Farm Economics

Training Package for Extension workers

August, 2017

SNV

DAIRY TRAINING CENTRE

Developed with
Dairy Training Centre

Farm Economics

Part I Training manual

Part II Training Guideline

Preface

SNV Ethiopia, through EDGET project (Enhancing Dairy Sector Growth in Ethiopia, 2013-2018), engages in the capacity building, extension services and innovative support to the Ethiopian dairy sector particularly working with smallholder dairy farmers. The aim of the project is to increase milk production and productivity in order to double the income of the smallholder dairy farmers. EDGET is operational in the regions Oromia, Amhara and SNNP, and working with 65,000 dairy farming households.

The project works closely together with livestock regional bureaus and their respective zonal, woreda and kebele staff in delivering extension and other supports. One area of collaboration is the development of practical training and coaching tools and materials for extension workers based on a need assessment.

SNV has engaged the Netherlands based Dairy Training Centre (DTC) for the development of the Training package for extension workers. The documents were more elaborated and validated with the utmost contribution of high level experts from regional Livestock and Fisheries resources Development Bureaus/Agencies and Research Centers from the three operational regions of EDGET.

Overall nine training packages were developed on Breed Improvement and Fertility Management; Dairy Cattle Feeding and Nutrition Management; Dairy Cattle Health Management; Dairy Farm Management; Dairy Housing and Manure Management; Farm Economics; Forage Production and Management; Hygienic and Quality Milk Production; Young Stock Management.

This training package is on **Farm Economics.**

SNV, also on behalf of the experts that contributed and DTC, would hope to see the materials widely used outside the project areas by all interested dairy development practitioners. The materials will be available in hard copies and soft copies including on SNV website www.snvworld.org and other relevant websites.

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I. Farm Economics Training Manual

1. Introduction

1.1 The farm as an economic unit: input and output.

Farming is an activity in which we use resources such as seeds, fertilisers, water, feedstuff and labour in order to produce valuable products such as eggs, meat, milk, cereals, root crops and beans. The resources we put into the farm business are called **input** and the products that come out are called **output:**

Input → **The farm business** → **Output**

If a farmer is running his farm as an economic production unit, his aim is to produce output of which the total value exceeds the total value of the input. In that way, there will be a profit. There will be a loss if the total value of the input is higher than the total value of the output.

The total value of the output is called gross output and the total value of all input is equal to the total costs.

Total value output - **Total value input** = **Profit or loss**

In the same way:

Gross output - **Total costs** = **Profit or loss**

In these definitions, we only deal with the input and output **of the farm.** If a farmer buys a sewing machine, a bicycle or perhaps a car, which will only be used privately, they will not be considered as farm input. But products produced on the farm, which are consumed by the farmer's family, will still be farm output, because they could have been sold.

1.2 Farm enterprises.

Next, we look at the farm business with more precision. On many farms we find more or less independent activities. On a farm we may find teff, maize, sunflower, soybeans, a dairy herd, a poultry unit, etc.

These more or less independent activities within one farm business are called **farm enterprises.** Therefore, often a farm business is made up of several farm enterprises.

Each individual farm enterprise has its own input and output and sometimes we find that within one farm business the output of one farm enterprise is the input of another farm enterprise (for instance, maize is output of a crop enterprise but when the same maize is used to feed dairy cattle it becomes the input of the dairy enterprise). These are so called **internal deliveries**.

The farm business

Input	Dairy enterprise	Output

The profit or loss made on the farm business is the overall result of the profits/ losses of the different farm enterprises. A profit on the farm business does not necessarily mean that on that farm all farm enterprises are running at a profit. Some of them may run at a loss. So, to be able to explain the overall result of the farm, we have to know the result of each separate farm enterprise. This means that input and output **have to be specified per farm enterprise as much as possible.** We say "as much as possible" because it is not always possible to allocate all input to individual farm enterprises. Some input may be used by more than one farm enterprise: for instance a tractor/ donkey cart may be used for the dairy as well as for the crop and beef enterprises. The value of such an input is then charged to the farm business as a whole and not to an individual farm enterprise.

Figure 1: Producing forage for the fodder market

1.3 Farm input: variable costs and fixed costs.

We know already that the total value of all input is equal to the total costs. Input used on the farm differs. Some input lasts for over a year, other input can only be used once. Some are for general farm use and others will only be used in one of the farm enterprises. For this reason the total costs are divided into two groups called **variable costs** and **fixed costs.**

Variable costs are **short-term costs** (usually for less than one year) and are defined as costs that:

- occur only if something is produced (and do not occur if nothing is produced);
- tend to vary according to the size of the enterprise (with the volume of output);
- can easily be allocated to individual enterprises.

For example, a lot of labour is required in vegetable production. If a farmer has to hire labour, then as production increases the need for hired labour increases too. Likewise, the fuel costs for a tractor increases when the use of the tractor increases. On the other hand, the greater the area a farmer plants for a rice crop, the higher the fertiliser costs. Thus, variable costs in farming are usually costs for seeds, fertilisers, pesticides, livestock feeds, veterinary costs, etc.

Fixed costs are **long-term costs** (they last for more than one year) and are defined as costs that:

- remain the same regardless of the volume of output;
- do not tend to alter with small changes in the size of an enterprise;
- are difficult to allocate to a specific enterprise

The costs of a horse cart or tractor hardly varies regardless of how much the tractor is used. The tractor may be used on any part of the farm.

It may be used to transport feed to cows or other livestock, it may be used to plant and weed maize or any other crop. If a farmer grows an extra hectare of maize or keeps six more pigs, the farmer will hardly increase the tractor costs.

If the farmer stops growing maize or keeping pigs it will not necessarily be possible to avoid all tractor costs. Of course, the costs of **using** the tractor, fuel costs in particular, are variable but the costs of **owning** the tractor are fixed.

A forage chopper (or a coffee pulpier) is used on one single enterprise, but the cost of owning it does not vary directly with the amount of time it is used. It is more convenient to treat costs of such specialised equipment as fixed. The **wages of full-time regular farm personnel** are also fixed once this personnel has been hired. Even though a person may be hired to look after a single enterprise, such as poultry, his or her wages will not vary directly with the number of birds kept or the number of eggs laid.

If rent is paid for land, this is also a fixed cost because it has to be paid whatever small changes are made in the organisation of the farm. Depreciation and repair of buildings and machinery are considered as fixed costs for similar reasons.

Thus, fixed costs in farming are the costs of land, farm buildings, fencing, machinery, permanent labour and farm tools. Also general overhead costs such as water and electricity charges are normally considered as part of fixed costs.

On irrigated farms water charges may be a separate fixed cost item. If the charges are set according to volume used and the volume used per enterprise is measured, water charges may be variable costs.

1.4 Opportunity costs.

Particularly in semi-subsistence and family farming, there is input which is not bought on the market, but which the farm household generates itself. Examples of such input are:

- family labour;
- farm input produced within the farm business. For example:
  - seed kept aside from the last harvest for use as sowing seed during the following growing season;
  - straw of grains (i.e. wheat, teff and maize) of a cropping enterprise, used within the farm for livestock feeding and/or bedding;
  - manure obtained from a livestock enterprise within the farm and used in the cropping enterprises of the same farm;
  - goods made by the farm household and used in a farm enterprise eg feed and water trough, barn, housing;
- family capital (own resource)

The input mentioned above is not bought "on the market" and thus does not imply cash expenses by the farmer. How do we value such input? To value such input,

the term **opportunity cost** has been introduced; it is a way to indirectly calculate (variable) costs:

> The opportunity cost (also called the "shadow price") of an input is equal to the income obtained by using the input in the best **alternative way.**

Instead of working on their own farm, the family members can also work as wage labourers on other farms. Their wage is the cost of family labour. This cost is equal to the cash payment the farmer has to make for hiring labourers.

Instead of keeping seed apart for use the following season, a farmer can also sell this seed on the market. So, the income not obtained by selling this seed on the market, is the cost of home-produced seed used in the farm business. This cost is equal to the cash payment the farmer has to make for buying the seed on the market.

Instead of using straw or home-produced millet for feeding his own livestock, a farmer can also sell this straw on the market. So, the income not obtained by selling this straw on the market is the cost of home-produced straw used in the farm business. The cost is equal to the cash payment the farmer has to make for buying straw on the market. The same applies to manure and homemade farm implements.

There are many alternative uses of capital. To overcome the problem of identifying the best alternative use, it is common to consider **the not-obtained interest,** by putting the money on a commercial bank, as the opportunity cost of family capital. So, in our example, the opportunity cost of ETB 3000 is equal to the interest obtained by putting the money on a commercial bank.

Example:

The new value of a fodder chopping machine is ETB 250,000 and the scrap value is ETB 50,000. If the expected useful life is 10 years, how much are then the depreciation costs this year? See formula above.

Depreciation costs: $\frac{\text{ETB 250,000 – ETB 50,000}}{\text{10 years}}$ **= ETB 20,000**

1.5 Period covered.

Another point, which we have to consider, is the length of the period that we take into consideration when calculating the value input and output. To a large extent, the length of this period depends on the kind of farm enterprise. If, for instance we look at a broiler unit it may take about 7 to 9 weeks from the time we buy the day-old chicks till the time we sell the mature broilers.

In this case, the length of the period over which we can calculate the value of the input and output is the time between the purchase of the chicks and the sale of the broilers. This is a production cycle for one batch of fattening chicks.

In the case of a dairy or beef enterprise, we can generally not identify a clear production cycle. In principle, for livestock enterprises this is possible only in so-called all in – all out systems.

In crop production, we can identify the production cycles easily except in cases of perennial crops like tree crops.

Usually, we can start the calculation of farm results that is the difference between the value of input and output, by calculating the results **per year.** If possible, we may further calculate results per production cycle. Sometimes we even calculate results per quarter of a year.

To measure input and output properly we have to do **stocktaking** at the beginning and at the end of the period under consideration.

Example:

Stock of fertiliser on 01-10-2015	=	25 bags	
Stock of fertiliser on 30-09-2016	=	10 bags	
Purchases 2015/2016 season	=	15 bags	
Input of fertiliser period 01-10-2015 until 30-09-2016:			
Stock 01-10-2015	=	25 bags	
Stock 30-09-2016	=	10 bags	-
Change of stock:	=	15 bags	
Purchases 15/16 season	=	15 bags	+
Input of fertiliser 2015/2016 season	=	30 bags	

1.6 Total costs

Both groups of costs, variable and fixed, have to be calculated in their own way, as we will see in the following chapters. For the time being, it is enough to know the difference between variable and fixed costs and that variable + fixed costs are equal to the total costs

Variable costs	**+**	**Fixed costs**	**=**	**Total costs**

2. Calculation of Fixed Costs

A great deal of fixed costs is incurred on items that last longer than one year. Such items are also called **durable capital items.** If we buy an implement that will be used for several years, then the costs of having this implement should be spread equally over the number of years we expect that implement to use.

The costs of capital items are built up of:

a. depreciation costs	fixed costs
b. interest costs	
c. maintenance costs	variable costs
d. running costs	

2.1 Depreciation costs

Suppose a farmer buys battery cages for poultry for ETB 5000. If the cages last for ten years it is wrong to say that the cost of production in the year the cages were bought should include all the ETB 5000. It is better to assume that the cages cost ETB 5000 divided by 10 each year. That is, the annual cost of having the cages is ETB 500. These annual costs of long lasting items are called **depreciation costs**. After ten years, the cages have come to the end of their useful "life". Then the sum of the annual depreciation costs has come to ETB 5000, which is equal to the amount of the original investment.

Normally depreciation costs are recovered in the output of the farm. It is best that a farmer actually **saves** the depreciation costs each year so that when the time of replacement has come he will have saved enough money to pay for the replacement. In the same way, if the investment is done with use of a loan, the money paid back on the loan can be considered as savings.

Some farmers do not save the costs of depreciation, often because the output of their farms is not big enough. This means that at the time the item has to be replaced the money supposed to have been accumulated during the time of the items' use is not there. The result will be that the farmer has to look for a **loan** (resulting in payments for the farmer!), otherwise replacement will not be possible.

The annual cost of depreciation of a capital item can be calculated as follows:

$$\frac{\textbf{New Value – Scrap Value}}{\textbf{Useful life in years}} = \textbf{Annual depreciation costs}$$

"New value" is the value of a new, similar capital item at the time when the calculation is made. It is not the value of the capital item at the time when it was bought.

The "**scrap value"** of an implement is the value of that implement at the time it has come to the end of its useful life.

In case of draft animals, the "scrap value" is the selling price when the animals are sold alive or slaughtered.

Information on the expected lifetime and the scrap value can be obtained from the dealer whom the fodder-chopping machine was bought from. If information on this matter is lacking, or tends to be very unreliable, you can ask other farmers in the area who use the same kind of capital item and adapt the information to your particular circumstances.

In times of rapid inflation, the new value as well as the scrap value of durable capital items will also increase rapidly. Hence, every year we will have to calculate the depreciation costs of such items again, using the values for that year.

As a rule of thumb, we take the scrap value as a percentage of the new value, for machinery often 20% is used.

Depreciation costs will be calculated as long as the item is used. As we gain experience we may adjust the useful life of an item in the calculation. The calculated depreciation is usually kept within the farm business until needed for re-investment. (Or used for repayment on a loan taken to buy the machine)

2.2 Interest costs.

At the time we buy a capital item, we actually make an investment. Money is invested which would have yielded a return if it were invested outside the farm. For this reason we calculate a **cost of interest** on capital items no matter if the items have been bought on loan or with own funds. If an item has been bought on loan, the calculated interest costs have to be paid to the lending institution.

By using his / her own funds, a farmer loses the opportunity to invest his money in another "yielding" way. Costs calculated in this way (we look at the return we would have had if the money had been used in an alternative way) are called **opportunity costs,** as was explained earlier.

If the item is bought with own funds the calculated costs of interest do not have to be paid to anyone. The amount of calculated interest costs of own funds will be part of the Farm Management and Investment Income or cash flow, as we will see later on.

Interest costs of capital items can be calculated as follows:

$$\frac{\text{New Value} + \text{Scrap Value}}{2} \times \text{Rate of Interest} = \text{Annual costs of Interest}$$

In case we do not deal with a single implement but with a whole range of implements and machinery, we usually calculate the costs of interest by multiplying the Interest Rate by a percentage (%) of the total New Value (NV) of these capital items. In many cases it is assumed that the Scrap Value is 20 % of the New Value (for machinery). Then the above formula reads:

$$\frac{\text{New Value} + \text{20 \% of NV}}{2} \times \text{x Rate of Interest} = \text{Annual costs of interest}$$

The first part of the formula can be written as:

$$\frac{\text{New Value +20 \% of New Value \% 100}}{2} \quad \text{of New Value x Rate of \% 60 = Interest}$$

The principle is that we calculate interest on the average invested capital over the useful life of the item. Calculated interest is, like depreciation, kept within the farm business.

2.3 Maintenance costs

Maintenance costs are costs, which have to be made every year to keep the capital items in good working order. Our bookkeeping records will show the *actual amount* spent on maintenance, which includes normal repairs. Repairs that increase the useful life considerably like the general overhaul of an engine should not be included here. These should be considered as investments, costs of which must be included in the depreciation costs.

For *planning purposes* we often use standard figures expressed as percentages of the new value. These percentages differ according to the type of capital item. For example, we may estimate the annual maintenance costs of buildings (houses/barns) at 2% of the new value per year while with farm machinery this percentage may be 10 to 15%.

2.4 Running costs.

Running costs are costs to operate a machine such as a tractor cart or a motor bike. Thus include the cost of diesel, petrol, oil and lubricants. Also in this case the bookkeeping records show the *actual amount* spent as running costs.

For *planning purposes* we use a standard figure expressed as an amount per working hour or kilometre.

Example A:

Calculate the costs for next year of a motor bike bought for B 50,000

Present new value	ETB 50,000
Scrap value	ETB 5,000
Useful life	3 years
Rate of interest 10%	
Use per year	9,000 kilometres
Fuel costs	1 litre per 30 kilometres at ETB 20 per litre
Lubrication costs	1 litre of oil per 1000 kilometre at ETB 100 per litre
Maintenance costs	20% of new value

The solution can be found on the next page

Figure 2: Running cost of a motorbike

Example B:

Calculate the interest costs of rearing a calf during the first 9 months

Initial value of the calf	ETB 1000
Daily costs of feeding, housing, etc.	ETB 25 per day
Rate of interest	10% per year

The solution can be found on the next page

Solution Example A:

Annual costs = (**a**) depreciation costs + (**b**) interest + (**c**) maintenance costs + (**d**) operating costs

a. Depreciation: NV – Scrap Value/ Useful life = 50000 – 5000/ 3 =ETB 15000

b. Interest: NV + Scrap Value/ 2 x Int. Rate = 50000 + 5000/2 x 10 % = ETB 2750

c. Maintenance costs: Maintenance 20 % x 50000 = ETB 10000

d. Operating costs: Lubrication 9000/ 1000 = 9 l x ETB 100 = ETB 900

Fuel 9000/ 30 = 300 x ETB 20 = ETB 6000 +

Total = ETB 6900

Total annual costs = a + b + c + d = ETB 34650

Solution Example B:

$$\text{Interest costs} = \frac{\text{Initial value + End value}}{2} \times \text{rate of interest}$$

Initial value = ETB 1000

Added value 9 months = 9 x 30 x 25 = ETB 6750 +

End value = ETB 7750

$$\text{interest} = \frac{1000+7750}{2} \times 10\% = \text{ETB 438 per year}$$

Interest over 9 months = 438 x 9/12 = ETB 329

3. Calculation of Variable Costs

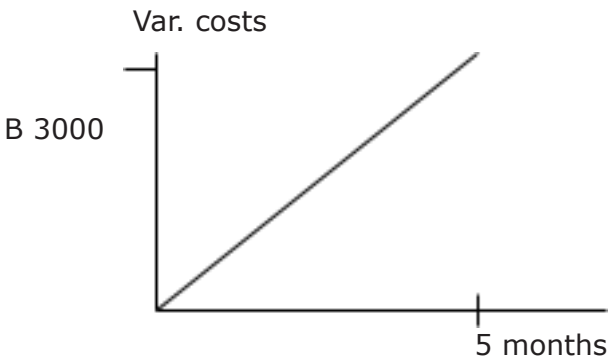
Variable costs are the costs of input, which occur only if something is produced (see definition of variable costs on page 4). In general we calculate these costs by multiplying the quantity by the unit price paid for the input.

In certain cases, when an input has not been bought but has been produced on the farm itself, we will use the opportunity costs i.e. the price we would have made if we had used the input to its best alternative way, as explained in chapter 1.4.

The variable costs also include an amount of calculated interest over the capital used to cover these costs. As with fixed costs, we calculate the interest over the average invested capital: (Start Value + End Value) / 2.

If the total variable costs of a Teff crop with a growing period of 5 months are Birr 3000 and the annual interest rate is 12%, the interest cost will be (assuming that the costs gradually increase):

$$\frac{\text{ETB}0 + \text{ETB}\,3000}{2} \text{ x } \frac{5}{12} \text{ x } 12\% = \text{ETB } 75$$



For enterprises with a daily marketable output, we do not calculate interest on variable costs.

Example: Calculate the total variable costs of a dairy enterprise.

Calculate the total variable costs of the dairy enterprise if the following input is used, with an interest rate of 7%.

Table 1: The herd composition of a dairy enterprise

Herd composition	Value per animal	1-1-20.. Number	1-1-20.. Total value	One year later Number	One year later Total value
Cows	ETB 10000	12	ETB 120000	14	ETB 140000
Pregnant heifers	ETB 8000	4	ETB 32000	3	ETB 24000
Yearling heifers	ETB 6000	5	ETB 30000	6	ETB 36000
Calves: female	ETB 3000	7	ETB 21000	8	ETB 24000
male kept Oxen	ETB 2000	1	ETB 2000	2	ETB 4000
	ETB 8000	4	ETB 32000	4	ETB 32000
Total		**33**	**ETB 238000**	**37**	**ETB 260000**

Or, in Livestock Units LU's (a cow weighing 500 kg is the standard):

Herd composition	Livestock Unit per animal	1-1-20.. Number	1-1-20.. LU	One year later Number	One year later LU
Cows	1.0	12	12.0	14	14.0
Pregnant heifers	0.8	4	3.2	3	2.4
Yearling heifers	0.5	5	2.5	6	3.0
Calves: female	0.2	7	1.4	8	1.6
male kept	0.2	1	0.2	2	0.4
Oxen	1.2	4	4.8	4	4.8
Total		**33**	**24.1**	**37**	**26.2**

Feeds:

concentrate for cows	2 kg per cow per day at ETB 8 per kg
milk for calf feeding	1500 litres at ETB 10 per litre

For the pasture (fertiliser):

ammonium nitrate	120 bags at ETB 300 per bag
triple super	60 bags at ETB 400 per bag

Miscellaneous costs:

minerals	13 cows	at ETB 800 per cow
AI costs	13 cows	at ETB 300 per cow
veterinary costs	25.2 LU	at ETB 1000 per LU

As a rule we calculate the variable costs for the average herd composition.

Table 2: Average herd composition

	Original number	Number one year later	Average
Cows	12	14	13.0
Pregnant heifers	4	3	3.5
Yearling heifers	5	6	5.5
Calves: female	7	8	7.5
male kept Oxen	1	2	1.5
	4	4	4.0
Total	**33**	**37**	**35**

Or, in Livestock Units LU's (a cow weighing 500 kg is the standard):

	LU originally	LU one year later	Average
Cows	12.0	14.0	13.0
Pregnant heifers	3.2	2.4	2.8
Yearling heifers	2.5	3.0	2.8
Calves: female	1.4	1.6	1.5
male kept	0.2	0.4	0.3
Oxen	4.8	4.8	4.8
Total	**24.1**	**26.2**	**25.2**

N.B. Sometimes an average herd composition can be calculated from data registered per month. In that case we add the numbers registered each month and divide the total by 12.

Calculate the cost of interest over the average herd value:

= Average herd value is $\frac{\text{ETB 238000 + ETB 260000}}{2}$ ETB 249000 =

Interest costs are: 7 % x ETB 249000 = **ETB 17430**.
Calculation of the **Variable costs**:

1	Feedings costs		
	concentrate for cows	x 2 x 365 x ETB 8 13	ETB 75920 =
	milk for calf feeding	x ETB 10 1500	ETB 15000 =
2	Fertiliser costs		
	ammonium nitrate	x ETB 300 120	ETB 36000 =
	triple super	x ETB 400 60	ETB 24000 =
3	Miscellaneous		
	minerals	cows x ETB 800 13	ETB 10400 =
	AI costs	cows x ETB 300 13	ETB 4200 =
	veterinary	LU x ETB 1000 25.2	+ ETB 25200 =
	subtotal		ETB190720
4	Interest dairy herd		+ ETB 17430
	Total variable costs		**ETB 208,150**

Note: *in dairy farms we usually do not calculate interest on the sub variable costs, as these costs will be paid back immediately by the sale of milk.*

4. Gross Output

Gross output is the value of what is produced on a farm. The total farm Gross Output is the sum of the output of the individual farm enterprises.

Output includes the following:

- value of farm produce sold;
- value of farm produce re-used on the farm;
- value of farm produce consumed by the farm family;
- the gain in value of tree crops and livestock;
- the gains in value of stored farm produce (because there is more than before.

Output which is used again as input on the same farm should be valued as part of the gross output for the producing enterprise and as a cost for the enterprises that use it. Here again we have to do with opportunity costs. By using own farm produce as farm input, we have lost the opportunity to sell the produce.

The gain in value of farm produce stored on the farm is also included in the gross output, because it increases the farmer's wealth.

* Explanation:	7 litres x 10.5 cows x 300 days	=	Litres 22050
	milk to calves	=	Litres 850
	milk to family	=	Litres750 -
	milk left for sale	=	Litres 20450

Example: Gross output calculation of a small dairy herd

The size and composition of the herd is according to the table below. During the year the farmer bought one heifer at ETB 12000 to replace the one that died.

Prices of stock sales are according to the value given in the table.
Milk and meat used for home consumption is valued at the commercial price (opportunity costs!).

The milk production of the cows is 7l per cow per day on average, for the average number of cows present. The average length of lactation is 300 days.
Milk price = ETB 10 per litre.

In total 750 litres of milk are used for home consumption and 850 litres has been fed to the calves.

Herd composition	1.1.20..	One year later	Value	Death	Sales	Home cons.
Cows	10	11	ETB 15000	-	1	1
Pregnant & bulling	3	3	ETB 12000	1	-	-
Yearling heifers	4	4	ETB 8000	-	1	-
Calves: female	5	6	ETB 4000	1	-	-
male	1	2	ETB 2000	1	2	-
Total herd	**23**	**26**				

Closing valuation:

Cows		11 x 15000	= ETB 165000
Pregnant and bulling heifers		3 x 12000	= ETB 36000
Yearling heifers		4 x 8000	= ETB 32000
Calves:	female	6 x 4000	= ETB 24000
	Male	2 x 2000	= ETB 4000

Closing value = *ETB 261000*

Opening valuation:

Cows		10 x 15000	= ETB 150000
Pregnant and bulling heifers		3 x 12000	= ETB 36000
Yearling heifers		4 x 8000	= ETB 32000
Calves	female	5 x 4000	= ETB 20000
	Male	1 x 2000	= ETB 2000

Opening valuation = *ETB 240000*

INCREASE IN HERD VALUE (positive) ***ETB 21000***

Sales:

cows	x Birr 15000	= Birr 15000	1
yearling heifers	x Birr 8000	= Birr 8000	1
bull calves	x Birr 2000	= Birr 4000	2
minus: purchased Heifer	– x Birr 12000	= Birr 12000	1
* milk	+ l x Birr 10	= Birr 204500	20450

Sub output **Birr 219500**

Home consumption (at commercial prices):

cow	1 x Birr 15000	= Birr 15000	
milk	750 litres x Birr 10	= Birr	7500 +

Produce used for home consumption **Birr 22500**

Internal Deliveries:

Milk to calves	850 litres x Birr	10 = Birr	8500 +

TOTAL TURNOVER DURING THE YEAR ***Birr 260500***

GROSS OUTPUT ***Birr 281500***

* Explanation:	7 litres x 10.5 cows x 300 days	=	Litres 22050
	milk to calves	=	Litres 850
	milk to family	=	Litres750 -
	milk left for sale	=	Litres 20450

Question:
How much of the gross output consists of cash receipts by the farmer?

Non Cash Output:	A	Increase in herd value	Birr 21000
	B	Home consumption meat	Birr 15000
		Home consumption milk	Birr 7500
	C	Milk used for calf feeding	Birr 8500 +
		TOTAL	**Birr 52000**

Out of the gross output the **cash receipts** are: Birr 281500 – Birr 52000 = **Birr 229500**

5. Gross Margin

In chapter one we have learnt:

Gross Output	-	**Total Costs**	=	**Profit / Loss**
		and also:		
Total Costs	=	**Fixed Costs**	+	**Variable Costs**

The gross output less total costs equals the profit or the loss.

This is perhaps the ideal way of comparing the performance of one enterprise with another. However, it is difficult, if not impossible, to allocate all fixed costs to individual enterprises.

Because of this a system has been devised for planning and comparing enterprise performance that does not require the allocation of fixed costs.

This is the **gross margin method.** Using this method, only the variable costs are deducted from the enterprise gross output:

Gross Margin	=	**Gross Output**	-	**Variable Costs**

The sum of the gross margins of the individual farm enterprises is called Total Farm Gross Margin.

See following table.

Table 3: Farm gross margin

Farm enterprise ▼	**Total gross margin**	**Area in hectares**	**Gross margin per hectare**
Teff	Birr 137080	2.5	Birr 54830
Wheat	Birr 62300	0.8	Birr 77870
Sweet potatoes	Birr 31580	0.3	Birr 105250
Maize	Birr 52430	0.8	Birr 65540
Total Farm Gross Margin	**Birr 283390**		

Which crop in the above example do you consider the best, and why? What would you advise the farmer?

The profit/loss of the whole farm can be calculated by deducting the total fixed costs from the total of the gross margins of all the farm enterprises.

For example:

gross margin maize	Birr	
gross margin Teff	Birr	
gross margin dairy section	Birr	+
total farm gross margin	Birr	
fixed costs	Birr	–
profit / loss	Birr	

Before we advise to enlarge (extend) an enterprise at the expense of another enterprise, we should consider the need for extra investments and the increase in regular labour which will increase the fixed cost level.

Example A: Gross Margin of 1 ha irrigated wheat crop, growing period 7 months

We start with the **data,** as follows.

Output:

yield paddy (3000 kg at Birr 33)	= Birr 99000
wheat straw is sold to a livestock farmer for B 8000	= Birr 8000
Wheat bran is not used	

Variable costs:

seeds (80 kg at Birr 33)	= Birr 2640
Fertiliser (1 bag at Birr 3000)	= Birr 3000
hired labour (no of days at work with cost per day))	= Birr 22500
Interest rate is 12%.	

Gross output

Output:

Wheat	Birr 99000
Wheat straw	Birr 8000 +
Total gross output:	Birr 107000

Variable costs

Output:

Seeds	Birr 2640
Fertiliser	Birr 3000
hired labourer	Birr 22500 +
Sub variable costs	Birr 28140

Interest $\frac{28140}{2} \times \frac{7}{12} \times 12\% =$ Birr 980

Total variable costs Birr 29120–

Gross margin **Birr 77880**

Example B: Gross Margin of 1 hectare mixed cropping teff, sorghum, groundnuts, cowpea, total growing period 9 months

The following **data** are available:

Output:

yield teff	500 kg	at Birr 19/kg	= Birr 9500
yield sorghum	1050 kg	at Birr 22/kg	= Birr 23100
yield groundnuts	700 kg	at Birr 65/kg	= Birr 45500
yield cowpea	400 kg	at Birr 78/kg	= Birr 31200

No income from straw, bran, etc. is expected.

Interest rate 12%.

Variable costs:

seeds:		
teff	2 kg at Birr 19/kg	= Birr 38
sorghum	2 kg at Birr 22/kg	= Birr 44
groundnuts	19 kg at Birr 65/kg	= Birr 1235
cowpea	4 kg at Birr 78/kg	= Birr 312
fertilisers:		
compound fertiliser	2 bags at Birr 3000/bag	= Birr 6000
Hired labour:		
80 man-hours	at Birr 25 per man-hour	= Birr 2000
Bags for transportation:	20 bags at B 2.5/bag	= Birr 50

Gross Output

Teff		Birr 9500	
Sorghum		Birr 23100	
Groundnuts		Birr 45500	
Cowpea	Birr 31200	+	
Total gross output			*Birr 109300*

Variable costs

seeds teff		Birr 38	
sorghum		Birr 44	
groundnuts		Birr 1235	
cowpea		Birr 312	
fertilisers		Birr 6000	
hired labour		Birr 2000	
bags		Birr 50	+
Subtotal		*Birr 9679*	
Interest $\frac{9679}{2} \times \frac{9}{12} \times 12\%$		Birr 435.6	+
Total variable costs		*Birr 10110*	-

GROSS MARGIN **Birr 99180**

Example C: Gross Margin of 1 ha cotton (irrigated), growing period 11 months.

Interest rate is 15%.

Yield cotton:	first crop	700 kg	
	second crop	280 kg +	
Total yield		980 kg at Birr 130 per kg	Birr 127400

Variable costs:

compound fertiliser	Birr 12200
insecticide	Birr 5300
packing materials	Birr 5300
hired labour	Birr 1600
casual labour hoeing	Birr 8500
picking first crop	Birr 26500
second crop	Birr 8500 +
Subtotal	Birr 67900

Interest: $\frac{67900}{2}$ x $\frac{11}{12}$ X 15% =Birr 4670 +

Total variable costs = Birr 72570 –

GROSS MARGIN **Birr 54830**

Example D: Gross Margin calculation of a poultry flock of 1000 laying birds.

Gross Output

eggs sold	19300 boxes at Birr 25	Birr 482500
culls	900 at Birr 30	Birr 27000 +
Total sales		Birr 509500

less pullets bought (1000 at Birr 80 each) Birr 80000 –

Birr 429500

Variable costs (including interest costs)

feed 40 tons layers ration	Birr 288000
litter, lighting, medicines, etc.	Birr 8000
Interest costs	Birr 0 +
	Birr

296000 –

GROSS MARGIN **Birr133500**

The gross margin therefore is Birr 133500 for 1000 birds or Birr 133 per bird.

It can be compared with the gross margin of a previous flock and other flocks, to see whether our flock has done well or not, in relative terms.

Example E *Gross Margin of a dairy herd.*

Calculate the gross margin that is based on the following **data:**

Opening value herd	Birr 158200	
Closing value herd	Birr 172500	
Output:		
- cows	Birr 16000	
- yearling heifers	Birr 8000	
- bull calves	Birr 2400	
- milk	Birr 125090 +	
Sub output	Birr 151490	
Home consumption:		
- cow	Birr 8000	
- milk	Birr 2500 +	
Total home consumption	Birr 10500	
Purchases of animals	Birr 12000	
Variable costs		
corn-and cob meal	Birr 18500	
milk for calf feeding	Birr 7900	
total miscellaneous costs	Birr 22000	
triple super fertiliser	Birr 9750	
ammonium nitrate fertiliser	Birr 18000 +	
Sub variable costs	Birr 76150	
Interest on average herd value 6%	Birr 9920 +	
	Birr 86070	
Total variable costs		

Now the Gross Margin calculation, as follows:

Increase in herd value:		
closing value herd	Birr 172500	
opening value herd	Birr 158200 –	
Increase		Birr 14300

Total turnover during the year:

Sub output	Birr 151490	
Home consumption	Birr 10500 +	
Subtotal	Birr 161990	
Purchases	Birr 12000 –	
Total turnover		
Gross output		Birr 149990
Variable costs	+	
		Birr 164290
GROSS MARGIN		Birr 86070 –
		Birr 78220

Example F: Calculate the gross margin/ha and the gross margin/ha/man day of the following activities:

	Dairy farming (stall feeding)	**Food grain (maize)**	**Cash crop (cotton)**
Production	2500 kg/ cow	1000 kg/ ha/ crop	800 kg/ ha/ crop
Price	Birr 10 / kg milk	Birr 20 / kg	Birr 30 / kg
Harvest per year	3 cuts	1	1
Land preparation costs/ha	Birr 2000 / year	Birr 6000	Birr 6000
Seed & fertiliser costs	Birr 20000/ ha / year	Birr 500 / ha	Birr 2000 / ha
Other variable costs	Birr 10000 / cow	Birr 1000 / ha	Birr 2000 / ha
Carrying capacity	4 cows / ha	-	-
Man day requirement	30 / cow	40 / ha	50 / ha

Solution:

	Dairy	**Maize**	**Cotton**
Revenue/ha	Birr 100000 (25000x4x1)	Birr 20000 (10000x2)	Birr 24000 (8000x3)
Costs:			
land preparation	Birr 2000	Birr 6000	Birr 6000
seed & fertiliser	Birr20000	Birr500	Birr 2000
others	Birr40000 +	Birr 1000 +	Birr 2000 +
	Birr62000	Birr 7500	Birr 10000
Gross margin/ha	Birr38000	Birr 12500	Birr 14000
Labour	120 days	40 days	50 days
Gross margin/ha/man day	Birr 316.6	Birr312.5	Birr280.0
Judgement	very good	good	less good

Before we advise to enlarge (extend) an enterprise at the expense of another enterprise, we should consider the need for extra investments and the increase in regular labour which will increase the fixed cost level.

6. Gross Margin and Farm Management

"Gross margins" are useful for detecting faults in management. To take a very simple example, assume that a farmer has 2.8 ha cropped as follows:

0.4 ha cabbage	gross margin	Birr 10000/ha	*Birr* 4000
0.4 ha potatoes	gross margin	*Birr* 8750/ha	*Birr* 3500
2.0 ha cattle +	gross margin	*Birr* 12500/ha	*Birr* 25000 +
2.8 ha	*Birr*		32500
minus:			
2.8 ha fixed costs			*Birr* 3500 –
	Profit		***Birr* 29000**

The reason for presenting the results in this way is that it is then easy to see the effect on profit of altering or improving the system of farming.

Suppose that the farmer, by applying *Birr* 500 of fertiliser, can increase the gross margin of the potato crop by *Birr* 1500. This would increase the total gross margin by *Birr* 1500 and, as the fixed costs would remain the same, the profit would also rise by *Birr* 1500.

Suppose that the farmer would grow less potatoes (0.2 ha) and instead of that more cabbage (0.2 ha). The effect would be a loss of *Birr* 1750 (potatoes) and a gain of *Birr* 2000 (cabbage) gross margin. That is to say a net gain of *Birr* 250.

Will this not change the man- and machinery-hours required? The answer is that if the change is not a large one, the regular labour force and machinery will remain virtually unaltered (it is being assumed here that all the work is done by regular labour). If, on the other hand, the change in the farm programme is so large that an extra labourer is required, the fixed costs will rise by a lump sum.

The idea is now to use gross margins for identifying weaknesses in farm organisation. If farm income is too low, the faults that are likely to be found can be classified under three headings:

1. the gross margins per hectare or per unit of output may be too low; due to low yields, expensive stock or excessive variable costs such as feedstuff;
2. the farming is not intensive enough; not enough high value crops or livestock;
3. the fixed costs may be too high; labour, machinery and power, rent or overheads.

Each of these faults has a different remedy and these remedies are summarised in *the table* on the following page.

Table 4: Diagnosis of farm faults with the aid of gross margins.

Normal		Fault 1 **Low gross margin**	Fault 2 **Low intensity**	Fault 3 **High fixed costs**
Beets Potatoes & peas Cattle	0.4 ha at *Birr*1075/ha *Birr* 430 0.8 ha at *Birr* 1750/ha *Birr* 400 2.8 ha at *Birr* 1250/ha *Birr*3500	0.4 ha at 500 *Birr* 200 0.8ha at 1500 *Birr*1200 2.8 ha at 500 *Birr*1400	1.2ha at 1075 *Birr*1290 0.4 ha at 1750 *Birr* 700 2.4ha at 1000 *Birr*2400	0.4 ha at 1075 *Birr* 430 0.8 ha at 1750 *Birr* 1400 2.8 ha at 1250 *Birr* 3500
Total GM Fixed costs	4 ha at *Birr* 1332/ ha *Birr* 5330 4 ha at *Birr* 75/ ha *Birr* 300	4 ha at 700 *Birr* 2800 4 ha at 75 *Birr* 300 4 ha at 1097 *Birr* 4390 4 ha at 75 *Birr* 300		4 ha at 1332 *Birr* 5330 4 ha at 250 *Birr* 1000
Profit ***Birr* 5030**		***Birr*** **2500**	***Birr* 4090**	***Birr* 4330**

Fault 1	**Improve the present system.**
Low gross margin	* improve crop yields (fertility and drainage problems, diseases, etc.)
*	improve livestock yields (diseases, poor stock, poor feeding, etc.)
*	economise on livestock costs (especially feedstuff, utilisation of grass and fodder)
Fault 2	**Plan a more intensive system:**
Low intensity	* change to a more intensive livestock system (more cows per ha through pasture improvement and fertilisation, pigs or poultry
*	grow more high value crops
Fault 3	**Economise on labour, machinery and other overheads:**
High fixed costs	* minimise buildings and fencing
*	streamline layout of fields to economise on labour and machinery
*	specialise to ensure full use of expensive equipment and/or buildings
*	keep a check on other overhead expenses

Of course, these examples are over-simplified and they are merely intended to illustrate the principles involved. Moreover, in practice, more than one thing may be wrong on a farm and in that case, a combination of remedies may be needed.

Moreover, the changes and improvements indicated above have their limitations, as outlined below.

Improve the present system (1).

The application of a second bag of fertiliser gives a lower increase in kg crop yield than the first and the third bag less than the second, etc. The effect is similar with concentrate fed to dairy cows.

Change to more intensive system (2).

It should be realised that these changes often require more labour and also capital investment (so increased fixed costs).

In addition, what is even more important, a much higher level of day-to-day **management** will be required.

For instance, compare a cow-calf beef herd with a herd of dairy cows. The total output of the dairy herd is much higher than that of the beef herd. At the same time, the costs of the dairy herd are also much higher.

If management is not of the required standard, the extra costs might use up (or even exceed) the extra revenue: all that the farmer gets is a lot more worries!

The same applies to milking twice per day with bucket milk feeding to calves as compared with milking once a day and suckling calves.

Similarly, it is more difficult to obtain a gross margin from a crop of Irish potatoes, peanuts or peppers (to name a few crops) than from crops such as sugar cane, yams, or even corn.

If the right management is available, it will be rewarded, but if the right management is not available, the high costs are still there!

High fixed costs (3).

It is clear that there should be a proper relation between gross margin and fixed costs.

High fixed costs (labour, machinery, rent of land, buildings) must be combined with intensive farming (a high gross margin).

Farming with low intensity (a low gross margin) can only be profitable with low fixed costs.

For instance, beef cattle farming in areas with high land prices and with expensive buildings and machinery can never be profitable. The same can be said of extensive crops.

On the other hand, the farmer with little land and no alternative use for his/ her labour, or who has had to set up new buildings and fences (high fixed costs over several years) can only survive if he/ she engages in intensive farming such as dairying and vegetable or flower growing.

Example:

On farm "A" weed control and harvesting is done by casual labour while on farm "B" the regularly employed labour force does this job.

On farm "A" the costs of weed control and harvesting are variable costs and therefore will be deducted from the gross output while on farm "B" weeding and harvesting costs will be fixed and for this reason will not be deducted from the gross output to calculate the gross margin.

This will cause a difference in the outcome of the gross margins but this difference does not necessarily indicate a difference in the financial result of the two farms.

Comparing Farms

Results of gross margin calculations of enterprises of different farms should always be compared very carefully since only a part of the total costs (i.e. the variable costs) are taken into consideration.

7. Farm Income Measurement

This chapter is about ways to measure farm income.

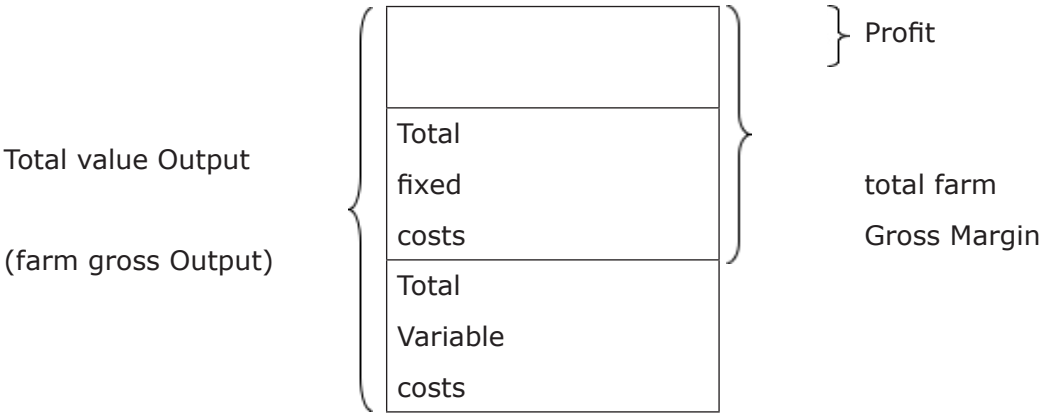
It is important to know that there are several ways to measure farm income. Often, different people use similar measurements in a different way and this is confusing. Therefore, when you read an income calculation you must realise that the measurement applied may be different from the one that you learn here.

First of all, remember what was said earlier in this guide about variable and fixed costs, (total farm) gross output, (total farm) gross margin and profit/loss over, say, a one-year period:

Gross Margin	=	**Gross Output**	–	**Variable Costs**
Profit or Loss	=	Total Value Output or Farm **Gross Output**	–	Total Value Input or **Total Costs** (fixed and variable)

and hence

Profit or Loss	=	Total Farm **Gross Margin**	–	**Fixed Costs**



"Profit/Loss" is generally called **NET FARM INCOME.**

Net Farm Income is used for (family) living expenses and for the payment of taxes (income tax, social security tax in many countries). The amount left after living expenses and taxes may be used for increasing the farm business' assets or decreasing its liabilities (see Reader Farm Accounting on Balance Sheet). If there is not enough to cover living expenses, etc., the opposite happens but this cannot last more than a few years.

The Net Farm Income is in general **NOT equal** to the cash income the farmer gets from the farm. As you know, we calculated opportunity costs for family labour, deprecations and also interest costs for the use of own funds. Although they are costs, they do not imply cash expenses by the farmer. On the other hand, paid interest is not included as a cost but has to be paid.

The Net Farm Income corrected (adjusted) for cash is often called MANAGEMENT AND INVESTMENT INCOME (M + I Income).

Note that the M + I Income will still be positive as long as a possible loss on the Net Farm Income does not exceed the corrections.

An outline for how to calculate the Net Farm Income (NFI) :

Total Farm Gross Output					Birr ...
Total Variable Costs					Birr ...
Total Farm Gross Margin					Birr ...
Fixed Costs:					
- machinery and equipment	depreciation	Birr			
	interest	Birr			
	maintenance	Birr	+		
				Birr	
- buildings, etc	depreciation	Birr			
	interest	Birr			
	maintenance	Birr	+		
				Birr	
- permanent labour; including family labour				Birr	
- possibly tenants rent				Birr	
- miscellaneous paid costs (e.g. water and electricity charges)				Birr	+
					Birr ...
NET FARM INCOME (Profit or Loss)					Birr ...

8. Cash flow calculations

So far, in our calculations we have been dealing with costs (input) and revenues (output). It should be clear that not all costs are in reality expenditures. Some expenditures are costs at the same time but we also have costs, which are not really expenditures, and finally expenditures, which cannot be considered as costs.

A few examples may make these differences more clear:

Costs and expenditures at the same time	:	purchase of fertilisers, stock feeds, etc.
Costs but not expenditures	:	costs of calculated interest; costs of depreciation; calculated costs of family labour; decrease of stocks and herd value; use of owner – occupier land
Expenditures but not costs	:	purchase of land; purchase of farm machinery; family expenditures (for instance school fees; redemption of loans)

The same can be said about receipts and farm output or revenues.

Receipts and farm revenue at the same time	:	sale of farm products such as maize, milk, sunflower, eggs, etc.
Farm revenue but not receipts	:	farm produce used for home consumption; increase of herd value; farm re-use
Receipts but not farm revenue	:	money received on loans; money received for off-farm activities; sale of produce grown in the previous year

The calculations on costs and revenues, which we have made so far, were mainly made to get an idea about **profitability.** That is, to find out whether a certain enterprise or even the whole farm will give a profit. These calculations are very important because no farm can be continued in the long run if there is no profit. If there is no profit, sooner or later the farm will have to be stopped due to lack of funds for the necessary input and re-investments to keep the farm going.

Apart from profitability, there is another important factor, which is **liquidity.** A liquidity calculation is based on payments and receipts and not on costs and farm output.

In case the total amount of receipts exceeds the total amount of payments during a certain period, the farm (or, in general, a business) is called **liquid** for that period. In the opposite case (payments exceeding the receipts) the farm is called **illiquid.** In this case the farmer will need additional funds from outside the farm to enable him to make the payments required in order to keep the farm going.

In practice, it happens quite often that a profitable business cannot be continued because of liquidity problems.

Cash flow calculations:

The purpose of cash flow calculations is to know whether a certain farm enterprise (or the farm as a whole) is liquid or illiquid.

When making a cash flow calculation it is not the revenues and costs that are taken into account but the receipts and payments. A cash flow calculation is a projection of the money coming in and going out.

The period over which we make the cash flow calculation may vary. If we want to know whether a farmer will be able to repay a loan, a cash flow calculation per year for several years may be required.

9. Financial Record Keeping

9.1 Cash Book, Petty Cash and Diary

A **cashbook** is what it says, namely a record of **all changes in cash** and a record of all cash transactions. In other words, it records cash receipts and expenditures (or expenses).

For farms with a bank account, the cashbook also records changes in the bank account since a bank account may be considered as an extension of the cash box at home.

A cashbook has separate columns for receipts and for expenditures. In addition, there is a column for the date and one for a (brief) description of each transaction.

Therefore, the cashbook in its simplest form is as follows:

Table 5: Cash book form

Date	Description	Receipts (debit)	Expenditures (credit)
	Total		

Each transaction starts with a new line in the cashbook.

To check whether the amount of money in the cash box (or purse) is equal to the cash balance in the cashbook, the total expenditures in the cashbook must be subtracted from the total receipts.

In principle, the total cash receipts must be a larger sum than the total cash expenditures. But where a cashbook also records bank account changes, the total receipts may be less than the total expenditures because a bank account can be overdrawn.

To keep the cashbook neat and tidy the above calculation is done in draft. Then the difference, which is called **cash balance** (or closing balance), is entered in the expenditure column because, in accounting, debits and credits must always be equal. This procedure is called "closing the books".

If there is a difference between the cash balance and the actual cash in hand, the farmer will usually be able to discover the error (by checking all entries) provided that the previous closing of the books did not take place too long ago. Therefore checking should be done weekly, or at least monthly.

The "opening of the book" is done by entering the previous cash (closing) balance from the expenditure column in the receipt column and then calling it "cash in hand" (or opening balance).

Example of a cashbook:

Cashbook of Ato Solomon Kebede from Sululta Farm covering the period January 1st to December 31st 2016.

Date	Description	Receipts	Expenditures
01-01	Cash in hand (opening bal.)	2,000	
12-01	10 kg cattle minerals		32
21-01	Milk cheques	148	
23-01	1 heifer sold	1,500	
23-01	2 kg nails		12
23-01	Veterinary service, Dec. '15		176
31-01	Wages		120
31-01	Private drawing		1,590
31-01	Cash (closing) balance		* 1,718
31-1	**Total (closing January)**	**3,648**	**3,648**
01-02	Cash in hand (opening bal.)	* 1,718	
02-02	Maize seed		40
02-02	Fencing wire		175
02-02	1 cull cow sold	375	
10-02	Artificial insemination		1
15-02	Fencing posts		150
22-02	Milk cheque, Jan. 2016	487	
28-02	Wages		120
28-02	Private drawing		1,425
28-02	Cash (closing)Balance		* 669
28-02	**Total (closing February)**	**2,580**	**2,580**
Summary for the rest of the year	Cash in hand 01-03	* 669	
	Milk	4,325	
	Beans	1,250	
	1 bullock sold	950	
	Goats and sheep sold	290	
	28 bags of maize at B 82	2,296	
	Cabbage	2,365	
	Tractor repairs		2,425
	Fuel and oil		960
	Cattle feed and minerals		235
	1 milk can		175
	Artificial insemination		4
	Veterinary services		475
	Cattle medicines		68
	Fertiliser for crops		1,275
	Wages		1,200
	Private drawings		4,800
	Cash Balance		528
	Total (rest of the year)	**12,145**	**12,145**
	TOTAL	18,373	18,373
	* Minus carried forward Balances	2,387	2,387
	TOTAL for the year	**15,986**	**15,986**

Remarks on Ato Solomon Kebede cash book:

The purpose of a cashbook is to record receipts and expenditures whenever they occur and to balance both sides at any time. That may be daily, depending on what is desirable or necessary.

The balance in the expenditure column must correspond with the money in the cash box and the bank. This balance is then carried forward into the receipt column when the book opens for the following period (in our case February, to begin with).

Looking at the "totals" at the end of January, February, or for the rest of the year, the amounts indicated are not a true reflection of what was really received or spent in the time period under consideration (January or February or the rest of the year). The carrying forward procedure of the balances of each month causes a bias.

In order to arrive at the "true" total for the year, the carried forward balances have to be deducted from the total for the twelve months (arrived by adding the totals for each month), except those at the beginning and the end of the year.

Always keep two rules in mind:

- at the beginning (opening) of an accounting period the balance in cash is always entered in the receipt column and at the end (closing) the cash balance is entered in the expenditures column;
- sales and purchase are only entered after **payments** (by cash or by cheque) **have taken place.**

Sometimes farms use a **petty cash book** in which expenditures and receipts for cash in hand are recorded when they occur ("petty" means small). Once a week or once a month the totals are entered in the cashbook.

A **diary** is a book of events, transactions or observations recorded daily or at frequent intervals. Large farms which keep a complete set of accounting books may use a diary for non-financial records, such as work performed by labourers, fertiliser applications on specified crops and fields, dates of sowing and harvesting, servicing, yields, feed given to animals, etc.

9.2 The design and use of the Cash Analysis Book

It is **not** possible to calculate the Net Farm Income from the cashbook as such.

To make this possible, receipts and expenditures have to be sorted out, kind by kind. And, what is more, for management purposes the farmer needs to know more than the total receipts and expenditures, which the (simple) cashbook can provide.

To be able to manage the farm in such a way that the most profitable use is made of the farm resources, the farmer must:

- **Calculate** the profitability of his separate farming activities (also called enterprises);
- **Compare** the output and costs of each activity with the results of previous years and also with the results of other farms;
- **Distinguish** receipts for farm produce from other receipts, such as sales of capital goods and loans;
- **Distinguish** expenditures for production purposes from expenditures for other purposes such as investments and repayments.

The **CASH ANALYSIS BOOK (CAB)** can provide these necessary data. The Cash Analysis Book is an extension of the cashbook. In order to analyse receipts and

expenditures, the Cash Analysis Book adds several columns to the total receipts and total expenditures columns of the cashbook. In these columns receipts and expenditures of the same kind are recorded a second time. The totals of such columns enable a farmer at the end of the year to analyse each particular farm activity (or enterprise). The number of these added columns depends on the number of activities (operations, enterprises) on the farm and on how many details the farmer requires about costs. So, the first columns in a Cash Analysis Book are like those in a cashbook: date, brief description, total.

Then follow different types of columns, as required:

- columns in which the output and costs are entered for **each activity** (enterprise of operation) for which separate information is wanted, *Examples: maize, poultry, citrus, milk, cattle, woodlot;*
- a column "other output" on the receipts side and a column "overhead costs" (or general costs) on the expenditures side, in which output and costs are entered **which cannot be allocated to a specific activity**;
- a column for **livestock sales** on the receipts side and a column for **purchases** on the expenditures side;
- a column for **non-output** receipts and a column for **non-cost** expenditures on the expenditures side (*e.g. investments*);
- a column for **receipts by the household** (private) and a column for **expenditures** of the household;
- For cash balance, cash in hand and cash corrections the **contra account** column is used.
- a column called **cross-bookings** is used when also a bank account is maintained (see below).
- other columns.

It should be noted that all entries are made twice and on the same horizontal line: once in the total column and once in the appropriate analysis column.

An example of a Cash Analysis Book is shown on the following page.

If a farmer has a business account with a bank, the same type of Cash Analysis Book can be used. Then, however, the columns of total receipts and total expenditures have to be divided into two: one for cash and one for bank. Moreover, an additional column is needed at the very end (after "private") to enter all transfers from cash to bank and vice-versa. This column could be called "cross-bookings". All transfers have to be entered twice, once on the receipts and once on the expenditure side. This cross-bookings column can then also be used for cash and bank balances at the opening and closing.

Example of a cash analysis book:

Cash analysis book of Ato Solomon Kebede January 1st to December 31st 2016.

Receipts

Date	Description	Total	Crops	Milk	Livestock sales	Other output	Private	Contra account
01-01	Cash in hand	2,000						2,000
12-01	Milk cheque							
	Dec. 2015	148		148				
23-01	1 heifer	1,500			1,500			
02-02	1 cull cow	375			375			
22-02	Milk cheque							
	Jan. 2016	487		487				
Summary for the rest of the year:								
Milk delivered		4,325		4,325				
Beans sold		1,250	1,250					
1 bullock sold		950			950			
Goats and sheep sold		290			290			
28 bags of maize at B 82		2,296	2,296					
Cabbage		2,365	2,365					
Total		**15,986**	**5,911**	**4,960**	**3,115**	**–**	**–**	**2,000**

Expenditures

Date	Description	Total	Crops	Cattle costs	Overhead costs	Private	Invest-ments	Contra account
12-01	10 kg cattle minerals	32		32				
23-01	2 kg nails	12			12			
23-01	vet. services							
	Dec. 15	176		176				
31-01	Wages	120			120			
31-01	Private draw.	1,590				1,590		
02-02	Maize seed	40	40					
02-02	Fencing wire	175					175	
10-02	AI	1		1				
15-02	Fencing posts	150					150	
28-02	Wages	120			120			
28-05	Private draw.	1,425				1,425		
Summary for the rest of the year:								
Tractor repairs		2,425			2,425			
Fuel and oil		960			960			
Cattle feed & minerals		235		235				
1 milk can		175					175	
AI		4		4				
Veterinary services		475		475				
Cattle medicines		68		68				
Fertiliser for crops		1,275	1,275					
Wages		1,200			1,200			
Private drawings		4,800				4,800		
Cash balance		528						528
Total		**15,986**	**1,315**	**991**	**4,837**	**7,815**	**500**	**528**

10. Partial Budgeting

Managers often need quick ways to assess the financial effect of a change in the farm setup or prices of farm products. Partial budgeting enables them to assess these effects of small changes, such as buying a sprayer instead of hiring one or adding a cow to the dairy herd. Partial budgeting is an analysis technique, as it looks at changes in costs and receipts, and thus Net Farm Income, likely to result from a marginal change in the farming system.

There are 2 main situations in which partial budgeting will help:

a. Change in combination of enterprises.

This could mean complete substitution of one enterprise by a new one or changing the scale of enterprises.

b. Change in production method.

For example buying a new machine or construction of a new barn to either reduce labour costs or increase output.

Partial budgets are easier to make than complete budgets that are not needed when only fairly small changes are considered. However, a partial budget is sometimes a too weak tool and complete budgeting is necessary. For example, when introducing the first tractor to replace most manual labour, it will affect most inputs used and output produced and modify the whole farming system.

Partial budgeting simplifies decision making for many problems by giving the most precise possible forecast of the financial effect of a proposed change. This should prevent unprofitable changes being made and the budget also serves as a target against which to compare later performance.

It is essential to clearly specify the proposed change stating what is involved and when it occurs. It then helps to go through the following three stages:

-Find out and calculate the present situation

-Calculate the situation after the change

-Complete the partial budget using the format below

Table 6: Format for partial budgeting

Losses	**Gains**
Income lost: - - - Extra/ new costs: - - -	Extra/ New Income: - - - Costs saved: - - -
Total gains – Total losses = Extra Profit Advise:	

For example, a smallholder farmer is growing currently 2 ha Teff. He/ she heard that maize prices have increased and considers replacing 1 ha of Teff by 1 ha of maize.

For 1 ha of Teff the following inputs are required:

-Seed 20 kg @ Birr 40/ kg

-Herbicides @ Birr 150

-Casual labour @ Birr 30/ day, total 40 days required

For 1 ha of Maize the following inputs are required:

-Seed 35 kg @ Birr 20/ kg

-Herbicides @ Birr 100

-Casual labour @ Birr 30/ day, total 50 days required

Output of 1 ha of Teff:

-1500 kg grain @ Birr 25

-Straw @ Birr 1000

Output of 1 ha of maize:

-3000 kg grain @ Birr 20

-Maize stover @ Birr 2000

The Partial Budget Format will be as follows:

Losses	**Gains**
Income lost: -1 ha of Teff 1500 kg x Birr 25 = Birr 37500 -Straw = Birr 1000 Extra/ new costs: -Maize seed 35 kg x Birr 20 = Birr 700 -Herbicides Birr 100 = Birr 100 -Casual labour 50 x Birr 30 = Birr 1500 Total: Birr 40800	Extra/ New Income: -1 ha maize 3000 x Birr 20 = Birr 60000 -Maize stover Birr 2000 = Birr 2000 Costs saved: -Teff seed 20 kg x Birr 40 = Birr 800 -Herbicides Birr 150 = Birr 150 -Casual labour 40 x Birr 30 = Birr 1200 Total: Birr 64150
Total gains – Total losses = Extra Profit; 64150 – 40800 = Birr 23350 Advise: If fixed costs are not changing the farmer should go ahead!	

Farm Economics
Training Guidelines for Dairy Extension workers

II. Farm economics training Guideline

A. Farm Economics Lesson Matrix

Lesson Matrix	
Topic / Serial #	
Practical Lesson Lesson 1 Farm Economics	
Date	
Venue	
Duration	1 day/ Day 1 of the Course
Type of students	EDGET Extension Workers
Suggested number of students	16
Starting situation	Students have very little or no experience with Farm Economics
Outcomes	The student is able to:
Skills	-calculate variable costs, fixed costs, gross margin, farm income and cash flow of enterprises on small holder farms with special emphasis on the dairy enterprise. -Benchmark the gross margins of enterprises on small holder farms and analyze sub-standard performance. -Work with a cash book as well as a cash analysis book. -Use the "partial budget" method to calculate the economic benefit of a small change/ innovation/ investment on a small holder farm.
Knowledge	-Explain how VC, FC, Gross Output, GM, NFI and cash flow is calculated -Explain benchmarks for various small holder farm enterprises -Explain how to use a cash analysis book -Explain how a partial budget can be calculated
Attitude	Convince farmers that for commercialization and optimization of their small holder farms farm economics is an essential part of farm management

Time in minutes	**Brief Content**	**Role trainer /didactical methods**	**Teaching aids**	**Role/activities Participants**
30	-Opening of the Course, getting acquainted with each other, explanation Module Book and Course Objectives	-Explaining/ guiding/ making trainees feel at ease	-Module Book	-Listening, introduction of themselves, asking questions, answering questions
30	-Sharing experiences with farm economics -Introduction into farm economics -Distribution Ec. Man.	-Asking for experiences to get an idea about student level	-Example Farm -Farm Economics Manual	-Sharing experiences -Participate in example explanation -Check contents of Manual
60	-Explanation of terms used in farm economics -Explanation on how to calculate fixed costs -Assignment	-Explaining theory + assignments	-PPT -Manual -Assignments 1 and 2, terms and fixed costs calculation	-Observing theory -Checking examples -Asking questions -Making assignment
30	Break			
60	-Explanation on how to calculate variable costs + examples -Assignment	-Explaining theory + assignment	-PPT -Manual -Assignment 3 variable cost calculation	-Study theory -Study examples -Asking questions -Making assignment

Time in minutes	Brief Content	Role trainer /didactical methods	Teaching aids	Role/activities Participants
60	-Explanation on how to calculate Gross Output + examples -Explanation on how to calculate Gross Margin + examples	-Explaining theory + assignment	-PPT -Manual -Assignment 4 gross output calculation + 5 GM calculation	-Study theory -Study examples -Asking questions -Making assignments
60	Lunch			
180	-Explanation on how to use GM as a management tool	-Explaining theory + assignment	-PPT -Manual -Assignment 6.1 GM calculation enterprises on a farm + farm advise	-Study theory -Study examples -Asking questions -Making assignment
30	-Summary/ reflection/ homework	-Summary theory/ testing knowledge -Common made mistakes -Homework assignment	-PPT -Manual -Assignments -Homework study above + assignment 6.2/ 6.3	Answering and asking questions

LESSON 1: fixed costs/variable costs/gross margin/net farm Income/cash flow

Required materials:

-Manual Farm economics

-Exercises 1 to 6

1. Sharing experiences with farm economics

2. Introduction

- Distribute and discuss course plan

- Distribute book "Farm Economics"

*Discuss table of contents, exercises (and solutions)

- Discussion on economics, use trainer guideline

3. Lecturing the manual:

- Summarize chapter 1 on White Board (WB) or Black Board (BB) / PPT + make example assignments, make assignment 1, allow 20 minutes and discuss answers, distribute answer sheet.

- Summarize chapter 2 on WB/ PPT (make example assignment), pay attention to "what to do with Depreciation money" ---> savings within the farm. Same for Interest-money not paid.

- Assignment:

- distribute exercise 2 , allow 20 minutes
- distribute and discuss answer Exercise 2

- **summarize chapter 3 Variable Costs** on BB/ PPT. What to calculate? q x price, I on

SubVC (sometimes!?) and I on herd value, draw graph to make average Interest clear

Input 500

V.C. 250

0 0 1 2 3 4 5 6 àMonths

Note: for enterprises with daily marketable products, we do not calculate interest on variable costs.

- assignment: **distribute** exercise 3, work + disc. mind flexibility with average no. of cows, heifers and calves! Sold male calves are getting milk! Others are not considered. Explain that how you do it is your own Belayce, but do it consequently!

- **summarize chapter 4 Gross Output** on BB/ PPT. What to calculate? q x price, +/- herd value

- assignment: study/ make example, make exercise 4. Student puts answer on white board, discussion and distribution of answer sheet.

-**Summarize and discuss chapter 5 on gross margin** on BB/ PPT. Study/ make examples mentioned in chapter 5; Work on exercise 6. Student puts answer on white board, discussion and distribution of answer sheet.

-Summarize chapter 6 on use of GM for farm management on BB/ PPT.

- **distribute** exercise 7, work out question 7.1, is also homework.

Summary of lesson through questions and answers/ responding to student questions/ giving homework

4. Evaluation:

- Summary of the lessons, any questions?
- Home work (write on WB):
- study manual
- study/make Exercises 1 to 5
- Make/ complete exercise 6
- If time allows, students start working on homework

5. End of day 1

INTRODUCTION TO APPLIED ECONOMICS

Aim of the exercise:

For 30 minutes students get an idea about the function of farm economics in farm management.

Content of the discussion:

* What is the aim of farm economics?

- advice the farmers to enable them to take better decisions

* Can you give some examples?

- purchase of fodder/concentrates, which one to buy?

- comparison of different farm activities, which is the best, in mixed farm system, the best activity might be enlarged at the cost of the worst activities, but mind spreading of risk!

- calculate the farm income

- investment decisions; do it yes/no

* Lets have a close look at a mixed farm, what are the outputs and the inputs for the livestock and cash crop section?

- make table on BB and fill in (response of students)

MIXED FARM			
OUTPUT		INPUT	
Livestock:	- milk - animals - manure - draft power - wool etc.	Livestock:	- fodder - concentrates - labour - health care - water etc.
Cash crops:	- grain, corn, cane, fruits, etc. - by products (straw, tops, etc.)	Cash crops:	- water - seeds - labour - ploughing, etc.

Note: * diversify inputs in fixed and variable costs

* diversify for cash and non-cash outputs and inputs

- These money terms are used to make calculations and take decisions to make the farm more efficient.
- Objectives of a farm (family) may not only lie in the economical field however.

IN ECONOMICS WE ATTACH A MONETARY/MONEY VALUE TO EACH OF THESE OUTPUTS AND INPUTS

Therefore decisions are not only made on economical grounds, others objectives can be linked to:

- Prestige (no of cows/ highest production/ biggest tractor)
- Social aspects (milk robot)
- Religious value (India/ holy cows)
- Other ?

Decisions will be made after balancing all these aspects.

-In economics the following kind of activities are undertaken/ calculations made in line

with the "management cycle", show **sheet of management cycle:**

1. Budgeting; (feasibility/ setting income objective)

- Next year budget
- cost/benefit calculations on proposed investments

2. Registration: (monitoring)

- Cashbook
- cash analysis book

3. Results: (Targets reached/ adjustment assumptions/ setting new income objective or stop the business))

- Gross margin/ farm income/ M+I income/ balance sheet/ cost price/ irr/ etc.

4. Analysis: (strong, weak, how to improve)

- comparing results with previous year(s)
- comparing results with other farms
- which changes to be made for the next year?

SUMMARY ON THE RELATION MANAGEMENT AND ECONOMICS:

- Income from dairy herd depends on management
- Importance of knowing your inputs and outputs!

COW PRODUCTIVITY VERSUS FARM PRODUCTIVITY

* cow ---> P = G + E (productivity = genetics + environment)

* farm ---> farm income depends on:

output – input

– VC FC

– – – paid

– – – not paid

Lesson Matrix	
Topic / Serial #	
Practical Lesson	Day 2 Farm Economics
Date	
Venue	
Duration	1 day/ day 2 of the Course
Type of students	EDGET Extension Workers
Suggested number of students	16
Starting situation	Students have very little or no experience with Farm Economics
Outcomes	The student is able to:
Skills	-calculate variable costs, fixed costs, gross margin, farm income and cash flow of enterprises on small holder farms with special emphasis on the dairy enterprise. -Benchmark the gross margins of enterprises on small holder farms and analyze sub-standard performance. -Work with a cash book as well as a cash analysis book. -Use the "partial budget" method to calculate the economic benefit of a small change/ innovation/ investment on a small holder farm.
Knowledge	-Explain how VC, FC, Gross Output, GM, NFI and cash flow is calculated -Explain benchmarks for various small holder farm enterprises -Explain how to use a cash analysis book -Explain how a partial budget can be calculated
Attitude	Convince farmers that for commercialization of their small holder farms farm economics is an essential part of farm management

Time in minutes	**Brief Content**	**Role trainer /didactical methods**	**Teaching aids**	**Role/activities Participants**
30	Discussion home work: -Questions chapter 1 to 6 ? -Questions regarding exercises ? -Student puts answer exercise 6.1 on white board	-Asking/ giving questions -Discussion result question 7.1	-PPT -Exercises -White board	-Study theory and examples -Asking questions/ giving answers -1 student giving answer exercise 7.1
60	-Explanation NFI and Management & Investment income calculations -Assignment 7.2 and 7.3 -Assignment Gebreselassie -Assignment exercise 8	-Explaining -Instruction on exercises -Discussion on answers	-PPT -Exercises 7/ 8 and Mr. Gebr.	-Study theory and examples -Asking questions/ giving answers -Making exercises
60	-Explanation financial recording and examples -Explanation exercise 9, making cash book, CAB, etc.	-Explaining -Instruction on exercises -Discussion on answers	-PPT -Exercise CB and CAB	-Study theory and examples -Asking questions/ giving answers -Making exercises
30	Break			

Time in minutes	Brief Content	Role trainer /didactical methods	Teaching aids	Role/activities Participants
60	-Explanation financial recording and examples -Explanation exercise 9, making cash book, CAB, etc. continuation	-Explaining -Instruction on exercises -Discussion on answers	-PPT -Exercises CB and CAB	-Study theory and examples -Asking questions/ giving answers -Making exercises
60	-Explanation partial budgeting -Explanation example -Explanation exercise 10	-Explaining -Instruction on example and exercise -Discussion on answers	-PPT -Example -Exercise 10	-Study theory and example -Asking questions/ giving answers -Making exercises
60	Lunch			
60	-Explanation partial budgeting -Explanation example -Explanation exercise 10 continuation	-Explaining -Instruction on example and exercise -Discussion on answers	-PPT -Example -Exercise 10	-Study theory and example -Asking questions/ giving answers -Making exercises
30	Summary on farm economics theory	-Asking/ answering -Reflection on quality of work done	-PPT -Manual -Exercises	-Asking/ answering -Reflection on theory and how exercises went -Importance for farmers
30	-Explanation on farm assignment and assessment -Making groups	-Explaining assignment and assessment -Making groups	-Assignment/ assessment	-Study assignment/ assessment
60	-Groups prepare for assignment and assessment	-Coaching of groups	-Assignment/ assessment	-Groups work and prepare

B Lesson 2: Farm Economics

Handouts: Exercise 6/ Exercise 7/ Exercise Gebreselassie/ Nyoto exercise CB + CAB/ Exercise Partial budgeting/ article profits do not equal cash flow

1. Homework and exercise 6.

-Discussion and summary of what was done on day 1, through asking and answering a brief repetition.

-Student is requested to put the answer of exercise 6 on the WB, followed by discussion and distribution of answer sheet. Give time to reflect.

2. Summarize chapter 7/ 8 on Net Farm Income and M+II/ Cash Flow

Use PPT to explain theory, distribute Article: "Profits do not equal cash flow"

- Work on exercise 7
- Make exercise Farmer Gebreselassie

3. Explanation financial record keeping: Cash Book and Cash Analysis Book.

Use manual to give example of a cash book/ CAB (use one of the students to make a cash book for one week/ example John Pasture).

Give assignment Nyoto:

-CB

-CAB

Explain that from the CAB you can calculate Gross output and Variable costs per enterprise, and then the Gross Margin per enterprise.

4. Partial budgeting

Handouts: exercise Cheru

-Explain background and format partial budgeting.

-Ask students to study chapter 11 and make example.

-Discuss example and answer questions

-Give assignment Cheru and Belay

-Students are requested to work a partial budget for one of their own farms

-Ask one of the students to explain answer Cheru (use white board), same for Belay, same for own farm

5. Closure Farm economics/ lesson summary

-Lessons learned/ reflection on difficulties encountered/ usefulness for farmers/ how to develop farmer course on economics/ how to present to farmers

6. Assignment/ assessment

-Distribute assignment/ assessment, ask students to read/ study. Then go through the assignment/ assessment and allow students to ask questions.

-Make groups of maximum 4 students

-Students to sit in groups and prepare questionnaire for farm visit/ set benchmark standards

Lesson Matrix	
Topic / Serial #	
Practical Lesson	Day 3 Farm Economics
Date	
Venue	
Duration	1 day/ Day 3 of the Course
Type of students	EDGET Extension Workers
Suggested number of students	16
Starting situation	Students have very little or no experience with Farm Economics
Outcomes	The student is able to:

Lesson Matrix	
Skills	-Collect required information to work out GM's of enterprises present on small holder farm -Present and explain small holder farms how their enterprises are performing and advise them on the ideal set up of their farm from an economic point of view -Introduce new set up and economic performance using partial budget method
Knowledge	-Explain farmers how variable costs, gross output, GM and NFI are calculated -Explain farmers the partial budget method -Explain how financial parameters can be benchmarked with results of other farmers/ standards
Attitude	Convince farmers that for commercialization of their small holder farms farm economics is an essential part of farm management

Time in minutes	**Brief Content**	**Role trainer /didactical methods**	**Teaching aids**	**Role/activities Participants**
240	-Travel to target farmers -Groups to observe the farm and its enterprises -Groups to meet with their assigned farmer and collect economic info on their enterprises and verify with their observations -Return to workshop premises	-Guidance and coaching	-Target farms	-Observing -Interviewing -Collection of information
60	Lunch			
240	-Groups work out their observations and information into farm enterprises and their economic performance (VC/ GM/ NFI per enterprise -Groups benchmark results and find weaknesses -Groups work out an advise for their target farm	-Guidance and coaching	Target farms	-Collected observations and information -Benchmarks per identified enterprise

Lesson Matrix	
Topic / Serial #	
Practical Lesson	Day 4 Farm Economics
Date	
Venue	
Duration	1 day/ Day 4 of the Course
Type of students	EDGET Extension Workers
Suggested number of students	16
Starting situation	Students have very little or no experience with Farm Economics
Outcomes	The student is able to:

Lesson Matrix	
Skills	-Collect required information to work out GM's of enterprises present on small holder farm -Present and explain small holder farms how their enterprises are performing and advise them on the ideal set up of their farm from an economic point of view -Introduce new set up and economic performance using partial budget method
Knowledge	-Explain farmers how variable costs, gross output, GM and NFI are calculated -Explain farmers the partial budget method -Explain how financial parameters can be benchmarked with results of other farmers/ standards
Attitude	Convince farmers that for commercialization of their small holder farms farm economics is an essential part of farm management

Time in minutes	**Brief Content**	**Role trainer /didactical methods**	**Teaching aids**	**Role/activities Participants**
120	Students prepare for presentation	-Guidance and coaching	-target farms	-Preparing presentation
60	Break and arrival of farmers			
120	Presentation of economic performance, benchmarks and advises to target farms by groups	-Assessing performance	-Projector/ white board/ flipovers	-Group presentations
60	Lunch (students and farmers)			
60	-Assessment result per group	-Reflection on assignment results and assessment score	-Discussion per group	-Reflection and discussing assessment result
60	-Brainstorm on farmer training -Special focus on gender, whether the male or female members are involved in financial record keeping, have access to income and other farm resources, take decisions with regard to (financial) management of the farm, etc.	-Lead discussion and gives ideas how to train farmers in the topic; -Who are the target group for the training, only men or only women or both -What lesson material to use and at what level to train	-Experiences during the Course -Experiences with the small holder farms in the working area	-Active participation in the brain storm session
60	Evaluation of course	-Explaining evaluation form	-Evaluation form	-Filling evaluation form

C. Questions - Farm Economics

Subject: - Gross Margin

Title: - **Mr. Gebreselassie Dairy Farm**

In 2015 the herd-structure on the farm was as below:

	# Start of year	Born	Sold	Died	# End of year	Value per head
Cows	5		1	1	4	B 1,500
Pregnant heifers	1				2	B 1,800
Heifers	2			1	2	B 1,000
Female calves	3	2			2	B 500
Bull calves	0	3	2	1	0	B 400
Oxen	1				1	B 1,400

- Milk production: 20,000 kg sold to dairy plant for B 1.20
  Each newborn calf is fed with in total 400 kg milk
  The family consumed 500 kg milk
- Animals are sold for the prices as stated in the table above
- Other output: manure sold to gardener for B 1,500. -
  Surplus hay sold to neighbour for B 800. -

The variable costs are:

- Fertilisers for roughage production 2,500 kg at B 1.10
- Herbicides for weed control B 500. -
- Hire of tractor with baler for baling hay B 350. -
- Concentrates used 2,500 kg at B 0.80
- Total veterinarian costs B 800. -
- Total 8 inseminations needed at B 18. -
- Casual labourers B 750. -
- Interest level is 10 %

Exercise:

1. Calculate the Gross Output
2. Calculate the Variable Costs
3. Calculate the Gross Margin for the Dairy Farm.
4. What is the Gross Margin on cash-basis?
5. What kind of fixed costs would you expect on this farm
6. Based on the answer of 5 calculate the NFI

D. Answers - Farm Economics

Subject: - Gross Margin

Title: - **Mr Gebreselassie Dairy Farm**

Herd Value

	Value per head	# Start of year	Value Start of the Year	# End of year	Value End of the year
Cows	B 1,500	5	7,500	4	6,000
Pregnant heifers	B 1,800	1	1,800	2	3,600
Heifers	B 1,000	2	2,000	2	2,000
Female calves	B 500	3	1,500	2	1,000
Bull calves	B 400	0	0	0	0
Oxen	B 1,400	1	1,400	1	1,400
			M 14,200		**M 14,000**

Increase in Herd Value: 14,000 – 14,200 = -/- B 200

Average Herd Value: (14,200 + 14,000) / 2 = B 14,100

Output:

MILK:	Sales	20,000 kg	x	B 1.20	= B 24,000
	Fed to calves	5 x 400 kg	x	B 1.20	= B 2,400
	Home Consumption	500 kg	x	B 1.20	= B 600
				TOTAL	**B 27,000**

ANIMALS:	Sales cow	1	x	B 1,500	= B1,500
	Sales calves	2	x	B 400	= B 800
	TOTAL SALES				**B 2,300**

Growth of Herd	Closing Balance	B 14,000
	Opening Balance	B 14,200
	Increase Herd Value	**/- B 200**

OTHER OUTPUT	Sales of manure	total	B 1,500
	Sales of roughage	total	B 800
		TOTAL	**B 2,300**

GROSS OUTPUTB 31,400

Variable Costs:

PURCHASES:	Fertilizers	2,500 kg	x	B 1.10	= B 2,750
	Herbicides			total	= B 500
	Hire of tractor			total	= B 350
	Concentrates	2,500 kg	x	B 0.80	= B 2,000
	Veterinarian costs			total	= B 800
	Inseminations	8 pcs.	X	B 18	= B 144
	Casual laborers			total	= B 750
				TOTAL	**B 7,294**
INTERNAL DELIVERIES:					
	Milk for calves	5 x 400 kg	x	B 1.20	= **B 2,400**
INTEREST COSTS:					
	Closing Balance			B 14,000	
	Opening Balance			B 14,200	
	Average Herd Value			B 28,200 / 2 =	B 14,100
	Interest rate			10 %	
				Interest Costs	**B 1,410**
TOTAL VARIABLE COSTS:					**B 11,104**

GROSS MARGIN

Gross Output	B 31,400
Variable Costs	B 11,104
Gross Margin	**B 20,296**

E. Excercises day 1 and day 2

Exercise 1 (relates to chapter **Error! Reference source not found.**)

Describe in your own words the following terms:

1. farm input;
2. farm output;
3. farm business;
4. farm enterprise;
5. economic production unit;
6. farm gross output;

7. total costs;
8. fixed costs;
9. variable costs;
10. profit/loss;
11. general overhead costs;
12. Production cycle.

Describe the "gender" situation on the small holder farms in your working area with regard to:

1. Who decides which enterprise should be part of the small holder farm?
2. Who provides the labour for the most common enterprises on small holder farms?
3. Who is controlling the resources (land/ labour/ income/ etc.) on the small holder farm?
4. Who has control over "money/ income" and decides which investments to make/ inputs to buy for the different farm enterprises
5. Who ultimately receives the income from the enterprises and has control over the usage of this income ?

F. Answers for Exercise 1

1. **Farm input:** these are the resources on the farm; they are not the same as expenditures. Input is the measure of how much of a resource (such as labour, fertiliser, tractor hours, etc.) is actually used on the farm in a given period, whether it was paid for in that period or not. Also, in the case of family labour, whether it had an actual charge to it or not makes any difference.

   This means we have input that has to be paid for and other input for which we do not have to pay at all.

2. **Farm output:** output is a measure of production in a given period no matter whether the production was actually sold or not. Therefore stocktaking at the beginning and at the end of the period is necessary, both for input as well as for output.
3. **Farm business:** farming is an economic activity in which we use resources (input) in order to produce valuable products (output); with the intention that the total value of the output exceeds the total value of the input.
4. **Farm enterprises:** the more or less independent sections of which a farm business may be built up, each with its own input and output.
5. **Economic production unit:** A unit that involves human effort and decision making; with the intention to produce output with a total value exceeding the total value of the input.
6. **Farm gross output:** the total value of the farm output during a certain period (in most cases one-year), which is corrected for stock changes.
7. **Total costs:** the total value of all the farm input during a certain period (in most cases one year), which, of course, is corrected for stock changes.

8. **Fixed costs:** these are long-term costs (including overheads) of resources, which last for over a year. They apply to the farm as a whole and do not tend to vary according to the size of an enterprise. They cannot be avoided even if we want to discontinue a certain enterprise. Examples of fixed costs are the annual costs of farm buildings, farm machinery, permanent paid labour, etc.
9. **Variable costs:** these are short-term costs of resources that last for less than one year. They are easy to allocate to individual enterprises and they tend to vary according to the size of an enterprise. They can be stopped if an enterprise is discontinued. Examples of variable costs are the costs of fertilisers, stock feeds, chemicals for weed control, casual labour, etc.
10. **Profit/Loss:** The balance left after the total costs have been deducted from the gross output.
11. **General overhead costs:** these are costs that are normally taken as part of the fixed costs. Overhead costs apply to the whole farm. Examples of overhead costs are the costs of electricity, water supply, telephone, stationary, etc.
12. **Production cycle:** the period in which all input into an enterprise is valued via the output and the production process can start afresh.

The Gender situation on the farm should be discussed with the whole group!!

Exercise 2 FIXED COSTS (relates to chapter 2, including the effect of inflation)

From a motor bike used for transport of milk the following information is available:

- original new price : B 20000
- scrap value : B 4000
- useful life : 10 year
- inflation : 20 %
- interest rate : 25 %
- maintenance : 5 % of present new value
- Fuel : B 600/year

1. Calculate for the **first** year in operation:
   - fixed costs
   - variable costs
   - total costs
2. Next calculate the same costs for the **second** year in operation.

Advice: calculate first the present new value and present scrap value (=second year values = original new price + inflation for 1 year)

Solution exercise 2 FIXED COSTS

From a motor bike used for transport of milk the following information is available:

- original new price : B 20000

- scrap value : B 4000
- useful life : 10 year
- inflation : 20 %
- interest rate : 25 %
- maintenance : 5 % of present new value
- fuel : B 600/year

SOLUTION:

A. Actual values in the second year of operation:

present new price = original new price + 20% inflation

= B 20,000 + B 4,000 = B 24,000

present scrap value = original scrap value + 20% inflation:

= B 4,000 + B 800 = B 4,800

B. Fixed costs:

1. Depreciation = $\frac{24{,}000 - 4{,}800}{10}$ = B 1,920 (year 1: B1,600)

2. Interest = $\frac{24{,}000 + 4{,}800}{2}$ x 25% = B 3,600 (year 1: B 3,000)

3. Maintenance = 5% x B 24,000 = B 1,200 (year 1 : B 1,000)

Total fixed costs: B 1,920 + 3,600 + 1,200 = B 6,720

C. Variable costs:

1. Running costs = B 600 + 20 % = B 720 + (year 1 : B 600) +

Total variable costs: **B 720** **(year 1: B 600)**

D. Total costs = variable + fixed costs

= B 720 + B 6,720

= B 7,440 **(year 1: B 6,200)**

Remark:

Running costs are considered variable costs here as well, as they are allocated to milk transport only. When more machines are available and no separate records for each machine is kept, then running costs are not known for each machine separately and thus considered fixed costs. Interest, depreciation and maintenance remain fixed costs, as they do not vary with the use of the machine.

Interest on sub-variable costs is not included, as milk money is received on a more or less daily basis. For fattening of animals and crop production interest on variable costs is taken into account.

Exercise 3: VARIABLE COSTS, chapter 3

Calculate the total variable costs of the following dairy enterprise:

Herd composition	LU	Value per head	No. per 1-1-….	No. per 31-12-.	Sales
Cows	1.0	1000	20	22	5
Pregnant heifers	0.8	800	7	6	-
Yearling heifers	0.5	500	7	8	1
Female calves	0.2	150	9	11	-
Male calves	0.0	100	1	1	10
Oxen	1.2	600	2	2	-
Total			46	50	16

Variable costs:

1. Feeding:
    - concentrates 2 kg/LU/day, price B 0.60/kg
    - milk for female calves: 300 kg/calf
    - Milk for male calves: 30 kg/calf
    - Milk price B 0.50/kg
2. Fertilizer:
    - 500 kg/ha, total 5 ha, price B 25/bag of 50 kg
3. Other costs:
    - Health care B 75/LU
    - AI B 25/cow and pregnant heifer
    - Others B 20/LU
4. Interest:
    - 10%

Advises for calculations:

- Calculate first the averages for herd value and livestock units
- Calculate the variable costs (feeding, fertilizer, others, interest on the herd value and the total variable costs)

- **Solution exercise 3: VARIABLE COSTS, chapter 3**

A. Averages of the herd:

Herd	LU/ head	Value/ head	No. Per 1-1-….			No. Per 31-12-….		
			No.	Value	LU	No.	Value	LU
Cows	1.0	1000		20	20,000	22	22,000	22.0
P. Heifers	0.8	800			20.0	6	4,800	4.8
Yearling Heifers	0.5	500	7	5,600	5.6	8	4,000	4.0
Female calves	0.2	150	7	3,500	3.5	11	1,650	2.2
Male calves	0.0	100	9	1,350	1.8	1	100	0.0
Oxen	1.2	600	1	100	0.0	2	1,200	2.4
			2	1,200	2.4			_____+
Total:					_____+			____+
					____+		33,750	35.4
					31,750			
					33.3			

* Average herd value: $\frac{31,750+33,750}{2}$ = 32,750

* Average Livestock Units: $\frac{33.3+35.4}{2}$ = 34.35

Variable costs:

1. **Feeding costs**:

   - 2kg conc. x 34.35 LU x 365 d. x B 0.60 = B 15,045.30
   - Milk for female calves: (9+11) : 2 = 10 average

     10 c. x 300 kg x B 0.50 = B 1,500
   - Milk for male calves: (1+1) : 2 = 1 average,

     10 sold+1 av. =11à 11 c. x 30 kg x B 0.50 = B 165 +

     Total feeding costs: **B 16,710.30**

2. Fertilizer costs:

   - 5 Ha. x 500 kg = 2500 kg, 1 bag = 50 kg à 2500:50=50 bags

     Total fertilizer costs: 50 bags x B 25 = **B 1,250**

3. Other costs:

   - Animal health: B 75 x 34.35 LU= B 2,576.25
   - AI: cows: (20+22) : 2=21

     and heifers: (7+6) : 2=6.5

     à(21+6.5) x B 25 = B 687.50
   - Others: B 20 x 34.35 LU= B 687 +

     Total other costs: **B 3,950.75**

4. Interest costs herd value: **B 32,750 x 10%** = **B 3,275**

C. Total Variable costs = B 16,710.30 + B 1,250 + B 3,950.75+ B 3,275 = **B 25,186.05**

Exercise 4

Calculation of the gross output of a dairy herd

Herd composition	..1-1-20	One year later	Value	Sales
Cows	12	14	B 800	2
Pregnant heifers	4	3	B 600	–
Yearling heifers	5	6	B 400	1
Calves: female	7	8	B 100	–
Male	1	2	B 60	4
Oxen	4	4	B 450	–
Total	**33**	**37**		**7**

During the year the farmer bought one heifer at B 600. Prices of the sales are according to the above table. The farm produced in total 25000-l milk of which 1000 l have been used for home consumption and 1500 l for calf feeding.

The price of milk is B 0.43 per l. The farmer slaughtered one cow with the normal value for home consumption.

Questions:

1. Calculate the value of the herd at the beginning and at the end of the year.
2. How much is the increase of the value of the herd during the year?
3. What is the total value of the sale of animals during the year?
4. What is the total value of the animals slaughtered for home consumption during the year?
5. How much is the amount for sales and home consumption of animals taken together?
6. What is the total value of the animals purchased during the year?
7. How much is the total amount of sales + home consumption minus animal purchases?
8. What is the total value of the milk produced?
9. Calculate the gross output of this dairy herd.
10. How much of the gross output is "cash-available" to the farmer?

N.B. - The milk used for calf feeding is included in the gross output.

- The milk and the meat used for home consumption are valued at the commercial price (opportunity costs!).

Answer Exercise 4 (Gross output calculations)

1. Value of the herd at the beginning and end of the year.

Herd composition	Value/animal	1-1-20.. Number	Total value	One year later Number	Total value
Cows	B 800	12	B 9600	14	B 11200
Pregnant heifers	B 600	4	B 2400	3	B 1800
Yearling heifers	B 400	5	B 2000	6	B 2400
Calves: female	B 100	7	B 700	8	B 800
male	B 60	1	B 60	2	B 120
Oxen	B 450	4	B 1800	4	B 1800
Total		**33**	**B 16560**	**37**	**B 18120**

2. Value at the end of the year = B 18120
   Value at the beginning of the year = B 16560 –
   Increase in value = B 1560

3. Value of the sale of animals during the year:

cows	2 x B 800	= B 1600	
yearling heifers	1 x B 400	= B 400	
bull calves	4 x B 60	= B 240	+
Total		B 2240	

4. Value of animals slaughtered for B 800 + home consumption
5. Amount for sales and consumption B 3040
6. Value of animals purchased: B 600 –
7. Sales + home consumption less purchases = B 2440
8. The total value of milk produced 25000 l x B 0.43 = B 10750+
9. Total gross output of the dairy herd = B 14750
10. The share of the gross output which comes as cash-available to the farmer:

Gross output minus:

increase herd value	B 1560	
slaughtering for home consumption	B 800	
milk for home consumption	B 430	
milk for calf feeding	B 645	+
Total deductions	= B 3435	–
The share of the gross output which comes as cash-available to the farmer	B 11315	

OR:

Total value of animal sales	B 2240
Minus animal purchases	B 600 –
	B 1640
Plus milk sold=22500 l x M 0.43 / lt.	B 9657 +
Cash-available to the farmer	B11315

Remember:

Closing value less Opening value	B 1560
+ Sales less Purchases	B 1640
+ Slaughtering for home cons.	B 800
+ Total milk	B 10750 +
Total gross output	B 14750

Exercise 5: GROSS MARGIN, chapter 5

From a dairy enterprise is the following information available:

Herd composition	LU	Value per head	....No. Per 1-1-	.No. Per 31-12-	Sales
Cows	1.0	800	6	6	2
Pregnant heifers	0.8	700	3	3	1
Yearling heifers	0.5	400	3	2	-
Female calves	0.2	200	3	5	-
Total			15	16	3

Information from the farm records is summarized as:

Milk production:

- to dairy factory: 6,500 kg, milk price B 0.80/kg
- to labourers: 350 kg (no payments made)
- to family: 1,100 kg
- to calves: 750 kg

Feeding:

- 25 bags of bran, price B 14/bag
- 10 bags of cotton seed cake, price B 56/bag
- milk to calves, from own farm
- concentrates to calves: 4 bags, price B 65/bag

Fodder production:

- 10 kg seeds, price B 22/kg
- 10 bags fertilizer A, price B 15/bag
- 20 bags fertilizer B, price B 25/bag

Sales of cattle:

- heifer B 700
- culled cows B 500/cow

Others:

- 1 bag minerals, price B 55/bag
- veterinarian costs: B 405
- interest on herd value: 8%
- interest on subtotal of the variable costs: 12%

Questions:

5.1 Calculate the Gross Margin

5.2 Why should interest over buildings not be included?

5.3 Why should interest over the variable cost not be included?

Solutions exercise 5: GROSS MARGIN, chapter 5

5.1 Gross Margin calculation

A. **Averages of the herd:**

Herd	LU/ head	Value/ head	No. Per 1 – 1 - ..... No. Value LU	No. Per 31 – 12 - ..... No. Value LU
Cows	1.0	800	6 4,800	6 4,800
Pregnant Heifers	0.8	700	3 2,100	3 2,100
Yearling Heifers	0.5	400	3 1,200	2 800
Female calves	0.2	200	3 600	5 1,000
			_____+	_____+
Total:			____+	____+
			8,700	8,700

Average herd value: $\frac{8,700 + 8,700}{2}$ = B 8,700

Average Livestock Units: $\frac{\quad + \quad}{2}$ = N.A.

B. **Gross output**

1. Increase in herd value: 8,700-8,700= B 0

2. Milk production:

6500 + 350 + 1100 + 750= 8700 kg x B 0.80 = B 6,960

3. Sales-purchases:

2 cows x B 500 = 1,000

1 pr. heifer x B 700 = 700 +

Sales = 1,700 – purchases (0) = B 1,700 _____+

4. **GROSS OUTPUT= B 8,660**

C. **Variable costs:**

1. Feeding costs:

- 25 bags of bran x B 14/bag= B 350
- 10 bags of c.s.c. x B 56/bag= B 560
- milk to calves: 750kg x B 0.80= B 600
- conc. to calves: 4 bags x B 65/bag= B 260 +

Total feeding costs: B 1,770

2. Fodder production costs:

- 10 kg seeds x B 22/kg= B 220
- 10 bags fertilizer A x B 15/bag= B 150
- 20 bags fertilizer B x B 25/bag= B 500 +

Total fodder costs: B 870

3. Other costs:

- 1 bag minerals x B 55/bag= B 55
- vety costs: B 405= B 405 +

Total other costs: B 460

_____+

4. Subtotal Variable Costs: B 3,100

5. Interest costs:

- on the average herd value: B 8,700 x 8% = M 696
- on the subtotal variable costs: NA +

Total interest costs: B 696

_____+

6. Total Variable costs = B 3,796

D. **GROSS MARGIN:**

Gross margin = gross output - variable costs

B 8,660 – B 3,796 = **B 4,864**

IN SUMMARY FORMAT

GROSS MARGIN DAIRY ENTERPRISE			
Output	B	Variable costs	B
Increase herd value Milk production Sales – purchases	-- 6,960 1,700	Feeding, incl. milk to calves Fodder Other costs Interest on av. Herd value	1,770 870 460 696
Total output	8,660	Total VC	3,796
GM Dairy Enterprise: Output – VC = 8,660 – 3,796 = **B 4,864**			

E. **Other answers:**

5.2 Interest on buildings is part of the fixed cost, Gross Margin = Output – Variable costs

5.3 In dairy farming the money for milk sales is received almost directly, after the expenses are made (feed, medicines, etc.). Interest costs over the variable costs are only included when there is a waiting period between the majority of the variable inputs and the output. Examples are cash crops and fattening bulls.

Exercise 6: GROSS MARGIN ANALYSIS, chapter 6 + FARM INCOME, chapter 7

From a mixed farm the following information is available:

- 4.5 ha of land at an altitude of 1200 m. and an av. Rainfall of 800 mm/year
- Enterprises: 1. Zebu cattle, using 2 ha for fodder prod.
  2. Maize on 1 ha
  3. Potatoes on 0.5 ha
  4. Sheep and goats, using 1 ha for fodder crops
- Herd composition:

	LU	Value per head	No. Per 1-1-.....	No. Per 31-12-.....	Sales
A adult cows	1.0	800	6	7	-
P heifers < 1 year	0.5	400	2	1	1
H female calves	0.3	200	1	1	-
M male calves	0.3	100	2	2	-
Sheep: - adult	0.2	50	5	5	-
- young	0.1	25	2	3	-
Goats: - adult	0.2	50	6	5	-
- young	0.1	25	2	1	-
Total			26	25	1

Data on input and output:

-2000 kg cow milk sold to dairy factory at B 0.65/kg

-All goat milk fed to calves: 500 kg, value B 0.65/kg

-Cow milk used for home consumption 365 kg

-1 heifer was sold and an adult goat slaughtered for home consumption (value table)

-5 bags of potatoes sold at B 60/bag

-12 bags maize sold at B 25/bag

-2 bags of maize fed to the cows

-Veterinary costs for cattle B 200

-Seed potatoes bought for B 150

-Pesticides for potatoes B 25 and fertilizer B 75

-For maize: seed B 50, pesticide B 25 and fertilizers B 100

-Fixed and overhead costs: B 815.69

-Growing period potatoes and maize is 6 months

-Fertilizer and other costs for fodder B 50/ha

-Interest rate is 5% annually

QUESTIONS

6.1 Calculate the gross margin for each enterprise

6.2 Calculate the total farm gross margin

6.3 Rank the enterprises according gross margin/ha

6.4 Calculate the farm income

6.5 What is your advise to the farmer?

6.6 Are more internal deliveries possible then mentioned?

6.7 What is the effect of internal deliveries on the GM's?

Solution exercise 6: Gross Margin analysis, chapter 6 + FARM INCOME, chapter 7

6.1 Gross margins for each enterprise

ZEBU Cattle			
Output	B	Variable costs	B
Milk sales	1,300	Fodder crops	100
Milk for home cons	237.25	2 bags of maize	50
Sold heifer	400	goat milk to calves	325
Increase herd value	400	veterinary costs	200
		I on av. Herd value 6,200 x 5%	310
Total output	2,337.25	Total VC	985
GM ZEBU Cattle: output-VC = 2,337.25 - 985 = 1,352.25			

SHEEP/GOATS			
Output	B	Variable costs	B
Milk to calves	325	fodder crops	50
Home consumption goat	50		
Decrease herd value	-/-50	I on av. Herd value 625 x 5%	31.25
Total output	325	Total VC	81.25
GM Sheep/goats: output-VC = 325 – 81.25 = 243.75			

POTATOES			
Output	B	Variable costs	B
Sold 5 bags	300	Seed potatoes	150
		Pesticides	100+
		Sub VC	250
		I on Sub VC 250/2 x 5% x 1/2 =	3.12
Total output	300	Total VC	253.12
GM Potatoes: output-VC = 300 – 253.12 = 46.88			

MAIZE			
Output	B	Variable costs	B
12 bags sold	300	Seeds	50
2 bags fed to cows	50	Pesticides + fertilizers	125+
		Sub VC	175
		I on Sub VC 175/2 x 5% x 1/2 =	2.19
Total output	350	Total VC	177.19
GM Maize: output-VC = 350 - 177.19 = 172.81			

6.2 Total farm gross margin = 1,352.25 + 243.75 + 46.88 + 172.81

= B 1815.69

6.3 Ranking of enterprises according gross margin/ha

Farm Enterprise	Total GM	No. of Hectares	GM/Ha	Ranking
Zebu cattle	1,352.25	2	676	1
Sheep/goats	243.75	1	244	2
Potatoes	46.88	0.5	94	4
Maize	172.81	1	173	3
Total GM 1,815.69		4.5 .Total Ha	Average GM/Ha = 403	

6.4 Farm income = GM – fixed costs

= B 1,815.69 – B 815.69 = B 1,000

6.5 Advise to the farmer:

An advise should not be based on economics only, several other aspects have to be taken into account, examples:

- Yearly price fluctuations
- Bad luck with an enterprise??
- Fixed costs structure
- Preference farmer and his family
- Soil type and water availability
- Risk involved, and how to limit it

If it does not make much difference to the farmer, it should be advised to enlarge the best enterprise at the cost of the worst one(s). It might be good to stop with potatoes and sheep/goat. Maize is the better cash crop and also provides maize grain and stovers to Zebu cattle.

6.6 Internal deliveries:

a. mentioned:

- maize grain: from maize to Zebu cattle
- goat milk: from sheep/goats to Zebu cattle

b. other internal deliveries possible:

- manure from Zebu cattle and sheep/goat to potatoes and maize
- maize stover from maize to Zebu cattle and sheep/goat
- weedings from potatoes to Zebu cattle and sheep/goat
- draft power from Zebu cattle to other enterprises

c. internal deliveries should not be mentioned when there is no opportunity to sell the delivery. Example: weedings

6.7 Effect of internal deliveries on the GM's:

a. on the enterprise GM's:

* internal delivery = output ---> > GM

* internal delivery = input ---> < GM

b. on the total farm GM: no effect

c. calculating internal deliveries provides a more accurate GM for each enterprise, which is important in comparing the enterprises.

Exercise 7 (relates to chapter 7)

Gross output dairy section		B 7825		
Gross output crop section			B 5125	
Total Farm Gross Output			B ……..	
Variable costs dairy section			B 3550	
(including B 450 interest costs)				
Variable costs crop section		B 2550		
(including B 70 interest costs)				
Total Variable Costs				B ……. –
Total Farm Gross Margin				B …….
Fixed costs:				
- machinery and equipment:	depreciation	B 263		
	interest	B 55		
	maintenance	B 131		
				B ……..
- buildings, fencing and infrastructure	depreciation	B 849		
	interest	B 643		
	maintenance	B 334		
				B ……..
- permanent labour : 1 man for 12 months at B 100/month				B ……..
- family labour				B …….
- tenant's rent			p.m.	
- miscellaneous paid costs:				

water & electricity charges at B 12/month B .....

Total Fixed Costs B .....

Net Farm Income **B.....**

Additional Information:

Opportunity costs family labour: 2 men for 12 months at B 100 per man per month.

Paid Interest: loan of B 17,000 at 7% interest per year

Question: Complete the table and calculate the Net Farm Income and M&I Income

Answer Exercise 7

Gross Output dairy section		B 7825		
Gross Output crop section		B 5125 +		
Total farm gross output				B 12950
Variable costs dairy section		B 3550		
(including B 450 interest costs)				
Variable costs crop section		B 2550 +		
(including B 70 interest costs)				B 6100
Total farm gross margin				**B 6850**
Fixed costs:				
- machinery and equipment:	depreciation	B 263		
	interest		B 55	
	maintenance		B 131 +	
		B 449		
- buildings, fencing and infrastructure:	depreciation		B 849	
	interest		B 643	
	maintenance		B 334 +	
			B 1826	
- permanent labour: 1 man for 12 months at B 100 per month			B 1200	
- family labour:			B 2400	
- tenants rent:			p.m.	
- water & electr. charges at B 12 p. month			B 144 +	

	B 3744	
		B 6019 –
Profit		**B 831**

After certain corrections for cash, the Management + Investment Income (M+I Income) is as follows:

Net Farm Income		B 831
correction for interest:		
Total calculated interest costs	B 1218	
Total paid interest costs		
(loan of B 17,000 at 7% per year)	B 1190 –	
	B 28	
Calculated interest on own capital		p.m.
correction for family labour:		
Family labour income		
2 men for 12 months at B 100 per man per month		
(opportunity cost)		B 2400 +
Subtotal		B 3259
correction for depreciation:		
machinery and equipment	B 263	
buildings	B 849 +	
	B 1112 +	
Management + Investment Income		**B 4371**

Remark.

Even if sometimes a farm is running at a loss (Net Farm Income), the M + I Income can still be positive.

Exercise 8: Cashbook/ Cash Analysis Book Shiferaw Farm (November)

Date	Description	Amount in B	
1	Cash in hand	80.50	
	Bank	550.80	
2	Shiferaw farm sold 2 cows (bank)		2010.-
	Shiferaw farm bought 20 sheep (bank)	2400.-	
3	Coffee yield July-September (bank)		1500.-
6	Milk yield October (bank)		560.-

9	Cattle feed from K.F.A. (bank)		720.-
11	Sheep feed from K.F.A. (bank)	300.-	
13	Pig feed from K.F.A. (bank)		800.-
14	Pig sales to Upland; 3 baconers (bank)	1080.-	
21	Coffee spray	69.-	
23	Sales of bull calf	25.-	
26	Sales of 2 bags beans		70.-
	Bought from market for family		
	3 tin potatoes		18.-
	1 bag maize	24.-	
27	Cash sales of milk (November)	325.-	
28	Clothes for children	75.-	
29	Meeting in Nyeri; lunch W. Rhino	10.-	
30	Wages permanent labour	95.-	
	Oil for water engine (farm)		8.-
	Sales of 200 napier sticks	4.-	
	3 bags of fertiliser from UNION (bank)		150.-
	10 fence poles bought		30.-
	Dipping costs cattle	50.-	
	Private use	80.-	

G. Assignment:

8.1 Prepare, with the information from the above diary, a combined **Bank/Cashbook** for this month.

8.2 Compose a **Cash Analysis Book** for Shiferaw farm.

8.3 Fill in this Cash Analysis Book for the month November.

Answer exercise 8.1 : Prepare a Bank/ Cashbook for Shiferaw Farm

Date	Description	Receipts		Expenditure	
		Cash	Bank	Cash	Bank
1	Cash in hand / Bank	80.50	550.80		
2	Shiferaw farm sold 2 cows		2010.-		
	(bank)				2400.-
3	Shifera farm bought 20 sheep		1500.-		
6	(bank)		560.-		
9	Coffee yield July-September				720.-
11	(bank)				300.-
13	Milk yield October (bank)				800.-
14	Cattle feed from K.F.A. (bank)		1080.-		
21	Sheep feed from K.F.A. (bank)			69.-	
23	Pig feed from K.F.A. (bank)	25.-			
26	Pig sales Upland 3 baconers	70.-			
	(bank)				
	Coffee spray			18.-	
	Sales of bull calf			24.-	
27	Sales of 2 bags beans	325.-			
28	Bought from market for family			75.-	
29	3 tin potatoes			10.-	
30	1 bag maize			95.-	
	Cash sales of milk (November)			8.-	
	Clothes for children	4.-			
	Meeting in Addis; lunch W.				150.-
	Rhino			30.-	
	Wages permanent labour			50.-	
	Oil for water engine (farm)			80.-	
	Sales of 200 Napier sticks				
	3 bags of fertiliser UNION			45.50	1330.80
	(bank)				
	10 fence poles bought				
	Dipping costs cattle				
	Private use				
	BALANCE				
	Total	504.50	5700.80	504.50	5700.80

Answer Assignment 8.2 and 8.3: Design and prepare a Cash Analysis Book for Shiferaw Farm

Receipts

Date	Description	Total		Cattle	Sheep	Pigs	Coffee	Beans	Misc.	Contra Acc.
		Cash	Bank							
1	Balance	80.50	550.80							631.30
2	2 cows sold		2010.-	2010.-						
3	Coffee yield		1500.-				1500.-			
6	Milk yield Oct		560.-	560.-						
14	3 Baconers		1080.-			1080.-				
23	Bull calf	25. -		25.-						
26	2 bags beans	70.-						70.-		
27	cash milk sales	325.-		325.-						
30	200 napier sticks	4.-							4.-	
	Total	504.50	5700.80	2920.-	-.-	1080.-	1500.-	70.-	4.-	631.30

Expenditures

date	Description	Total		Cattle	Sheep	Pigs	Coffee	Fertiliser	Fencing	Labour	Misc.	Private	Contra Acc.
		Cash	Bank										
2	20 sheep		2400.-		2400.-								
9	Cattle feed		720.-	720.-									
11	Sheep feed		300.-		300.-								
13	Pig feed		800.-			800.-							
21	Coffee spray	69.-					69.-						
23	3 tin potatoes	18.-										18.-	
	1 bag maize	24.-										24.-	
28	Clothes child	75.-										75.-	
29	Meeting	10.-									10.-		
30	Wages labour	95.-								95.-			
	Oil engine	8.-									8.-		
	3 bags fert.		150.-					150.-					
	10 Fence	30.-							30.-				
	poles	50.-		50.-									
	Dipping costs	80.-										80.-	
	Private	45.5	1330.80										1376.30
	BALANCE												
	Total	504.5	5700.80	770.-	2700.-	800.-	69.-	150.-	30.-	95.-	18.-	197.-	1376.30

Balance December 1st: 45.50 1330.80

Exercise 9: PARTIAL BUDGETTING

Exercise 9.1: Farmer Kassa

Farmer Kassa is thinking of cutting his maize area by one hectare and substituting it for a hectare of tobacco. He will have to hire more casual labour to cope with the tobacco in the peak reaping and curing period. Further he has to build curing barns.

The following information is available:

- Output maize 36 bags/ha at B 5.20 per bag
- Costs maize/ ha: - 22.5-kg seed at B 0.20/ kg
  - 5 bags fertiliser at B 7.50/ bag
  - fumigant for storage B 3.30
- Expected output tobacco 900 kg/ ha at B 0.50/ kg
- Expected costs/ ha - fertiliser 7 bags at B 10.50/ bag
  - casual labour B 54.00
- Investment in 7 curing barns B 20. - each
- Depreciation rate barns is 20 %, scrap value is 0, interest rate 10 %, no main tenance costs

Question: Prepare a partial budget for Farmer Kassa.

Exercise 9.2: Mr. Ali

Mr. Ali is considering changing from chopping fodder by hand to using an electric fodder chopper.

The following information is available:

- Mr Ali is employing 4 persons at B 475/annum to chop the fodder by hand.
- Investment in the fodder chopper machine requires B 4500.-.
- Annual depreciation is 6 %.
- Annual interest costs are B 190.-.
- operational costs are: - electricity B 10.- per week.
  - maintenance B 7.- per week.
  - one new cutter blade at B 180/ year

Question:
- Prepare a partial budget for Mr. Ali.
- At what labour-price is an electric chopper machine not attractive any more ?
- Are there any other aspects influenced by the introduction of the chopper machine.

Answer exercise 9.1: Farmer Kassa

Headman Kaunda is thinking of cutting his maize by one hectare and substituting it with a hectare of tobacco. He would have to hire more casual labour to cope with the tobacco in the peak reaping and curing period. Further he needs to build curing barns.

The likely financial effect of this proposed substitution is shown in the following table

Partial Budget to estimate the effect of substituting 1 ha tobacco for 1 ha maize			
Losses		*Gains*	
Income Lost:		*New Income:*	
36 bags maize @ B 5.20/bag	187.20	900 kg tobacco @ B 0.50	450.00
New Costs:		*Costs Saved:*	
Fertiliser 7 bags @ B 10.50	73.50	22.5 kg maize seed @ B 0.20	4.50
Specific casual labour	54.00	5 bags of fertiliser @ B 7.50	37.50
Depreciation 7 barns @B 4	28.00	fumigant for storage	3.30
Interest costs barns @ B 1	7.00		
Net Gain:	*145.6*	*Net Loss:*	--
Total	B 495.30	Total	B 495.30

Answer exercise 9.2 : Mr Ali

Mr. Ali is considering changing from chopping fodder by hand to using an electric fodder chopper.

Partial Budget to estimate the effect of introducing machine milking			
Losses		*Gains*	
Income Lost:	–	*New Income:*	–
New Costs:		*Costs Saved:*	
Electricity B10 per week	520.00	Four less labourers	1900.00
Maintenance etc. @ B 7 / week	364.00		
Extra cutting blade	180.00		
Depreciation of machine	270.00		
Paid Interest on loan	190.00		
Net Gain:	*376.00*	*Net Loss:*	--
Total	B 1900.00	Total	B 1900.00

- New costs are B 1524 in total. So At a cost per labourer of B 381 it doesn't make any financial difference whether to chop by hand or machine.
- Quality of chopping ? Better chopped fodder will lead to more feed intake and less wastage ? Etc.

H. Assignment Farm Economics

During the course one assessment will be conducted to measure the competence level of the participants to advise a small holder farm on his/ her economic performance. The assessment will be a group assignment. The group (maximum 4 persons) will have to visit an assigned small holder farm and implement the following tasks:

A. Tuesday afternoon, after working groups have been formed, prepare yourself for the visit to your assigned small holder farm:

- Discuss with your group members the assignment and divide tasks among the members
- Given the enterprises normally present on a small holder farm decide what observations you want to make to have an impression on the technical performance and especially financial performance of each enterprise.
- Through internet and other information sources try to find out financial benchmarks for these enterprises (variable cost level, gross margin level, NFI level, all per acre or ha).
- Prepare a questionnaire for collecting all of the relevant (financial) information you think is necessary for being able to calculate GM and NFI for each enterprise.
- A dairy unit should always be included as one of the enterprises!!

B Wednesday morning, after arrival on the assigned small holder farm:

- Organize brief meeting with the farmer and his/ her family during which the group introduces themselves and explains the exercise and purpose of the visit.
- Requests the farmer and family to show the enterprises present on the farm and their technical performance and try to verify the information through observations.
- Organize interview with the farmer and his/ her family for collection of all relevant information for calculation of GM/ NFI of each enterprise.
- At the end of the interview thanks the farmer and his family for their time and information and invite the farmer to attend the presentation of the results and advice for the next day.

C Wednesday afternoon, after returning to the workshop premises and after lunch:

- Decide which enterprises were present on the farm and select the 4 most important ones.
- Each group member works out the VC/ FC/ GM and NFI of one enterprise per acre or ha and present to all group members and benchmarks results with potential levels.
- The group works out total farm GM/ NFI

- Through benchmarking and performance levels on the farm the group works out the most optimum composition of enterprises on the farm and the financial benefit the farmer can expect. The group introduces and innovation/ new enterprise and demonstrate financial benefit through the use of a partial budget.
- The group works out a brief report on the findings which will be handed over to the Course Trainer/ Coordinator for assessment purposes and to the concerned small holder farm. Reports will be submitted Thursday evening at the latest before 10 PM, preferably earlier.

D Thursday morning:

Each group member prepares for the presentation of his/ her enterprise to all the colleagues and invited farmers. Don't forget to include the benchmarks used in your presentation and where they came from.

The group as a whole prepares for their presentation of their advice for optimization of their concerned small holder farm with regard to the composition of their enterprises, the introduction of an innovation with the corresponding partial budget, and the potential GM/ NFI the farm as a whole could achieve.

After the break, during which the farmers are received, Each group makes their presentation with a duration of maximum half an hour. The sequence of the groups will be determined by the trainer/ assessor.

E Assessment:

-Each group receives a group score for their report.

-Each group member receives an individual score for their individual presentation.

-Assessment results will be discussed with the groups after lunch.

-For the used assessment forms see annex 1 and 2 of this assignment.

Assessment form written report (Group score)

Group members:.....

Subject / Title: .....

Group Score ..... (out of 60, each item can score from 1 to 10 points, 1 = very poor/ 10 = excellent)

	Excellent	Good	Average	Poor	Very poor
1. Introduction - Objective of the report was indicated - Method of work is explained - Content of the report is introduced					
2. Description of the actual situation - Description of the farming system - Description of enterprises					

	Excellent	Good	Average	Poor	Very poor
3. Data collection and analysis of the actual situation - Data collection - Analysis of data - Identification & Relative importance of constraints					
4. Proposal for improvement - Technical description of the proposal - Quality partial budget - Economic impact of the proposal on the overall farm Technical Performance/ GM/ NFI - Organisational aspects of the proposal					
5. Conclusion - Based on the contents of the report - Clear and well formulated					
6. Quality of the Report - Language - Level (for farmer) - Lay out - General impression					

Assessment is passed with a score of minimum 35 points

Assessment form for observation of student during presentation (Individual score)

Name trainer:	
Enterprise presented:	
Observer:	
Date:	
Behaviour criteria; **The participant:**	**Remarks and score by observer (range from 0 (insufficient) to 5 (very good))**
1. Has prepared the correct and required teaching aids	
2. Presentation can be followed by all including farmers	
3. Presentation follows a logical path and is divided in clear steps if required	
4. Links the level of knowledge and skills instructed to the level of the farmers	
5. Can execute the basic skills required for the lesson	
6. Speaks clearly and is pleasant to listen to	
7. Makes contact with the group and keeps this momentum during the lesson	
8. Stimulates interaction with the participants	
9. Provides for feedback during the presentation to check if message comes through	
10. Can describe to which extend outcome was realised	
Further Remarks and final score :	

Minimum score for passing the assessment will be 30.

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