4.5
Delivery of chickens/eggs	6	12	18
Total Labour Days	**67.25**	**111**	**156.75**
(G) No. of days - hired labour	0	0	0.00
(H) No. of days - family labour	67.25	111	156.75
(I) Average Wage Rate ($/day)	$20.00	$20.00	$20.00
(J) Total cost of hired labour (G x I)	$0.00	$0.00	$0.00
(K) Total cost of family labour (H x I)	$1,345.00	$2,221.25	$3,135.00
NET INCOME - incl. cost of family labour (F - K)	**-$2,305.50**	**$10,679.88**	**$14,171.50**
CUMULATIVE NET INCOME - incl. family labour	**-$2,305.50**	**$8,374.38**	**$22,545.88**

GROSS MARGIN BUDGET FOR CHICKENS

Scenario: **100 Hens (Medium-Scale Free-Range Enterprise)**

ASSUMPTIONS

Production period (weeks)	12	
(A) No. of hens:	100	
No. eggs laid/hen:	15	
No. eggs hatched/hen:	10	
Total no. of eggs hatched:	1000	
Mortality rate of chicks (%):	50%	
Total number of chicks sold:	500	
Total number of eggs sold:	500	(approx. 40 doz.)
No. of roosters:	5	
Area of free-range enclosure:	1 acre	
Price of chickens ($/lb liveweight):	$5.00	
Average weight/chicken (lbs):	3.0	
(B) No. of working hours/day:	8	

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Chickens	500	chickens @	$15.00	$7,500.00
Eggs	40	dozen @	$5.00	$200.00
(B) Total Income ($)				**$7,700.00**

COSTS($)	**Quantity**	**Unit**	**Unit Cost**	**Total**
Supplementary Feed				
Custom Grower Feed	6	40 kg bags @	$78.00	$468.00
Fowl Wheat	3	40 kg bags @	$87.00	$261.00
Coconuts	1000	nuts @	$0.10	$100.00
Housing & Enclosure Maintenance				
Litter material (sand)	1	250 kg load @	$20.00	$20.00
Mowing enclosure (Fuel - 30 litres)	30	litres @	$2.00	$60.00
Packaging				
Plastic wrap (0.5m/chicken)	250	metres @	$0.75	$187.50
Labels	500	labels @	$0.20	$100.00
Egg cartons	40	cartons @	$0.10	$4.00
Transport				
Delivery of chickens & eggs	12	trips @	$30.00	$360.00
(C) Total Costs				**$1,560.50**
(D) GROSS MARGIN (B-C)				**$6,139.50**
Gross Margin/Hen (D/A)				**$117.50**
Gross Margin/Family Labour Day (D/E)				**$767.44**

Labour Inputs (Days)

Task	Hired Labour	(E) Family Labour	Total
Feeding		10.5	10.5
Slaughtering & packaging		31.25	31.25
Mowing enclosure		3	3
Maintaining housing		1.5	1.50
Delivery of chickens/eggs		6	6
Total Labour Days		**52.25**	**52.25**
(G) Daily Wage Rate ($/day)			$20.00
(H) Total cost of family labour (F x G))			$1,045.00
(I) Total family labour requirement (days) (F/B)			52.25
GROSS MARGIN - Including cost of family labour			**$5,094.50**

SENSITIVITY ANALYSIS - excluding cost of family labour

No. of Chickens Sold	Price Change		
	$10.00	$15.00	$20.00
300	$1,640	$3,140	$4,640
400	$2,640	$4,640	$6,640
500	$3,640	$6,140	$8,640

6.4 Chickens - Eggs

Enterprise Background for Egg Production (3000 Hens)

The following gross margin budget represents a fully commercial intensive egg production enterprise consisting of 3000 layer hens.

The production system is modelled on New Zealand and Australian systems for barn-laid eggs. Day old chicks are imported from New Zealand (Shaver, ISA Brown) and are raised in deep litter barns. Chickens are fed imported custom made feeds and commence laying eggs at 17-18 weeks (smaller pullet eggs). At 23-24 weeks, chickens start laying full sized eggs and continue producing until 75-80 weeks, when chickens begin moulting[10].

a) Production Information

Flock structure:

The egg enterprise consists of 3000 layer hens.

Production cycle:

Each production cycle lasts for 80 weeks (i.e. from arrival of day-old chicks until chickens begin first moulting). Layer hens are slaughtered after the first moult.

The following feeding regime is used.

Age	Feed Type	Purpose
Day old chicks – 6 weeks	Starter feed	Increasing body weight & developing bone structure.
7 weeks – 17 weeks	Grower feed	For slowing growth & reaching maturity
18 weeks – 80 weeks	Layer feed	For laying eggs
80+ weeks	Copra meal	Maintaining condition

Production level:

On average, each hen lays 345 eggs over the 80 week production cycle. Total egg production is 828,000 (69,000 dozen).

Mortality rate:

The mortality rate of chickens is 20 per cent (i.e. 600 deaths). Illness and bullying of weaker chickens from other chickens are the main causes of loss. The number of surviving chickens is 2,400.

b) Income

Eggs are sold to local retail outlets for $5.50/dozen.

Chicken manure is collected and sold as fertiliser for $5.00-$10.00 per bag.

Cull chickens are sold live for $5.00/chicken and slaughtered and cleaned for $6.50/chicken. Approximately 90 per cent of cull chickens are sold live.

c) Direct Costs

Day old chicks:

Day old chicks are purchased from New Zealand for SAT $5.50 (landed price including air freight, VAGST, import duty etc.).

Supplementary feed:

[10] Moulting is when chickens lose older feathers and grow new ones. Chickens generally stop producing eggs until the moult is completed.

As mentioned, chickens are fed exclusively with imported custom-made chicken feed (starter, grower and layer feed) during the 80 week production cycle. Chicken feed is purchased from local farm supply stores in 40kg bags, for approximately $88.00/bag on average. Chickens are fed nine bags of feed per day.

Once chickens begin moulting, they are fed copra meal for up to six weeks prior to sale/slaughter. Chickens are fed 15 bags of copra per day for $12.00 per bag.

Housing maintenance:

Saw dust and manure is used as litter material in the barn. The barn floor and laying boxes are filled with saw dust twice during the production cycle (i.e. prior to arrival of day-old chicks and 15 weeks). Sixty bags of sawdust are used each time (40 bags for the floor and 20 bags for laying boxes) at a cost of $1.00 per 40 kg bag.

Packaging:

Recycled egg cartons are purchased locally at $0.10 per carton.

For cull chickens, once slaughtered and cleaned, each chicken carcass is wrapped in plastic. Each chicken requires 0.5 metres of plastic wrap ($0.75 per metre).

Electricity:

The barn is fitted with lights for heating. During the first three weeks of the production cycle when chicks are very young, the lights are frequently used to keep chicks warm. The electricity cost during the first three weeks is approximately $900. For the remaining weeks (Week 4 – Week 80), the electricity cost is $40.00 per week. During moulting, electricity costs $20.00 per week.

Disease control:

Disease control costs are minimal.

Day old chicks are pre- vaccinated for Marek's disease on arrival in Samoa. In addition, starter and grower feed include an anti-coccidial stat to build up chickens' resistance to coccidiosis.

The shed is cleaned out between production cycles and disinfected to minimise the risk of Marek's disease which leads to paralysis in chickens. The approximate cost of disinfectant is $100.

Delivery:

One trip per production cycle is made to FaleoloAirport to collect day-old chicks that are air-freighted from New Zealand ($30.00 for the return trip).

Once chickens commence laying (17-18 weeks), eggs are delivered to town daily ($30.00 per return trip). Any inputs required for the enterprise are picked up from town on daily trips.

During times when chickens are not laying (i.e. first 16 weeks and moulting), one trip is made to town per week for the egg enterprise ($30.00 per return trip).

d) Labour

Three full-time hired labourers are hired for the operation of the egg enterprise (feeding, cleaning sheds, egg collection, delivery etc.) during the 80 week production period for $120/week.

One full-time labourer is hired during moulting (feeding, maintenance etc.) at $120.00/week.

e) Capital Costs

The following capital costs are associated with establishing a barn-laid egg enterprise (constructed to Australian and New Zealand standards):

- Shed

  $90,000

- Fittings for shed:

  drinkers, laying boxes, feeders, perches, lighting
  $20,000

- Cement rain-water tank:

  $5,000

- Shed or ex-shipping container for feed storage: $2,000

- Truck (second-hand)

  $30,000

GROSS MARGIN BUDGET FOR CHICKENS - EGG PRODUCTION

Scenario: **Intensive Commercial Enterprise -3000 Egg Laying Hens**

Production Assumptions	
Production period (weeks):	80
Molting period (weeks):	6
(A) Total number of day old chicks purchased:	3,000
Mortality rate:	20%
Number of Deaths:	600
No. of surviving chickens:	2,400
No. of bags of feed/day:	9
Egg production (per hen)/80 Weeks	345
Total no of eggs sold (dozen)	69,000
Proportion of cull chickens sold live:	90%
Proportion of cull chickens sold slaughtered:	10%
No. of bags of manure:	720

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Eggs	69,000	dozen @	$5.50	$379,500
Cull Hens				
Live	2,160	chickens @	$5.00	$10,800
Slaughtered	240	carcasses @	$6.50	$1,560
Manure	720	bags @	$7.50	$5,400
(B) Total Income ($)				**$397,260**

COSTS($)				
Day Old Chicks	3,000	chicks @	$5.50	$16,500
Feed				
Custom chicken feed (9 bags/day @ 80 weeks)	5,040	40 kg bags @	$88.00	$443,520
Copra meal (9 bags/day @ 6 weeks)	378	40 kg bags @	$12.00	$4,536
Housing maintenance				
Litter material (saw dust)	120	40kg bags @	$1.00	$120
Disinfectant	10	litres @	$10.00	$100
Packaging Costs				
Egg cartons	69,000	cartons @	$0.10	$6,900
Plastic wrapping (240 carcasses)	120	metres @	$0.75	$90
Electricity				
Weeks 1-3 (3 weeks @ $300/week)	3	weeks @	$300.00	$900
Weeks 4-80 (77 weeks @ $40/week)	77	weeks @	$40.00	$3,080
Molting (6 weeks @ $20/week)	6	weeks @	$20.00	$120
Transport				
Collect day old chicks from airport	1	trips @	$30.00	$30
Egg delivery (7 days/week)	560	trips @	$30.00	$16,800
General (Weeks 1-17, molting, 1 trip/week)	23	trips @	$30.00	$690
Labour				
Production period (3 men x 80 weeks @ $120/week)	240	weeks @	$120.00	$28,800
Molting (1 man x 6 weeks @ $120/week)	6	weeks @	$120.00	$720
(C) Total Costs				**$522,906**
(D) GROSS MARGIN (B-C)				**-$125,646**
Gross Margin/Hen (D/A)				**-$42**

Hired Labour Inputs (Weeks)

Task	No. of People	No. of Weeks	Total
Feeding, cleaning sheds, egg collection, delivery (3 men x 80 weeks)	3	80	240
Feeding, maintenance - molting (1 man x 6 weeks)	1	6	6
Total Labour Weeks			**246**
Weekly wage rate ($/week)			120
Total cost of hired labour			$29,520.00

SENSITIVITY ANALYSIS - excluding family labour cost

No. of Eggs (Dozen)	Price of Eggs ($/dozen)			
	$3.50	$4.50	$5.50	$6.50
50,000	-$330,146	-$280,146	-$230,146	-$180,146
60,000	-$295,146	-$235,146	-$175,146	-$115,146
69,000	-$263,646	-$194,646	-$125,646	-$56,646

No. of Eggs (Dozen)	Cost of Feed ($/bag)			
	$58.00	$68.00	$78.00	$88.00
50,000	-$78,946	-$129,346	-$179,746	-$230,146
60,000	-$23,946	-$74,346	-$124,746	-$175,146
69,000	$25,554	-$24,846	-$75,246	-$125,646

6.5 Piggery

Enterprise Background for a Piggery – 5Sows Building to 10 Sows.

The following budgets represent two scenarios for a fully commercial sheep farm enterprise:

- Gross margins budget for a Piggery of 10 Sows(approx. piggery size - 120 head);

Both scenarios assumes that the Piggery is self-replacing (i.e. Sows are retained for developing the piggery unit and once the piggery reaches steady state, Sows are retained to replace cull Pigs).

The gross margin is not gross profit because it does not include fixed or overhead costs such as depreciation, interest payments, rates, and permanent labour which have to be met regardless of enterprise size.

The following analysis is based on a 'steady rate' situation, and consequently, excludes the substantial capital costs in establishing a piggery. Due to rapid market fluctuations and differing individual situations, it is strongly recommended that producers use their own figures as possible.

c) Production Information

Litter size:

The average litter size from the five farms this Budget is based on ranges from 8 to 12. Thus, the average litter size is 8 after taking into account the Mortality Rate.

Mortality rate:

For piglets aged 0-28 days(0-4 weeks), the mortality rate (Pre Weaning Mortality) is 20 per cent (i.e. 4 piglets in every 20 piglets born will not survive). For the remainder of the Piggery (i.e. animals over 4 weeks of age), the mortality rate is 5 percent (i.e. 2 animals in 40 will not survive).

Breeding Life of Sows and Boars:

Gilts are usually selected for breeding at five to six months of age. The selected gilts are reared to weigh between 120 and 130 kg live weight at 7 ½ - 8 months of age when they are ready to be served by a boar for the first time.

The boar must be at least 8 months old. Consider replacing the boars to avoid inbreeding.

Gilts have to be in good condition (i.e. ***Body Condition Score*** of 2 to 3) to produce large litters (10 to 12 or more healthy piglets) and should not be too fat (i.e. BCS 4 to 5) or too thin (i.e. BCS below 2) when they are ready for mating. Therefore, they should be fed about 6 kg of meal dry basis or 8 kg meal fresh basis per day from the time of selection until a boar serves them at the age of eight months.

Replacement Sows are first mated at 8 months of age and the sow's gestation period is 116 days (approx. 3 months, 3 weeks, 3 days). She is with piglets for a month before weaning. This leaves five months between farrowing.

Sows that farrow regularly and rear large litters (10 – 12 or more piglets) and are free of other problems and diseases should rear five to six or even more litters before they have to be removed from the herd (Culled at 3 years old). Other factors that leads to Sows being removed includes BCS, mothering ability etc.

Stocking rate:

Pigs have different space recommendations depending on the age and size. Below are the calculated space requirements for the projected population of a 10 Sow unit, where 8 weeks weaning is practised.

1. Determine the farrowing interval and number of farrowings per year.

Gestation	114days
Lactation	42 days
Re mating	5 days
Farrowing interval	161 days

Number of farrowings per Sow and Year 365/161 = 2.2

2. Determine the number of Farowing Pens. The piglets remain in the farrowing pen until 12 weeks of age.

Before Farrowing	7 days
Farrowing Lactation	14 days
Farrowing Lactation Creep	28 days
Cleaning and Sanitation of Pens	7 days
Occupation per Cycle	56 days

Thus, one farrowing pen can be used for 365/56 = 6.5 farrowings per pen. A 10 Sow Herd with an average of 2.2 farrowings per Sow and Year requires (10 x 2.2)/6.5 = 4 Farrowing Pens.

3. Determine the number of Servicing/Gestating Pens.

Average Weaning to Conception Interval	5 days
Gestation Period less 7 days in Farrowing Pen	107 days
Cleaning and Sanitation of Pens	7 days
Occupation per Cycle	119 days

Thus, 1 place in the servicing/gestation accommodation can be used for 365/119 = 3.1 farrowings per year. With a total of 20 farrowings a year 20/3.1 = 6 to 7 places would be required.

4. Determine the number of places for Replacement Stock.

Presume the Sows on Average get 5 litters, then 20% of all litters will be from Gilts.

Rearing of Breeding Stock (12 to 35 weeks)	168 days
Gestation less 7 days in Farrowing Pen	107 days
Cleaning and Sanitation of Pens	2 days
Occupation per Cycle	277 days

About 30% more animals are separated than the required number of gilts thus the required number of places in the 10 Sow herd will be (10 x 1.9 x 0.2 x 1.3 x 277)/365 = 4 Places

Number of Sows = 10
Number of Piglets = 22 (i.e. 2.2 x 10 = 22.2 piglets/sow/year)

Liveweight	Minimum Total Space Required	
(Kg)	Area (m^2)	Area (ft^2)
<10	0.15	1.6
<20	0.20	2.2
<30	0.30	3.2
<50	0.40	4.3
<85	0.55	5.9
<110	0.65	7.0
>110	1.00	10.8
200 (Sow)	2.8	30

	Area in sq. meters	Area in sq. ft
Boar mating pen	9.3	100
Boar Housing only	7.5	80
Sow loose-housed	2.8	30
Sow confined	1.5	16
Gilt housing during oestrus	2.8	30
Farrowing crate	4.6	50

Herd Structure:

For the development budget, the herd is established in Year 1 with the purchase of 5 Sows (5-6 months) and one Boar. The enterprise builds up to a steady state self-replacing mob of 10 Sows (represented in gross margin budget). The herd structure over the 5 year period is presented over leaf.

d) Income

Markets:

Sale Pigs are sold to the following markets:

- Weaners (Size 2 approx. 12 weeks: Retail Butchers and Restaurants - $100 per head.
- Cull Sows (3+years old): fa'alavelave - $500 per head.
- Cull Boars (4 years old): retail butchers - $500 per head (200 lbs dressed weight @ $3.00/lb).

d) Direct Costs

Sow/Boar Feed

Type of Feed	%	Cost of Feed ($/kg)
Cassava roots (fresh)	75	0.50
Copra meal	20	1.00
Meat meal	5	1.23
Minerals	1	0.22

204 dry days x $3.83 (6kg ration) + 161 farrowing dates x $5.09 (8kg ration) = $1,600.00

Boar is fed 365 days with 6kg sow ration

Weaner/Grower feed

Type of Feed	%	Cost of Feed ($/kg)
Cassava roots (fresh)	62	0.50
Copra meal	20	1.00
Meat meal	17	1.23
Minerals	1	0.22

Weaned piglets at 6 weeks old when reaching 10kg LW and feed 380g feed/day for 56 days to reach 30kg LW

=56*$0.28 = $15.70

Size 2 piglet retail price = $9.90/kg plus head

Avge dressed wt = 21kg

Retail price = 21*$9.90 = $208.00

Or live sales @ $16/kg LW

30kgLW x $16 = $480.00/weaner

The amount of feed (kg) required per day are as follows.

Pig Type	Feed weight (kg) per day (fresh)
Sow	8
Gilt	6
Grower	6
Boar	6

Animal husbandry:

Animal husbandry costs are estimated to be $10.00 per head annually. This cost covers drenching and any other related animal husbandry costs.

Vaccinations for parvovirus and treating leptospirosis and erysipelas are no longer provided by MAF-Animal Protection and Health Division.

Selling Costs:

Pork sold for fa'alavelave are collected from the farm-gate by buyers.

The farmer is responsible for the delivery of carcasses to retail butchers. One trip is made per carcass at a cost of $20.00/ return trip.

e) Labour

The farmer uses both hired labour and family labour for the cattle enterprise.

Hired labour is used for the following tasks.

- Cleaning: 10 men x 5 days/week x 3 weeks (Year 3)

Once the Piggery exceeds 40 head, the farmer would hire one full-time labourer to assist with day-to-day operations (5 days per week @ $100/week).

Hired labourers are paid $21.71 per day.

Family labour is used for day-to-day operation of the Piggery (e.g. herd monitoring, animal husbandry, maintaining pens, checking water, slaughtering, delivery to market etc).

- Herd monitoring, maintaining fences, water etc: 3 hours/day (5 days/week)
- Slaughtering: 3 men x 4 hours/animal
- Delivery to butchers: 1 man x 4 hours/return trip

Family labour is valued at the market rate for hired agricultural labour of $20.00 per day ($2.50/hour).

PRODUCTION ASSSUMPTIONS:

Herd Parameters	
Sow numbers	10 SOWS
Boar %	6%
Sows replaced after	3 Years
Boar replaced after	2 Years
Sow Mortality	3.00%

Reproduction	**Per Sow**	**Total Herd**
Litters per year	2.1	**21**
Average litter size born alive	10	**210**
Average litter size weaned	8.8	**184**
No. pigs reared/sow/year	18	**180**
Less replacement gilts	0.036	**3**
No. pigs available for sale		**177**

Piglet Mortality	
Pre-weaning mortality	20%
Post-weaning mortality	5%

GROSS MARGIN BUDGET

Income:				**Standard Budget**
	177 @	70 kg @	$3.00/kg	$37,170.00
	3 Sows@	130kg @	$3.00/kg	$1,170.00
				$38,340.00

VARIABLE COSTS:

Herd				
	Health	@	$50 / sow	$ 500.00
	Recording	@	$2 / sow	$ 20.00
Shed				
	Electricity	@	$15/sow	$ 150.00
	Repairs & Main.	@	$10/sow	$ 100.00
Labour		@	$100/sow	$ 1,000.00

Feed Table

Class of Pig	Feed per	No. of pigs	Costs	Total Cost

	pig		($)	($)
Sows	1100 kg	10	$ 728.00	$ 7,280.00
Boars	700 kg	1	$ 463.00	$ 463.00
Growers	236 kg	180	$ 120.00	$ 21,600.00
Suckers	30 kg	184	$ 32.00	$ 5,888.00
				$ 35,231.00

B. Total Variable Costs	**$ 37,001.00**
TOTAL GROSS MARGIN (A - B)	**$ 1,339.00**
GROSS MARGIN / SOW	**$ 133.00**

Enterprise Background for Sheep Farming – 10 Ewe lambs Building to 30 Ewes.

The following budgets represent two scenarios for a fully commercial sheep farm enterprise:

- Development budget for a new sheep flock starting with 6 lambs (5-6 months old) and building to 100 sheep (approx. flock size - 200 head) over a 8-year timeframe;

Both scenarios assumes that the sheep flock is self-replacing (i.e. females are retained for breeding up until the flock reaches its maximum stock density, ewes are culled due to productivity or health issues.

Eight acres of improved pastures are available for the sheep enterprise.

e) Production Information

Lambing percentage:

The lambing percentage is 120% (e.g. for every 10 ewes joined, 12lambs will be born). It is assumed that for each lambing, approximately 50 per cent of lambs born are male and 50 per cent are female.

Mortality rate:

For lambs aged 0-6 months, the mortality rate is 10 per cent (i.e. 2lambs in 20 lambs born will not survive). For the remainder of the mob (i.e. animals over 6 months of age), the mortality rate is 2 per cent (i.e. 1 animal in 50 will not survive).

Breeding Life of Ewes and Rams:

Replacement Ewes (Ewe Hogget) are first mated at 12 months of age with an approximate gestation period of 5 months (i.e. purchased in Year 1 will be joined in Year 2 and calve in Year 3).

Due to the small number of breeding ewes available for developing the mob, Ewes are retained for a maximum breeding season of six years (culled at 6 years old).

Stocking rate:

Eight acres of improved pastures are available for the sheep enterprise, allowing an acre per 5livestock unit[11] (LSU) when the enterprise reaches steady state production (i.e. 30 sheep).

The farmer commences a pasture improvement program in Year 1, improving 5 acres per year, by incorporating improved pasture species and legumes into the native pasture. This pasture improvement helps to increase the carrying capacity of the grazing area.

Fig: Fiji fantastic Sheep

[11] Livestock units are used to estimate the carrying capacity and stocking rate of grazing land, by recognizing that sheep of different age/size classes have varied nutritional requirements. To calculate livestock unit equivalents, the following weightings are used: Ewe- 1.Ram – 1.5, Wether-0.8, lamb-0.5. In Samoa, the stocking rate recommended by MoA-Animal and Plant Health Divisions is 5 LSU/acre for improved pastures and 5 LSU/2 acres for unimproved pastures.

Flock Structure:

For the development budget, the mob is established in Year 1 with the purchase of 10 ewe lambs (5-6 months) and one Ram. The enterprise builds up to a steady state self-replacing mob of 30 ewes (represented in gross margin budget). The mob structure over the 10 year period is presented over leaf.

All wethers are not retained for mob development, they should be fattened and sold off to make room for the ewes.

Ewe replacement rate is the percentage of ewes that are replaced in the flock each year. You need to keep enough ewe lambs to replace the ewes that die, as well as the ones that you cull. A replacement rate of 15 to 20 percent is common. You can make more rapid genetic improvement if you replace ewes at a more rapid rate.

The ram replacement rate is an indication of how many years a ram is kept. A 33 percent replacement rate means that you keep a ram for three years before getting rid of him. In this budget, it is assumed that breeding rams are purchased. However, in most cases, it is really the Animal health report and visual observations of these animals will determined the viability of keeping the animal or be culled.

f) Income

Markets:

Sale of Mutton to consume and Sheep for Breeding are as follows:

Culled Stock = $8.50/kg dress weight (i.e. this is the same throughout all classes of Sheep)

Breeding Stock (i.e. Ram Hoggets) = $6.00/kg liveweight – avg wt 22kg, and Ewe Hoggets = $6.60/kg lwt - avg weight 35kg.

f) Direct Costs

Supplementary feed:

This feed comprises of what is readily available here in Samoa, and formulating this feed to ensure the ration is balanced in minerals, energy and protein.

This is the ratio for supplementary feed, for instance:

- if 10 kg of supplementary feed is needed, then 15 shovels of dessicated coconut is mixed with 7 ½ shovels of Brewer's grain.
- If 20 kg of supplementary feed is needed, then 30 shovels of dessicated coconut is mixed with 15 shovels of Brewer's grain.

Fig: Fiji fantastic sheep

STOCK RECONCILIATION FOR SHEEP - 5 SHEEP AND BUILDING TO 30 SHEEP (SELF-REPLACING MOB)

ASSUMPTIONS

Age of purchased breeding stock:		**Wether turn-off**		
Ewe lambs	5 - 6 months	10 - 12months	50%	
Ram lambs	12 months	6 months	50%	
Age of First Joining				
Ewe Hoggets	12 months	**Mortality Rate**		
Breeding Rams	2 Years	Lambs (0 - 6 months)	10%	(2 in 20)
Lambing	140%	Rest of Mob (6+ months)	2%	(1 in 50)
Sex of Lambs				
Ewes	50%			
Rams	50%			

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Opening Stock:	**6**	**6**	**10**	**16**	**36**	**52**	**76**	**112**
Purchases:	**6**	**0**	**0**	**1**	**0**	**0**	**1**	**1**
Ewe Hoggets	5	0	0	0	0	0	0	0
Ram Hoggets	1	0	0	1	0	0	1	1
Deaths	**0**	**0**	**0**	**0**	**7**	**11**	**16**	**25**
Sheep	0	0	0	0	5	4	6	10
Lambs	0	0	0	0	4	7	10	15
Births	**0**	**7**	**12**	**21**	**49**	**71**	**105**	**155**
Ewe lambs	0	4	6	10	25	35	52	77
Ram lambs	0	3	6	11	24	36	53	78
Sales	**0**	**3**	**7**	**11**	**29**	**40**	**59**	**88**
Ewes	0	0	0	0	5	4	6	10
Rams/Wethers	0	3	7	11	24	36	53	78
Closing Stock	**6**	**10**	**16**	**36**	**52**	**76**	**112**	**164**

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Opening Stock:		**6**	**6**	**10**	**16**	**36**	**52**	**76**	**112**
Purchases:		**6**	**0**	**0**	**1**	**0**	**0**	**1**	**1**
	Ewe Hoggets	5	0	0	0	0	0	0	0
	Ram Hoggets	1	0	0	1	0	0	1	1
Deaths		**0**	**0**	**0**	**0**	**7**	**11**	**16**	**25**
	Sheep	0	0	0	0	5	4	6	10
	Lambs	0	0	0	0	4	7	10	15
Births		**0**	**7**	**12**	**21**	**49**	**71**	**105**	**155**
	Ewe lambs	0	4	6	10	25	35	52	77
	Ram lambs	0	3	6	11	24	36	53	78
Sales		**0**	**3**	**7**	**11**	**29**	**40**	**59**	**88**
	Ewes	0	0	0	0	5	4	6	10
	Rams/Wethers	0	3	7	11	24	36	53	78
Closing Stock		**6**	**10**	**16**	**36**	**52**	**76**	**112**	**164**

Animal husbandry:

Animal husbandry costs are estimated to be $20.00 per head annually. This cost covers drenching and any other related animal husbandry costs.

The most common diseases/ conditions that affect mob mortality rates and performance are internal parasites, clostridial diseases, respiratory syndromes and footrot.
The veterinary service is currently provided by the MAF – Animal Protection and Health Division, at a subsidized fee.

Pasture improvement:

Two acres of pasture are improved annually, incorporating improved grass species (e.g. Batiki, Signal, Elephant) and legumes (e.g. Calliandra, Leuceana).

Planting material is sourced free of charge from neighbours and MAF-Animal Protection and Health Division.

Weedicide is purchased for weed control (1 x 5 litre bottle Sting/per 5 acres @ $120.00).

Selling Costs:

The farmer is responsible for the delivery of carcasses to retail butchers. One trip is made per carcass at a cost of $20.00/ return trip.

g) Labour

The farmer uses both hired labour and family labour for the cattle enterprise.

Hired labour is used for the following tasks.

- Fencing: 5 men x 5 days/week x 2 weeks (Year 3)
- Pasture improvement: 2 men x 5 days (Years 1-4)

Hired labourers are paid $21.71per day.

Family labour is used for day-to-day operation of the Sheep enterprise (e.g. herd monitoring, animal husbandry, maintaining fences, checking water, slaughtering, delivery to market etc).

- Herd monitoring, maintaining fences, water etc: 3 hours/day (5 days/week)
- Slaughtering: 2 men x 2 hours/animal
- Delivery to butchers: 1 man x 4 hours/return trip

Family labour is valued at the market rate for hired agricultural labour of $20.00 per day ($2.50/hour).

h) Capital Costs

The following capital items are required for a Sheep enterprise with 10 Sheep (total herd approximately 30 head).

- Breeding stock – Ewe lambs and Rams (5-6 months old): $150-200/head
- Fencing (2 rows of barbed wire and wooden posts): $8,000
- Temporary watering points (44 gallon drums):
- Permanent water supply (mains connection, pipes, troughs):

ENTERPRISE BUDGETS FOR SHEEP

DEVELOPMENT BUDGET FOR SHEEP

Scenario: **6 Sheep Mob building up to 100 Sheep**

Production Assumptions	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**
(A) No. of Breeding Ewes	5	9	11	25	50	85	138	215
Total no. of Sheep	6	13	22	37	74	121	191	293
Total no. of Sheep sold:								
Ewes	0	0	0	1	5	4	6	10
Rams/Wethers	0	3	6	11	24	36	53	78
Cost of breeding stock ($/head)								
Ewe Hoggets	230	230	230	230	230	230	230	230
Ram Hoggets	132	132	132	132	132	132	132	132
Price of Culled Stock ($212/25kg)	212	212	212	212	212	212	212	212
(B) Area grazed (acres)	50	50	50	50	50	50	50	50
Area of improved pasture (acres)	4	8	12	16	20	24	28	32

INCOME ($)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**
Livestock Sales								
Culled Stock @ 212/head	0	636	1,272	2,544	6,148	8,480	12,508	18,656
© Total Income ($)	**$0**	**$636**	**$1,272**	**$2,544**	**$6,148**	**$ 8,480.00**	**$ 12,508.00**	**$ 18,656.00**

COSTS ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Animal Husbandry								
Animal health (i.e. drenching) ($5/head)	30	30	50	80	180	260	380	560
Ear tags (@$2.00/tag)	12	12	20	32	72	104	152	224
Pasture Improvement								
Sting (1 x 5 litre bottles/year @ $160/bottle)	160	160	160	160	160	160	160	160
Transport								
Transport to retail butcher (@$20.00/trip)	0	20	20	40	40	60	60	80
Labour								
Hired labour (@$21.69/day)	$ 217.10	$ 217.10	$ 1,302.60	$ 217.10	$ 217.10	$ 217.10	$ 217.10	$ 217.10
(D) Total Costs	**$ 389.23**	**$ 439.10**	**$ 1,552.60**	**$ 669.10**	**$ 669.10**	**$ 801.10**	**$ 969.10**	**$ 1,241.10**
€ GROSS MARGIN (C-D)	**($389.23)**	**$ 196.90**	**($ 280.60)**	**$1,874.90**	**$ 5,478.90**	**$ 7,678.90**	**$11,538.90**	**$17,414.90**

FIXED COSTS ($)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Capital Costs								
Stock Purchases								
Ewe Hoggets	1,150	0	0	0	0	0	0	0

Ram Hoggets	132	0	0	132	0	0	132	132
Fencing	0	0	8,000	0	0	0	0	0
Stockyards	1,500	0	0	0	0	0	0	0
Watering Points	500	500	500	0	0	0	0	0
(F) Total Fixed Costs	**3,282**	**500**	**8,500**	**132**	**0**	**0**	**132**	**132**
(G) NET INCOME ($) (E-F)	**($3,671.23)**	**$ (303.10)**	**$(8,780.60)**	**$1,742.90**	**$ 5,478.90**	**$ 7,678.90**	**$11,406.90**	**$17,282.90**
Net Income per breeding Ewe (G/A)	($734.25)	$ (60.62)	$(1,756.12)	$ 348.58	$ 1,095.78	$ 1,535.78	$ 2,281.38	$ 3,456.58
Net Income per family labour day (G/H)	($734.25)	$ (50.52)	$(1,463.43)	$ 193.66	$ 498.08	$ 479.93	$ 633.72	$ 640.11
Net Income per acre (G/B)	($73.42)	$ (6.06)	$ (175.61)	$ 34.86	$ 109.58	$ 153.58	$ 228.14	$ 345.66

7. ENTERPRISE BUDGETS FOR AQUACULTURE

7.1 Tilapia

Enterprise Background for Tilapia

The following budgets represent a fully commercial tilapia growing-out enterprise. Two budgets are presented:

- Gross margin budget for a single production cycle (six months) at steady state production;
- Development budget over five years (two production cycles per year over five years).

Tilapia are grown-out from fingerlings in an earthen pond (20m x 20m x 1.5m). Water is supplied to the pond from a river/freshwater spring located approximately 30 metres away from the pond via gravity feeding using PVC piping.

Fish are harvested at approximately 6 months using a purseine net and are then transferred to a cement tank filled with flowing water located next to the pond for 24 hours for purging.

After purging, fish are transferred to buckets and sold immediately. Fifty per cent are sold to local villages (family, friends in same village and nearby villages) and fifty per cent to hotels and other retail outlets in Apia.

At the end of each six month production cycle the ponds are drained and left to dry out for 2 weeks prior to the next production cycle.

For the development budget, it is assumed that two Tilapia crops can be produced each year.

The following production and cost information provided by MAF – Fisheries' Aquaculture Section was used to compile each of the budgets. This information is for one six-month production cycle. For the development budget, this information was scaled up accordingly to represent two production cycles per year, over five years.

a) Production Information

- Production cycle:
  6 months (180 days)
- Stocking density:
  5/m^2
- Pond dimensions
  20m x 20m x 1.5m
- Pond area:
  400 m^2
- Land area used by enterprise:
  0.1 acre
- No. of juveniles:
  2,000
- Mortality rate:
  5%
- No. of fish harvested:
  1,900
- Average weight/fish:
  300 grams

b) Income

Harvestable/Saleable Yield:

Approximately 1,900 fish are harvested, after taking into account a 5 per cent mortality loss (100 fingerlings).

Markets:

Fifty per cent of sales (950 tilapia) are made to local villagers. Buyers pick up fish from the Tilapia farm on the day of harvest. Fish are sold on a per-string basis, with three fish per string.

A further fifty per cent of sales (950 tilapia) are made to Apia-based hotels and retail outlets. The producer delivers fish to these markets on the day of harvest. Fish are sold on a per kilogram basis, with a single fish weighing 300 grams.

Price:

Fish are sold to local villagers for $5.00 per string (316 strings for one production cycle), and to hoteliers and retailers for $4.50 per kilogram.

c) Direct Costs

Juveniles:

Tilapia juveniles (approx. 20 grams/juvenile) are supplied free of charge from MAF Fisheries Division's Hatchery.

Feed:

Tilapia are supplementary fed custom-made formulations produced by a local company Farm Tech Company comprised of fishmeal, copra meal, brewer's waste, chicken pellets and flour. Two formulations are used:

- Fingerling formulation (1.2kg/day for 30 days)
- Adult formulation (10kg/day for 150 days)

The full cost of fingerling and adult formulation is $1.66/kg and $1.44/kg respectively[12]. Fish are fed twice a day.

Chicken Manure:

Prior to releasing fingerlings in the pond, one bag of chicken manure is placed in the pond to aid algal blooming, at a cost of $10.00 per bag.

Delivery Costs:

One trip per production cycle is made to Apia to deliver tilapia to hotel and retail customers at a cost of $30/trip.

Ice is required to keep fish fresh. Five bags are purchased @ $3.00 per bag.

[12] Cost estimates of feed formulation are taken from a preliminary manual compiled by Ministry of Agriculture – Fisheries (Aquaculture) under the Tilapia Reproduction and Culture Development Project, '*Nutritional Requirements and Formula Feeds – Feeding Technique Manual*', February 2005. At the time of compilation of these budgets, the above-mentioned manual was yet to be reviewed.

d) Labour

Family labour is used for the tilapia enterprise for the following operational tasks.

- Feeding: 90 hours – 1 person x 0.5 hours x 180 days
- Maintaining pond periphery: 12 hours – 1 person x 2 hours x 6 months
- Harvesting: 30 hours – 10 people x 3 hrs
- Transfer from purge tank into buckets: 2 hours – 2 people x 1 hours
- Selling to villagers: 4 hours – 1 person x 4 hours
- Delivery to hotels and retail outlets: 4 hours – 1 person x 4 hours

Family labour is also used for pipe installation and pond maintenance. These costs are associated with capital and are hence, only included in the development budget.

- Pipe installation: 8 hours – 2 people x 4 hours (Year 1)
- Pond sludge removal: 2 hours – 1 person x 2 hours (every five years)

An imputed cost for family labour of $2.50/hour is assumed.

Capital Costs

The following capital items are required for producing tilapia under the production parameters stated. These costs are included in the development budget.

- Pond construction: $4,500 - 30 hrs contract labour ($150/hr)
- Piping:
  - 40m x 2" high pressure PVC piping: $550 (40m x $13.75/m)
  - 6 x 2" PVC elbows: $48.00 (6 x $8.00/unit)
  - 2" ball valve: $113/unit
- Cement purging tank: $3,000 (9m x 1.5m x 1.5m)
- Net: $500 (Second hand tuna purseine net)
- Buckets: $200

Enterprise Budgets for Tilapia

GROSS MARGIN BUDGET FOR TILAPIA

ASSUMPTIONS		
Production cycle (months):	6	
Pond dimensions:	20m x 20m x 1.5m	
Pond area (m^2):	400	
Stocking density/$m^{2:}$	5	
(A) No. of juveniles:	2,000	(Supplied free of charge by MAF)
Mortality Rate:	5%	
No. of fish harvested:	1,900	
Harvestable weight/fish (kg):	0.3	
Proportion to village sales:	50%	(950 fish - sold on a per string basis)
No. of fish per string (village sales):	3	
No. of strings sold (village sales):	316	
Proportion to hotels, retail outlets:	50%	
Feed cost ($/kg):	50%	(Sold on a per kilogram basis - 950 fish = 285kg)
Fingerling feed - 1.2kg/day for 30 days	$0.83	(Supplied by MAF at half price)
Adult feed - 10kg/day for 150 days	$0.72	(Supplied by MAF at half price)
(B) No. of working hours per day	8	

INCOME	Quantity	Unit	Unit Price	Total
Tilapia - Village Sales	316	strings @	$5.00	$1,580.00
Tilapia - Hotels, Retail Outlets	285	kg @	$4.50	$1,282.50
(C) Total Income				**$2,862.50**

DIRECT COSTS				
Juveniles (Supplied by MoA for free)	2,000	juveniles @	$0.00	$0.00
Chicken manure	1	bag @	$10.00	$10.00
Feed				
Fingerling Feed	36	kg @	$0.83	$29.88
Adult Feed	1500	kg @	$0.72	$1,080.00
Delivery to retail outlets	1	trip @	$30.00	$30.00
Ice	5	bags @	$3.00	$15.00
(D) Total Variable Costs				**$1,164.88**

(E) GROSS MARGIN (C-D)	**$1,697.62**
Gross Margin/Fish (E/A)	**$0.85**
Gross Margin/Family Labour Day (E/I)	**$95.64**

Family Labour Inputs (Hours)			
Task	**No. of Persons**	**No. of Hours/person**	**Total Hours**
Feeding	1	90	90
Maintaining pond periphery	1	12	12
Harvesting	10	3	30
Transfer to buckets from purge tank	2	1	2
Selling on-farm to villages	1	4	4
Transport to hotels, retail outlets	1	4	4
(F) Total Family Labour (Hours)			**142**
(G) Average Wage Rate ($/hour)			$2.50
(H) Total cost of family labour (F*G)			$355.00
(I) No. of labour days (F/B)			17.75
Gross margin - including family labour cost ($) (E-H)			**$809.88**

SENSITIVITY ANALYSIS - Excluding Cost of Family Labour

Mortality Rate	Price (%) Change			
	-50%	-20%	0%	20%
5%	$266	$1,007	$1,698	$2,270
10%	$193	$1,125	$1,550	$2,093
15%	$116	$885	$1,398	$1,910

Havestable Weight Per Fish (kg)	Price (% Change)			
	-50%	-20%	0%	20%
0.2	$53	$783	$1,270	$1,757
0.3	$266	$1,125	$1,698	$2,270
0.4	$480	$1,467	$2,125	$2,783

DEVELOPMENT BUDGET FOR TILAPIA- (2 CYCLES PER YEAR)

ASSUMPTIONS - ONE YEAR'S PRODUCTION (2 CYCLES)		
Production cycle (months):	6	
No. of production cycles per year:	2	
Pond dimensions:	20m x 20m	
Pond area (m^2):	400	
Stocking density/$m^{2:}$	5	
(A) No. of juveniles:	4,000	
Mortality Rate:	5%	
No. of fish harvested:	3,800	
Harvestable weight (kg)	0.3	
Proportion to village sales:	50%	(1,900 fish - sold on a per string basis)
No. of fish per string (village sales):	3	
No. of strings sold (village sales):	633	
Proportion to hotels, retail outlets:	50%	(Sold on a per kilogram basis - 1,900 fish = 570kg)
Price per string of fish	$5.00	
Price per kilogram of fish	$4.50	
Feed cost per cycle ($/kg):		
Fingerling feed - 1.2kg/day for 30 days	$0.83	(Supplied by MAF - free until a profit is made and then at half price)
Adult feed - 10kg/day for 150 days	$0.72	(Supplied by MAF - free until a profit is made and then at half price)
(B) No. of working hours per day	8	

INCOME ($)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Tilapia - Village Sales (633 strings @ $5.00)	3,165	3,165	3,165	3,165	3,165
Tilapia - Hotels, Retail Outlets (570kg @ $4.50)	2,565	2,565	2,565	2,565	2,565
(C) Total Income	**$5,730**	**$5,730**	**$5,730**	**$5,730**	**$5,730**
DIRECT COSTS($)					
Juveniles (Free of charge from MoA)	0	0	0	0	0
Chicken manure (1 bag/cycle @ $10/bag)	20	20	20	20	20
Feed	0	0	2,220	2,220	2,220
Transport to local retailers (1 trip/cycle @ $30/trip)	60	60	60	60	60
Ice (5 bags/cycle @ $3.00/bag)	30	30	30	30	30
(D) Total Direct Costs	110	110	2330	2330	2330
(E) Gross Margin ($) (C-D)	**$5,620**	**$5,620**	**$3,400**	**$3,400**	**$3,400**

FIXED COSTS ($)	Year 1	Year 2	Year 3	Year 4	Year 5
Pond Construction (30hrs contract labour @ $150/hr)	4,500	0	0	0	0
Pond Maintenance	0	0	0	0	0
Pipes and Fittings:					
2" PVC Piping (40m @ $13.67/m)	547	0	0	0	0
2" PVC Elbows (6 @ $8.00)	48	0	0	0	0
2" ball valve	113	0	0	0	0
Cement Purging Tank (9m x 1.5m x 1.5m)	3,000	0	0	0	0
Net	500	0	0	0	0
Buckets	200	0	0	0	0
(F) Total fixed costs	**$8,908**	**$0**	**$0**	**$0**	**$0**
(G) ANNUAL NET INCOME (E-F)	**-$3,288**	**$5,620**	**$3,400**	**$3,400**	**$3,400**
Net Income/Fish (G/A)	**-$0.82**	**$1.41**	**$0.85**	**$0.85**	**$0.85**
Net Income/Family Labour Day (G/K)	**-$90**	**$158**	**$96**	**$96**	**$95**
Cumulative Net Income	**-$3,288**	**$2,332**	**$5,732**	**$9,132**	**$12,533**

Family Labour Inputs (Hours)

Task	Year 1	Year 2	Year 3	Year 4	Year 5
Pipe installation	8	0	0	0	0
Feeding	180	180	180	180	180
Maintaining pond periphery	24	24	24	24	24
Harvesting	60	60	60	60	60
Transfer to buckets from purge tank	4	4	4	4	4
Selling on-farm to villages	8	8	8	8	8
Transport to market	8	8	8	8	8
Pond sludge removal	0	0	0	0	2
(H) Total Family Labour Hours	**292**	**284**	**284**	**284**	**286**
(I) Average family labour cost ($/hour)	$2.50	$2.50	$2.50	$2.50	$2.50
(J) Cost of Family Labour ($) (H x I)	$730	$710	$710	$710	$715
(K) Total Family Labour Days (H/B)	**36.5**	**35.5**	**35.5**	**35.5**	**35.8**
(L) Net Income - incl. cost of family labour (G- J)	-$4,018	$4,910	$2,690	$2,690	$2,685
Cumulative Net Income - incl. cost of family labour	-$4,018	$892	$3,582	$6,272	$8,958

7.2 Sea Urchins

Enterprise Background for Sea Urchins

The following budgets represent three scenarios for fully commercial sea urchin enterprises:

- Gross margin budget for one cage (one five-month production cycle);
- Gross margin budget for six cages (one five-month production cycle); and
- Development budget for six cages (three years, two production cycles per year).

Sea urchins are produced in cages suspended in coastal waters.

The following production and cost information provided by MAF – Fisheries' Aquaculture Section was used to compile each of the budgets. This information is for one cage of sea urchins over one production cycle. For the six-cage enterprise budgets, this information has been scaled up accordingly.

a) Production Information

- Production cycle:
  5 months (150 days)
- Stocking density:
  25/m2
- Cage area:
  10 m2
- No. of sea urchin per cage:
  250
- Mortality rate:
  5%
- No. of sea urchin sold:
  237

b) Income

Harvestable/Saleable Yield:

Approximately 237 sea urchins are harvested, after taking into account a 5 per cent loss (13 urchins).

Markets:

All surviving urchins are sold to family and friends in the producer's village and neighbouring villages.

Sea urchins are collected directly from the producer, so there are no selling costs incurred.

Price:

The estimated price of sea urchins ranges from $3.00 - $5.00 per sea urchin. The average price is $4.00 per sea urchin.

c) Direct Costs

Juveniles:

Sea urchin juveniles are purchased from MAF Fisheries Division's Hatchery for $1.00 each. Juveniles for the enterprise's first production cycle are supplied for free. For all subsequent production cycles, the $1.00 charge is payable.

Feed:

There is no purchase cost for feed, as seaweed is collected from the lagoon (*Padina sp. & Sargassum sp.)*. Sea urchins are fed three times per week for over a duration of 60 days.

d) Labour

Family labour is used for the sea urchin enterprises for the following operational tasks.

- Feeding: 120 hours – 2 people x 1 hour/day x 60 days.
- Harvesting: 48 hours – 2 people x 2 hrs x 3 times/week x 4 weeks.

Family labour is also used for the construction of cages: 6 hrs - 2 people x 3 hrs. This cost is associated with capital and is hence, only included in the development budget.

Family labour is valued at the market rate for hired agricultural labour of $2.50 per hour.

e) Capital Costs

The following capital items are required for producing one cage of sea urchins. These costs are included in the development budget.

- Materials for cage constructions:
  - 1 x30m roll of mesh $400.00
  - 3 x Rebars (metal bars for frame) @ $35.00 each $105.00
  - Tying nylon for cages $ 30.00
- Mask & Snorkel: $ 70.00

Enterprise Budgets for Sea Urchins

GROSS MARGIN BUDGET FOR SEA URCHINS - 1 CAGE

ASSUMPTIONS

Production cycle/cage (days):	150	(5 months)
Stocking density/cage (m^2)	25	
Cage area (m^2):	10	
(A) No. of sea urchin per cage:	250	
Mortality rate:	5%	
No. of sea urchin sold/cage:	237	
(B) Number of cages:	1	
(C) No. hours per working day:	8	
Feed:	Seaweed from lagoon (Padina sp. & Sargassum sp.)	

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Sea Urchins	237	urchins @	$4.00	$948.00
(D) Total Income				**$948.00**

DIRECT COSTS($)	**Quantity**	**Unit**	**Unit Cost**	**Total**
Juveniles	250	urchins @	$1.00	$250.00
(E) Total Variable Costs				**$250.00**
(F) GROSS MARGIN (D-E)				**$698.00**
(G) Gross Margin/Sea Urchin (F/A)				**$2.79**
(H) Gross Margin/Cage (F/B)				**n/a**
(I) Gross Margin/Family Labour Day (F/M)				**$32.85**

Family Labour Inputs (Hours)	**No. of Hours**
Feeding	120
Harvesting	50
(J) Total Family Labour Hours	**170**
(K) Cost of family labour ($/hour)	$2.50
(L) Total Cost of Family Labour (J x K)	$425.00
(M) Total Family Labour Days (J/C)	21.25
(N) Gross Margin - incl. cost of family labour (E-L)	**$273.00**

SENSITIVITY ANALYSIS - excluding cost of family labour)

Mortality Rate	Price per Sea Urchin		
	$3.00	$4.00	$5.00
5%	$461	$698	$935
15%	$386	$600	$810
30%	$275	$450	$625

GROSS MARGIN BUDGET FOR SEA URCHINS - 6 CAGES

Assumptions

Production cycle/cage (days):	150	(5 months)
Stocking density/cage (m^2)	20-25	
Cage area (m^2):	10	
(A) No. of sea urchin per cage:	250	
Mortality rate:	5%	
No. of sea urchin sold/cage:	237	
(B) Number of cages:	6	
(C) No. hours per working day	8	
Feed:	Seaweed from lagoon (Padina sp. & Sargassum sp.)	

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Sea Urchins	1422	urchins @	$4.00	$5,688.00
(D) Total Income				**$5,688.00**

DIRECT COSTS($)	**Quantity**	**Unit**	**Unit Cost**	**Total**
Juveniles	1500	urchins @	$1.00	$1,500.00
(E) Total Variable Costs				**$1,500.00**
(F) GROSS MARGIN ($) (D-E)				**$4,188.00**
(G) Gross Margin/Sea Urchin (F/A)				**$2.95**
(H) Gross Margin/Cage (F/B)				**$698.00**
(I) Gross Margin/Family Labour Day (F/M)				**$32.85**

Family Labour Inputs (Hours)	**No. of Hours**
Feeding (120 hours x 6 cages)	720
Harvesting (50 hours x 6 cages)	300
(J) Total Family Labour Hours	**1,020**
(K) Cost of family labour ($/hour)	$2.50
(L) Total cost of family labour (J x K)	$2,550.00
(M) Total family labour days (J/C)	127.5
(N) Gross Margin - incl. cost of family labour (E-L)	**$1,638.00**

SENSITIVITY ANALYSIS - excluding cost of family labour

Mortality Rate	Price per Sea Urchin		
	$3.00	$4.00	$5.00
5%	$2,766	$4,188	$5,610
15%	$2,316	$3,600	$4,860
30%	$1,650	$2,700	$3,750

DEVELOPMENT BUDGET FOR SEA URCHINS - 6 CAGES (2 CYCLES/YEAR)

Assumptions		
Production cycle/cage (days):	150	(5 months)
(A) No. of production cycles/year:	2	
Stocking density/cage (m^2)	20-25	
Cage area (m^2):	10	
(B) No. of sea urchin per cage:	250	
Cost of juveniles ($/juvenile):	$1.00	(First production cycle free from MAF)
Mortality rate:	5%	
No. of sea urchin sold/cage:	237	
(C) No. of cages:	6	
Feed:	Seaweed from lagoon (Padina sp. & Sargassum sp.)	
(D) No of working hours/day:	8	

INCOME ($)	**Year 1**	**Year 2**	**Year 3**
No. of sea urchins sold (6 cages x 2 cycles)	2,844	2,844	2,844
Price ($/urchin)	$4.00	$4.00	$4.00
Sale of Sea Urchins	$11,376	$11,376	$11,376
(E) Total Income	**$11,376**	**$11,376**	**$11,376**

VARIABLE COSTS($)	**Year 1**	**Year 2**	**Year 3**
No. of juveniles purchased	1,500	3,000	3,000
Cost of purchasing juveniles (@ $1.00/juvenile)	$1,500	$3,000	$3,000
(F) Total Variable Costs	**$1,500**	**$3,000**	**$3,000**
(G) GROSS MARGIN ($) (E - F)	**$9,876**	**$8,376**	**$8,376**

FIXED COSTS ($)	**Year 1**	**Year 2**	**Year 3**
Mesh (1 x 30m roll per cage @ $400/roll)	$2,400	$0	$0
Rebars (3 per cage @ $35.00/rebar)	$630	$0	$0
Tying nylon ($30 per cage)	$180	$0	$0
Mask & Snorkel (2 sets @ $70/set)	$140	$0	$0
(H) Total Fixed Costs	**$3,350**	**$0**	**$0**
(I) NET INCOME (G - H)	**$6,526**	**$8,376**	**$8,376**
Net Income/Sea Urchin (I / (A x B x C))	**$2.18**	**$2.79**	**$2.79**
Net Income/Cage (I/C)	**$1,088**	**$1,396**	**$1,396**
Net Income/Family Labour Day (I/M)	**$25.15**	**$32.85**	**$32.85**
Cumulative Net Income	**$6,526**	**$14,902**	**$23,278**

Family Labour Inputs (Hours)	**Year 1**	**Year 2**	**Year 3**
Cage construction (6 hours/cage)	36	0	0
Feed collection (120 hours/cage/cycle)	1,440	1,440	1,440
Harvesting (50 hours/cage/cycle)	600	600	600
(J) Total Family Labour Hours	2,076	2,040	2,040
(K) Hourly wage rate ($)	$2.50	$2.50	$2.50
(L) Total Cost of family labour (J x K)	**$5,190**	**$5,100**	**$5,100**
(M) Total Family Labour Days (J/D)	260	255	255
Net Income - incl. cost of family labour (I - L)	**$1,336**	**$3,276**	**$3,276**
Cumulative Net Income - incl. cost of family labour	**$1,336**	**$4,612**	**$7,888**

7.3 Sea Grapes

Enterprise Background for Sea Grapes

The following budgets represent the scenario for fully commercial sea grape enterprises:

- Gross margin budget for one site (one six weeks production cycle);
- Gross margin budget for three sites (one six weeks production cycle); and

Sea grapes are produced in trays suspended in coastal waters.

The following production and cost information provided by MAF – Fisheries' Aquaculture Section was used to compile each of the budgets. This information is for one site of sea grapes over one production cycle. For the three site enterprise budgets, this information has been scaled up accordingly.

f) Production Information

- Production cycle: 6 weeks (35 days)
- Pond Dimensions: 4m x 6m x 2m
- Cage area: 24 m^2
- Amount of sea grapes per cage: 10kg
- No. of trays per site: 6 trays
- Mortality rate: 5%
- No. of sea grapes sold: 342 bundles

g) Income

Harvestable/Saleable Yield:

Approximately 342 sea grapes bundles are harvested, after taking into account a 5 per cent loss (18 bundles).

Markets:

All surviving sea grapes are sold to family and friends in the producer's village and neighbouring villages.

Sea grapes are collected directly from the producer, so there are no selling costs incurred.

Price:

The estimated price of sea urchins ranges from $8.00 - $15.00 per sea urchin. The average price is $10.00 per bundle of sea grapes.

h) Direct Costs

Sea Grape Biomass:

Sea grapes biomasses are purchased from villages that have them grown naturally in the lagoon for $3.30/kg. The amount of *C. racemosa* (sea grapes) biomass required to fill up one tray is 10 kg. There are six trays needed for every site, thus, 60kg of horizontal runners (i.e. stolons) biomass are needed to produce fronds (edible portions) in a fully commercial sea grape enterprise.

Feed:

(Macro algae)There is no purchase cost for feed, as seaweed is collected from the lagoon (*Halimeda Capiosa.)*. Halimeda Capiosa not only provides sea grapes with feed but also acts as supporting habitat for *C. racemosa* (sea grapes) to grow.

i) Labour

Family labour is used for the sea urchin enterprises for the following operational tasks.

- Harvesting: 24 hours – 2 people x 6 hrs x 2 times/week.
- Feeding (Supporting Habitat): 1 people x 2 hours x once

Family labour is also used for the construction of cages: 6 hrs - 2 people x 3 hrs. This cost is associated with capital and is hence, only included in the development budget.

Family labour is valued at the market rate for hired agricultural labour of $2.71 per hour.

j) Capital Costs

The following capital items are required for producing one cage of sea urchins. These costs are included in the development budget.

- Materials for cage constructions:
  - 2 x 1 x 30m roll of mesh $800.00
  - 4 x Rebars (metal bars for frame) @ $35.00 each $140.00
  - 2 Rolls Tying nylon for cages $ 30.00
- Mask & Snorkel: $ 70.00

ENTERPRISE BUDGET FOR SEA GRAPES

ASSUMPTIONS	
Production cycle/cage (days):	35 (6 weeks)
Stocking density (m2):	24
Site Area (m2):	24
(A) Amnt. Of Sea Grapes per cage:	10kg
Mortality Rate:	5%
No. of sea grapes bundles sold:	342
(B) Number of trays:	6
(C.) No. of hours per working day:	8
Feed:	Seaweed from lagoon (Halimeda capiosa)

INCOME ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Sea Grapes	342	bundles @	$10.00	$3,420.00
(D) Total Income				**$3,420.00**

DIRECT COSTS ($)	**Quantity**	**Unit**	**Unit Price**	**Total**
Sea Grape Biomass	60	biomass @	$3.30	$198.00
(E.) Total Variable Costs				**$198.00**
(F) GROSS MARGIN (D -E)				**$ 3,222.00**
(G) Gross Margin/ Sea Urchin (F/A)				$ 322.20
(H) Gross Margin/ Cage (F/B)				n/a
(I) Gross Margin/ Family Labour Day (F/M)				$ 151.62

Family Labour Inputs (Hours)	No. of hours
Feeding	120
Harvesting	50
(J) Total Family Labour Hours	170
(K) Cost of family labour ($/hour)	$2.50
(L) Total Cost of Family Labour (J x K)	$425.00
(M) Total family labour days (J/C)	21.25
(N) Gross Margin - incl. cost of family labour (E - L)	**$273.00**

SENSITIVITY ANALYSIS - excluding cost of family labour

	Price per Sea Urchin		
Mortality Rate	$8.00	$10.00	$12.00
5%	$ 2,600.00	$ 3,250.00	$ 3,900.00
15%	$ 2,320.00	$ 2,900.00	$ 3,480.00
30%	$ 1,912.00	$ 2,390.00	$ 2,868.00

APPENDIX 1: UNITS AND CONVERSION TABLE

Standard Weights and Measures (Imperial and Metric)

A	B	To Convert A to B Multiply By	To Convert B to A Divide By
Ounces	Grams	28.35	28.35
Pounds	Kilograms	0.454	0.454
Ton	Metric tonne	1.02	1.02
Acre	Hectares	2.47	2.47
Feet	Metres	0.305	0.305

Average Unit Weights of Agricultural Produce at Fugalei Market

Product	**Unit**	**Weight / No.**
Coconut	1 Nut	2 lbs
	Basket/Pile	27 lbs
	Ave. no. in basket/pile	9
Banana	Bunch	24 lbs
Tomatoes	Packet	1 lb
Cucumber	1 Cucumber	1 lb
	Packet	5 lbs
	Ave. no. per packet	5
Chinese cabbage	Bundle	0.3 lbs
	Ave. no. per bundle	4
Taro palagi	1 Taro	1 lbs
	Basket/Pile	17 lbs
	Ave. no. in basket/pile	20
Taro	1 Taro	2 lbs
	Basket/Pile	20 lbs
	Ave. no. in basket/pile	10
Taamu	1 Taamu	3 lbs

Source: Central Bank of Samoa 2005, unpublished data.

APPENDIX 2: FARM INPUT PRICES

Farming Input Price Collection - March/April 2012

Product	Farm Input Supplier # 1		Farm Input Supplier # 2	
	Price	Unit	Price	Unit
Weed and Pest Control				
Sting	$155.00	5 litres	$620.00	20 litres
Orthene	$6.00	50 grams	$6.00	50 grams
Talon	$8.50	250 grams	$28.00	500 grams
Gramoxone	$180.00	5 litres	$45.00	Litre
Tilt	$270.00	Litre	$270.00	Litre
Misting Oil	$445.00	20 litres	$440.00	20 litres
Miltex-C	$63.00	Litre	$301.00	5 litres
Agralin	$95.00	5 litres	-	-
Foschek	-	-	$385.00	5 Litres
Cusol (Copper Solution)	-	-	$179.00	5 Litres
Acetic Powder	-	-	$33.00	Pound
Punch	-	Litre	$106.00	250 ml
Tridex	$49.50	Litre	-	-
Round up	$275.00	5 litres	$61.00	Litre
Fertiliser				
NPK 12:5:20	-	-	$163.00	40 kg
NPK 14:5:15	-	-		
Urea	-	-	$161.00	40 kg
Hydrogreen (12:5:18:8)	$185.00	40 kg	-	
Seeds				
Cucumber - hybrid variety	$3.50	Packet	-	-
Tomatoes	$3.50	Packet	-	-
Chinese cabbage	$25.00	100 grams	-	-
Head cabbage	$150.00	100 grams	-	
		-	$101.00	40 kg
Chicken feed - layer feed	-	-	$83.00	40 kg
Mineral salt blocks	$49.00	20 kg block	$61.00	20 kg
Fencing Equipment				
Barbed wire	$355.00	400 metre roll	$275.00	500 metre roll
Chicken wire	-	-	$415.00	50 metre roll
Staples	$240.00	25 kg box	-	-

APPENDIX 3: MARKET PRICES

Fugalei Market Survey – 2012

Product	Weighted Average Price ($SAT/Pound)			
	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Taro	$1.39	$1.29	$1.19	$0.89
Banana	$0.50	$0.61	$0.54	$0.40
Taro Palagi	$1.23	$1.33	$1.24	$1.09
Taamu	$2.10	$2.01	$1.64	$1.19
Coconut	$0.28	$0.29	$0.28	$0.28
Head Cabbage	$2.44	$2.75	$1.96	$2.11
Tomatoes	$3.88	$4.93	$3.58	$2.80
Chinese Cabbage	$2.60	$2.42	$1.88	$1.63
Cucumber	$1.26	$1.36	$1.74	$1.29
Pumpkin	$0.96	$1.30	$1.00	$1.12

Source: Central Bank of Samoa, 2012