

Practical Manual *of* Farm Management

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Dr. J. M. Dhaka

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FOREWORD

Theory alongwith adequate practice is need of the hour in all technical fields, and agriculture is no exception. The ICAR had visualized this and made recommendations in **Third Deans' Committee** for practical manuals in every course at undergraduate level. A simultaneous provision of funds was also made, which still continue under "Strengthening and Development of Education" grants of the Council. However, the pace of development of the manuals has been slow and the quality concerns are always associated.

The present attempt by Dr. J.M. Dhaka, Associate Professor of Agricultural Economics, to develop a practical manual in the field of Farm Management is worth appreciating. He has meticulously touched every aspect alongwith fundamental rule and real world situation example, simultaneously providing ample exercise for the student. The language is simple and easy to understand. I am sure, this will have a wider use by the teachers and the students of Farm Management.

I congratulate Dr. Dhaka for his endeavor.


(ANIL KUMAR)

PREFACE

Till the recent past Indian farmers used to consider farming as a way of life rather than a business. They used to grow only those crops which were essential to meet the consumption requirements of their families. But now farmers have started considering farming as a business and have started taking those crops and enterprises which have high return potentials. Thus, Indian farming is moving towards commercialization. The success in business depends greatly on the vigorous application of economic principles. When these economic principles are applied in the field of farming, then they are called Farm Management Principles. Use of Farm Management Principles in farming helps the farmers in taking right decisions in right time which in turn help them in achieving their objectives.

The main objective of preparing this manual is to give practical training to the students in the application of Farm Management Principles and other tool/techniques of analysis in the field of farm business under static conditions. Presentation of the material in the manual has been kept simple and easy to understand. The procedure followed is first to illustrate the use of Farm Management Principles/techniques of analysis with the help of examples and then problems have been given which are to be solved by the students using the appropriate technique. It is hoped that the manual will be worthwhile to the students, teachers, bankers, researchers etc.

CONTENTS

1.	To study the "Principle of Diminishing Returns" and to work out the optimum level of input/output	1 – 2
2.	To study the "Cost Principle"	3 – 5
3.	To study the "Principle of least – Cost combination" and to find out the least cost combination of two resources	6 – 7
4.	To study the "Principle of Enterprise Combination" and work out the most profitable combination of two enterprises from the given information	8 – 9
5.	To study the "Principle of Equi-Marginal Returns" (opportunity Cost Principle)	10 – 11
6.	To study the "Principle of Time Comparison",	12 – 16
7.	To study the "Principle of Comparative Advantage"	17 – 17
8.	To find out the depreciation of a thresher by using different methods	18 – 20
9.	To prepare a farm budget	21 – 23
10.	To study the valuation of different farm assets	24 – 26
11.	To study the farm records and accounts	27 – 37
12.	To prepare the farm inventory	38 – 40
13.	To prepare the "Net Worth Statement" and work out the different financial test ratios	41 – 44
14.	To prepare the "Profit and Loss Statement"	45 – 47
15.	To prepare the "Cash Flow Statement"	48 – 49
16.	To work out the "Production Efficiency"	50 – 50
17.	To compute the Cropping Intensity of a farm from the given information	51 – 52
18.	To compute the Crop Yield Index	53 – 54
19.	To work out the Livestock Production Index	55 – 56
20.	To Compute the Total Production Index of a farm	57 – 58
21.	To compute the various Income Measures from the given information	59 – 61
22.	To prepare the "Farm Layout" and Determine the cost of fencing	62 – 67
23.	To study the different cost concepts and work out the cost of cultivation/cost of production	68 – 72
24.	Study of economic analysis of different crops and livestock enterprises	73 – 77
25.	To estimate the Break-even-Point from the given information	78 – 81

INDEX

Exercise No.	Title of Exercise	Page No.	Date	Signature
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				

EXERCISE 1

OBJECTIVE: To study the 'Principle of Diminishing Returns' and to work out the most profitable level of input/output.

THE PRINCIPLE:

The principle of Diminishing Returns is used under the conditions where resources are available in unlimited quantities (practically more than required quantities). The principle states that "each added quantity of a variable resource applied to a fixed resource adds less and less to the yield or output, the amount added to total output by each successive unit of a variable resource diminishes".

DECISION RULES:

Add variable resource to fixed resource as long as the added return is greater than the added cost. The optimum level is achieved at the point where added return and added cost are equal.

OPTIMUM CONDITION:

Added Return \geq Added Cost

Symbolically it can be expressed as :

$$\frac{\Delta Y}{\Delta X} \geq \frac{P_X}{P_Y}$$

$$\text{OR } \Delta Y P_Y \geq \Delta X P_X$$

Where :

$\frac{\Delta Y}{\Delta X}$ - Marginal Physical Product

ΔY - Change in the quantity of output

ΔX - Change in the quantity of input

$\frac{P_X}{P_Y}$ - Price - ratio

P_X - Price of input X

P_Y - Price of output Y

EXAMPLE 1

An experiment was conducted on the college farm to study the effect of nitrogen on wheat yield. The response data obtained from the experiment are given below :

Quantity of Nitrogen applied (Kgs./ha) (X)	Wheat yield (Qtls./ha) (Y)	Added yield (ΔY)	Added Nitrogen (ΔX)	Added return (Rs.) ($\Delta Y.P_Y$)	Added Cost (Rs.) ($\Delta X.P_X$)
1	2	3	4	5	6
0	22.00	—	—	—	—
20	25.00	3.00	20	2100	140
40	27.75	2.75	20	1925	140
60	30.25	2.50	20	1750	140
80	32.50	2.25	20	1575	140
100	34.50	2.00	20	1400	140
120	35.25	0.75	20	525	140
140	35.40	0.15	20	105	140
160	35.20	(-)0.20	20	(-)140	140
180	34.80	(-)0.40	20	(-)280	140

Find out the quantity of nitrogen which should be applied to maximize the profit and also find out the optimum level of wheat.

Given : Price of wheat Rs. 700/Qtl.

Price of Nitrogen Rs. 7.00/Kg.

Result :

The optimum quantity of nitrogen is 120 Kgs.

The optimum quantity of wheat yield is 35.25 Qtls.

Problem 1

Find out the most profitable level of nitrogenous fertilizer from the following information:

Quantity of fertilizer applied (Kgs./ha) (X)	Total production of wheat (Qtls./ha) (Y)	Added quantity of wheat (ΔY)	Added quantity of fertilizer (ΔX)	Added return (Rs.) ($\Delta Y.P_Y$)	Added Cost (Rs.) ($\Delta X.P_X$)
1	2	3	4	5	6
0	25.00				
25	27.00				
50	28.50				
75	29.50				
100	30.00				
125	30.20				
150	30.30				
175	28.00				

Given : Price of wheat (P_Y) Rs. 800/Qtl.

Price of Nitrogenous fertilizer (P_X) = Rs. 5.0 Kg.

EXERCISE 2

OBJECTIVE: To study the 'Cost Principle'

There are two categories of costs viz., fixed costs and variable costs.

- (a) **Fixed costs:** Fixed costs are those costs which do not change with the level of production land revenue, maintenance cost of farm work animals, taxes, rent, electricity metre charges, insurance premium, time depreciation and wages of permanent labour are the examples of fixed costs.
- (b) **Variable costs:** Variable costs are those costs which vary with the level of production. These costs do not incur if nothing is produced. Their amount depends on the scale of production. These costs are function of output in the production period. Cost of seed, fuel charges, wages of casual labour, repair charges, cost of fertilizers, insecticides, feeds etc. are the examples of variable costs.

THE PRINCIPLE:

- (i) *In short run*, to carry on the business, gross return should at least be greater than the variable cost.
- (ii) *In long run*, to carry on the business, gross return should be greater than the total cost (i.e. fixed and the variable costs).

DECISION RULES :

Increase production as long as the added return is greater than the added cost. The point where the added return is equal to the added cost will minimize the loss or maximize the net return, depending on the cost and return situation.

Added return \geq Added cost

EXAMPLE 2 (I)

An illustration of profit maximization and loss minimization on a one hectare "Chaudhary Krishi Farm" Jorpura in Jaipur District (2006-07)

Particulars	Costs and returns (Rs.)		
	Without application of fertilizer (Rs.)	Application of 50 kgs fertilizer per hectare (Budgeted)	Application of 100 kgs fertilizer per hectare (Budgeted)
1	2	3	4
Fixed Costs :			
(i) Land revenue	60.00	60.00	60.00
(ii) Depreciation of Buildings & Equipments	240.00	240.00	240.00
(iii) Interest on capital investment	150.00	150.00	150.00
(iv) Other fixed costs	2250.00	2250	2250.00
Total fixed costs	2700.00	2700.00	2700.00
Variables Costs			
(i) Seeds	750.00	750.00	750.00
(ii) Irrigation	450.00	450.00	450.00
(iii) Hired Labour	450.00	600.00	720.00
(iv) Insecticides	150.00	300.00	345.00
(v) Fertilizers	—	262.00	525.00
(vi) Others	150.00	300.00	375.00
Total variable costs	1950.00	2662.00	3165.00
Total costs	4650.00	5362.00	5865.00
Gross return	9150.00	10087.00	10425.00
Net return	4500.00	4725.00	4560.00
Added costs	—	712.00	503.00
Added return	—	937.00	338.00

RESULT:

It is clear from column no. 2 of the above table that in 2006-07 the gross return on the farm was Rs. 9150.00 against a total cost of Rs. 4650.00 yielding a net return of Rs. 4500.00. On addition of 50 kgs of fertilizer, gross return increases by Rs. 937.00 against an additional cost of Rs. 712.00 giving an additional profit of Rs. 225.00. Hence, application of 50 kgs fertilizer is profitable. The application of 100 kgs fertilizer indicates that the added return (Rs. 338.00) is less than the added cost (Rs. 503.00). Therefore, it is advisable for the farmer to use only 50 kgs of fertilizer per hectare. If he uses 100 kgs of fertilizer per hectare his profit will decrease by Rs. 165.00.

Now suppose the prices of farm products reduced to half during the year 2006-07, then gross return would be only Rs. 4575.00. If costs remain the same at Rs. 4650.00, then total costs would be greater than gross return by Rs. 75.00 (i.e. a loss of Rs. 75.00). It would still be profitable (loss minimization) for the farmer to continue to operate the farm because gross return is greater than the total variable cost. If he does not operate the farm then he would incur a net loss of Rs. 2700.00 (equal to the fixed cost) instead of Rs. 75.00. Application of any other quantity of fertilizer would increase the loss. Hence, under the situation of loss, the objective of the farmer should be to minimize the loss.

EXAMPLE 2 (II)

Mr. Ram Pratap, a farmer of Bhojpura, has sown one hectare of wheat crop. He has already invested Rs. 4000.00 on account of cost of seed, fertilizer, labour, irrigation and machine use which cannot be withdrawn at this stage. Now only harvesting and threshing operations remain to be done which would cost Rs. 2000.00. The expected gross return from the crop is Rs. 10000.00. Assuming that there is a hailstorm and crop is damaged badly reducing the expected income to only Rs. 4800.00. In such a situation what would be the decision of the farmer? Whether he should harvest the crop or not and why?

SOLUTION:

In this situation, the farmer should consider only the additional cost of harvesting and threshing. Since, the expected returns (Rs. 4800) are more than the additional cost (Rs. 2000.00) of harvesting and threshing, it will be economical to harvest the crop though total return per hectare is less than total cost. In this case, the farmer should spend Rs. 2000.00 to gain Rs. 4800.00 and minimize his loss by Rs. 2800.00. If he does not harvest the crop, then loss would be equal to Rs. 4000.00 (the cost already incurred). Hence, the farmer should harvest the crop to minimize the loss.

Problem 2

The following data were obtained from a Krishi Farm near Jobner town for the year 2005-06

Particulars	Costs and returns (Rs.)		
	Without application of fertilizer (Rs.)	Application of 50 kgs fertilizer per hectare	Application of 100 kgs fertilizer per hectare
1	2	3	4
Fixed Costs :			
(i) Land revenue	80.00	80.00	80.00
(ii) Depreciation of Equipments	200.00	200.00	200.00
(iii) Interest on capital	160.00	160.00	160.00
(iv) Maintenance of livestock	3000.00	3000.00	3000.00
Total fixed costs	3440.00	3440.00	3440.00
Variables Costs			
(i) Seeds	800.00	800.00	800.00
(ii) Irrigation charges	400.00	400.00	400.00
(iii) Hired Labour	400.00	600.00	760.00
(iv) Fertilizers	-----	400.00	800.00
(v) Insecticides	100.00	200.00	260.00
(vi) Miscellaneous	100.00	200.00	260.00
Total variables costs	1800.00	2600.00	3280.00
Total costs	5240.00	6040.00	6720.00
Gross return	9720.00	11160.00	11600.00
Net return	-----	-----	-----
Added costs	-----	-----	-----
Added return	-----	-----	-----

Find out the quantity of fertilizer per hectare which the farmer should apply to maximize his profit.

EXERCISE 3

OBJECTIVE : To study the Principle of Least Cost Combination (Principle of Factor Substitution) and to find out the least cost combination of two resources.

Procedure for working out the least cost combination :

Step 1 : Compute the substitution ratio (MRS)

$$MRS = \frac{\text{Change in the quantity of replaced resource}}{\text{Change in the quantity of added resource}}$$

$$MRS = \frac{\Delta X_1}{\Delta X_2}$$

Step 2 : Compute the price-ratio (PR)

$$PR = \frac{\text{Price of added resource}}{\text{Price of replaced resource}}$$

$$PR = \frac{P_{X_2}}{P_{X_1}}$$

Step 3 : Compare the MRS and the PR and find out the point where the two ratios are equal :

$$\frac{\Delta X_1}{\Delta X_2} \geq \frac{P_{X_2}}{P_{X_1}}$$

This will give the least cost /optimum combination of two resources.

DECISION RULES :

(i) If $\frac{\Delta X_1}{\Delta X_2} > \frac{P_{X_2}}{P_{X_1}}$ cost can be reduced by using more of X_2 (added resource) and less of X_1 .

(ii) If $\frac{\Delta X_1}{\Delta X_2} < \frac{P_{X_2}}{P_{X_1}}$ cost can be reduced by using more of X_1 (replaced resource) and less of X_2 .

(iii) If $\frac{\Delta X_1}{\Delta X_2} = \frac{P_{X_2}}{P_{X_1}}$ it is the point of least cost combination.

EXAMPLE 3

Based on an experiment conducted at Agronomy Farm, it was found that to produce 36 quintals of wheat per hectare, any one of the following combinations of nitrogen and phosphorus can be used.

Phosphorus (Kgs/ha) (X_1)	Nitrogen (Kgs/ha) (X_2)	Change in the quantity of phosphorus (ΔX_1)	Change in the quantity of nitrogen (ΔX_2)	MRS ($\Delta X_1/\Delta X_2$)	Price Ratio (P_{X_2}/P_{X_1})
1	2	3	4	5	6
45	10	—	—	—	—
35	30	10	20	0.50	0.44
26	50	9	20	0.45	0.44
20	70	6	20	0.30	0.44
16	90	4	20	0.20	0.44
13	110	3	20	0.15	0.44
11	130	2	20	0.10	0.44

GIVEN :

Price of Nitrogen = Rs. 7 / Kg.

Price of Phosphorus = Rs. 16 /Kg.

Find out the least cost combination of nitrogen and phosphorus.

RESULT :

The least cost (optimum) combination of nitrogen and phosphorus is 50 kgs and 26 kgs, respectively.

Problem 3

Find out the least -cost combination of green fodder and wheat bhusa for a two year old calf from the following information :

Combinations of Fodders		Change in the quantity of green fodder (ΔX_1)	Change in the quantity of wheat bhusa (ΔX_2)	MRS ($\Delta X_1/\Delta X_2$)	Price Ratio (P_{X_2}/P_{X_1})
Green fodder (Kgs) (X_1)	Wheat Bhusa (Kgs) (X_2)				
1	2	3	4	5	6
21	0				
15	1				
10	2				
6	3				
3	4				
1	5				
0	6				

GIVEN :

Price of green fodder (P_{X_1}) = Rs. 100/Qtl.

Price of wheat bhusa (P_{X_2}) = Rs. 200 /Qtl.

EXERCISE 4

OBJECTIVE : To study the Principle of Enterprise Combination and work out the most profitable (optimum) combination of two enterprises from the given information

PROCEDURE for computing the optimum combination of two enterprises :

Step 1 : Compute the substitution ratio (MRS)

$$\text{MRS} = \frac{\text{Change in the quantity of replaced enterprise}}{\text{Change in the quantity of added enterprise}}$$

$$\text{MRS} = \frac{\Delta Y_1}{\Delta Y_2}$$

Step 2 : Compute the price-ratio (PR)

$$\text{PR} = \frac{\text{Price of added enterprise}}{\text{Price of replaced enterprise}}$$

$$\text{PR} = \frac{P_{Y_2}}{P_{Y_1}}$$

Step 3 : Compare the MRS and PR and find out the point where the two ratios are equal

$$\frac{\Delta Y_1}{\Delta Y_2} \leq \frac{P_{Y_2}}{P_{Y_1}}$$

This will give the optimum combination of two enterprises.

DECISION RULES :

- (i) If $\frac{\Delta Y_1}{\Delta Y_2} > \frac{P_{Y_2}}{P_{Y_1}}$ Profit can be increased by using more of Y_1 (replaced enterprises) and less of Y_2 .
- (ii) If $\frac{\Delta Y_1}{\Delta Y_2} < \frac{P_{Y_2}}{P_{Y_1}}$ Profit can be increased by using more of Y_2 (added enterprise) and less of Y_1 .
- (iii) If $\frac{\Delta Y_1}{\Delta Y_2} = \frac{P_{Y_2}}{P_{Y_1}}$ it is the point of most profitable combination.

EXAMPLE 4

Find out the optimum (most profitable) Combination of barley and wheat crops for 100 kgs of Urea :

Quantity of Urea (kgs.)		Production (Qtls.)		Change in quantity of barley (ΔY_1)	Change in quantity of wheat (ΔY_2)	MRS ($\frac{\Delta Y_1}{\Delta Y_2}$)	Price ratio ($\frac{P_{Y_2}}{P_{Y_1}}$)
Barley	Wheat	Barley (Y_1)	Wheat (Y_2)				
1	2	3	4	5	6	7	8
100	0	27.0	20.0	—	—	—	—
80	20	26.60	22.0	0.40	2.0	0.20	1.50
60	40	26.10	23.50	0.50	1.50	0.33	1.50
40	60	25.50	24.50	0.60	1.0	0.60	1.50
20	80	23.50	25.0	2.0	0.50	4.0	1.50
0	100	21.0	25.40	2.50	0.40	6.25	1.50

GIVEN :

Price of wheat = Rs. 900/Qtl.

Price of barley = Rs. 600/Qtl.

Decision rule : $MRS \leq PR$

RESULT :

The optimum combination of barley and wheat crops is 25.50 Qtl. and 24.50 Qtls, respectively.

Problem 4

Determine the optimum combination of paddy and cotton crops from the following information assuming that the cost of production of both the crops is the same.

Production possibilities (Qtls.)		Change in the quantity of paddy (ΔY_1)	Change in the quantity of cotton (ΔY_2)	MRS ($\frac{\Delta Y_1}{\Delta Y_2}$)	Price ratio ($\frac{P_{Y_2}}{P_{Y_1}}$)
Paddy (Y_1)	Cotton (Y_2)				
1	2	3	4	5	6
65	0				
52	6				
39	11				
26	15				
13	18.50				
0	21.50				

GIVEN :

Price of paddy = Rs. 600/Qtl.

Price of cotton = Rs. 1800/Qtl.

EXERCISE 5

OBJECTIVE : To study the Principle of Equi-marginal Returns (Opportunity Cost Principle)

STATEMENT OF THE PRINCIPLE :

The principle of equi-marginal returns is used under the conditions where resources are available in limited quantities.

The principle states that returns from the limited resources will be maximized if each unit of the limited resource is used where it will add the most to returns.

EXAMPLE 5

A farmer has Rs. 8000/- with him and wants to allocate (use) this amount among three alternatives viz., barley, mustard and wheat. His problem is: What amount of capital (money) he should use in each enterprise to get the maximum profit? The marginal returns from each unit of Rs. 1000/- on investment in different crop enterprises is given below:

Amount of money invested (Rs.)		Marginal returns from each unit of Rs. 1000/-		
Marginal	Total	Barley	Mustard	Wheat
1000	1000	1600	1500	1300
1000	2000	1300	1450	1250
1000	3000	1250	1400	1200
1000	4000	1200	1200	1075
1000	5000	1150	1100	1050
1000	6000	1100	1050	900
1000	7000	1000	950	850
1000	8000	900	900	750
Total returns from Rs. 8000/-		9500.00	9550.00	8375.00
Net returns		1500.00	1550.00	375.00
Average return per rupee invested		1.187	1.194	1.047

Average return will be highest if the whole amount is invested in mustard crop with gross return of Rs. 9550 and net profit Rs. 1550.

Marginal returns will, however, dictate spending of this amount as under:

Unit	Enterprises	Added returns (Rs.)
I	Barley	1600
II	Mustard	1500
III	Mustard	1450
IV	Mustard	1400
V	Barley	1300
VI	Wheat	1300
VII	Wheat	1250
VIII	Barley	1250

Total returns	=	Rs. 11050.00
Net returns (Profit)	=	Rs. 3950.00
Thus, the farmer should use his limited capital as follows:		
Barley	Rs.	3000.00
Mustard	Rs.	3000.00
Wheat	Rs.	2000.00

Total	Rs.	8000.00
-------	-----	---------

Any other use of this amount will reduce the profit.

Thus, the profit will be maximum when each unit of limited resource is used where it gives maximum return.

Problem 5

Following data were obtained from Bajrang Krishi Farm Pratap Nagar.

Quantity of nitrogen applied (Kgs./ha)	Yield per hectare (Qtls.)			Added quantity of			Added return from		
	Barley (Y ₁)	Wheat Mexican (Y ₂)	Wheat Desi (Y ₃)	Barley (ΔY ₁)	Wheat Mexican (ΔY ₂)	Wheat Desi (ΔY ₃)	Barley (ΔY ₁ .Py ₁)	Wheat Mexican (ΔY ₂ .Py ₂)	Wheat Desi (ΔY ₃ .Py ₃)
1	2	3	4	5	6	7	8	9	10
0	23.00	25.0	21.0						
20	27.00	30.0	23.50						
40	30.00	33.0	25.50						
60	32.50	35.0	27.20						
80	34.50	36.50	28.60						
100	35.50	37.70	29.0						
120	36.00	38.60	28.50						
140	36.20	38.0	28.0						
160	36.00	37.50	27.0						
180	35.50	36.0	26.50						
200	35.00	33.0	25.0						

GIVEN:

Price of Barley = Rs. 600 /Qtl.

Price of Wheat Mexican = Rs. 900/Qtl.

Price of Wheat Desi = Rs. 1000 /Qtl.

The Farm Manager has only 200 Kgs of nitrogen available with him :

Find out :

- Optimum quantity of nitrogen for Barley
 - Optimum quantity of nitrogen for Wheat Mexican
 - Optimum quantity of nitrogen for Wheat Desi
- Name the Farm Management Principle you have used to solve the above problem.

EXERCISE 6

OBJECTIVE : To study the Principle of Time Comparison.

Time horizon involves two aspects viz. differences in profitability over time and differences in desirability of investment which relate to risk and uncertainty. The principle of time comparison deals with decision overtime. The problems relating to time can be answered satisfactorily if we have sufficient and reliable information about:

- (i) Future income or cost of the project
- (ii) Operator's capital position

In order to solve the problems relating to time, we need to calculate the present value of the future income or cost. The process of finding out the present value of future income or cost is known as discounting, whereas, the process of finding out the future value of present income or cost is called compounding. The formula for computing the present value is:

$$PV = \frac{Q}{(1+r)^n}$$

Where :

- PV – Present value of the future income or cost
- Q – Future income or cost
- r – Discounting rate or interest rate per rupee per annum
- n – Number of Years

Generally, the rate of discounting depends on the availability of capital with the farmers. For farmers who have sufficient capital, the rate of discounting will be lower than that for those who have limited capital. This is because the farmers owning the requisite capital have a wide range of investment or saving opportunities. However, for farmers who have less than the requisite capital such opportunities are limited.

EXAMPLE 6 (I)

A farmer wants to purchase one power thresher. He can either purchase a new thresher for Rs. 50,000 with an estimated life of 10 years or purchase an old thresher for Rs. 35,000 and replace it after five years with another old thresher worth Rs. 35,000 which will also provide service for five years.

Suggest him the appropriate course of action.

GIVEN:

- (i) If the farmer has unlimited (requisite) capital – only opportunity of lending the money at an annual interest rate of 10 %.
- (ii) If the farmer has limited capital – has opportunity of investing money in dairy and may make return of 25 % within the year.
- (iii) The quality of service rendered, salvage value and annual expenses on repairs and maintenance etc. are same in case of both the options.

SOLUTION:

(a) Farmer with unlimited capital:

Alternative 1: (i) Present cost of new thresher = Rs. 50,000

Alternative 2: (i) Present cost of first old thresher = Rs. 35,000

(ii) Present cost of second old thresher at an interest rate of 10 % will be :

$$\begin{aligned} PV &= \frac{35,000}{(1+0.10)^5} \\ &= \frac{35,000}{(1.1)^5} = \frac{35,000}{1.61} \\ &= \text{Rs. } 21739.13/- \end{aligned}$$

Total present cost of two old threshers = Rs. 35,000 + Rs. 21739.13
= Rs. 56739.13

RESULT: In this case the farmer should purchase a new thresher because the cost of purchasing a new thresher is less than the total present cost of two old threshers.

(b) Farmer with limited capital:

He has the opportunity to invest money in dairy enterprise where he can earn 25% returns every year. Here discounting rate will be the opportunity cost of not using this money in dairy.

Alternative 1: (i) Present cost of new thresher = Rs. 50,000/-

Alternative 2: (i) Present cost of first old thresher = Rs. 35,000/-

(ii) Present cost of second old thresher:

$$\begin{aligned} PV &= \frac{35,000}{(1+0.25)^5} = \frac{35,000}{(1.25)^5} = \frac{35,000}{3.05} \\ &= \text{Rs. } 11475.41/- \end{aligned}$$

Total present cost of two old threshers = Rs. 35,000 + Rs. 11475.41
= Rs. 46475.41/-

RESULT: In this case it is economical to purchase two old threshers instead of one new thresher because total present cost of two old threshers is less than the present cost of one new thresher.

EXAMPLE 6 (II)

Mr. Ram Lal, a farmer of Ratan Nagar wants to purchase a tractor. There are two alternatives before Mr. Ram Lal :

- (i) Purchase a new tractor worth Rs. 2,60,000 which will provide service for 10 Years.
- (ii) Purchase an old tractor for Rs. 1,50,000 which will provide service for 5 Years. He will replace it after 5 years with another old tractor worth Rs. 1,50,000 which will also provide service for 5 years.

GIVEN : Rate of interest 10%

The quality of service rendered, junk value and annual expenses on repairs and maintenance etc. are same for both the tractors.

Find out which tractor Mr. Ram Lal should purchase and why ?

SOLUTION :

1. Present cost of new tractor = Rs. 2,60,000
2. (a) Present cost of first old tractor = Rs. 1, 50, 000

(b) Present cost of second old tractor

$$PV = \frac{1,50,000}{(1+0.10)^5} = \frac{1,50,000}{(1.1)^5} = \frac{1,50,000}{1.61}$$

$$= \text{Rs. } 93167.70/$$

Total present value (PV) of two old tractors = 1,50,000 + 93,167.70 = Rs. 2,43,167.70.

RESULT : Mr. Ram Lal should purchase two old tractors rather than one new tractor because total present cost of two old tractors (Rs. 2,43,167.70) is less than the present cost of one new tractor (Rs 2,60,000).

EXAMPLE 6 (III)

The principle of time comparison is also applied to analyse the profitability of fruit cultivation. The following hypothetical data pertaining to costs and returns from fruit cultivation were obtained. Analyse the data and interpret whether the establishment of an orchard was economical or not.

Cost and Returns From Fruit Cultivation

Years	Costs	Returns	Net Returns	Net present value at	
				10% discount rate	12% discount rate
0	530	—	— 530	— 530	— 530
1	722	—	— 722	— 656.38	— 644.48
2	876	—	— 876	— 723.92	— 698.34
3	880	—	— 880	— 661.14	— 626.38
4	880	1348	468	319.64	297.42
5	900	1874	974	604.76	552.64
6	1122	3900	2778	1568.18	1407.34
7	1194	4534	3340	1714.08	1510.68
8	1236	4310	3074	1434.02	1241.58
9	1114	5016	3902	1654.84	1407.06
10	1130	4642	3512	1353.88	1130.86
11	994	3076	2082	729.74	598.58
12	1210	4086	2876	916.30	738.26
13	990	3074	2084	603.73	477.46
14	990	5058	4068	1071.10	832.32
15	862	4328	3466	829.76	633.24
16	868	5872	5004	1088.88	816.16
Total net present value	—	—	—	11317.47	9144.40

The net present values were computed at 10% and 12% discount rates. Here, it may be noted that instead of applying discounting procedure separately to costs and returns and then computing the difference between returns and costs, the net returns (Returns – costs) were calculated for each year. The net returns were then discounted to find out the net present value.

RESULT: The data in the example show that the net present value, keeping in view the life span of the orchard, was Rs 11317.47 at 10 percent discount rate and when 12 percent discount rate was used, the net present value from orchard was Rs 9144.40. Thus, the establishment of orchard was profitable.

Problem 6.1

After doing his graduation Mr. Sohan Singh decided to establish a dairy farm. He consulted the subject specialist who suggested him two alternative plans for a period of three years duration. The income estimates for the end of each year are given below:

Year	(Income in Rupees)	
	First Plan	Second Plan
First Year	50,000	60,000
Second Year	50,000	50,000
Third Year	50,000	40,000
Total	1,50,000	1,50,000

At the end of third year both the plans gave the same total income i.e. Rs. 1,50,000. Mr. Singh could not decide which plan to adopt. As a Farm Management specialist which plan will be recommended by you and why?

Given: Rate of interest 10% per annum

Hint: Discounting is to be done

Problem 6.2

A farmer of Naga ki Dhani, Jobner wants to start a small dairy business. He has an amount of Rs. 35,000 with him for this purpose. There are two alternatives for him:

1. To purchase two cows in milking stage which will yield him an income of Rs. 15,000.00 at the end of one year.
2. To purchase five heifers which will yield him an income of Rs. 20,000 at the end of two years.

Given: rate of interest = 10%

Which one of the two alternatives he should adopt and why?

EXERCISE 7

OBJECTIVE: To study the Principle of Comparative Advantage.

STATEMENT:

The law of comparative advantage states that if producers want the greatest profit then they should produce only those commodities in which their relative or percentage returns are greatest. The arithmetic or absolute advantage should not be the criterion.

EXAMPLE 7

The following information was obtained from two regions of Rajasthan State in respect of maize and bajra crops.

Particulars	Udaipur region		Jaipur region	
	Maize	Bajra	Maize	Bajra
Gross return /ha (Rs.)	6000	4544	5120	3600
Total Cost/ha (Rs.)	4800	3712	4160	2736
Net return (Rs.)	1200	832	960	864
Percentage return	125%	122.41%	123.08%	131.58%

From the above information suggest which crop should be grown in which region and why?

RESULT : Maize crop should be grown in Udaipur region and bajra crop should be grown in Jaipur region. Since, Udaipur region has comparative advantage in maize production, so this region should produce only maize. Similarly, Jaipur region has comparative advantage in bajra production, so this region should produce only bajra.

Problem 7

The following data were obtained from two areas of the State in respect of wheat and mustard crops.

Particulars	Bharatpur region		Sriganganagar region	
	Wheat	Mustard	Wheat	Mustard
Gross return /ha (Rs.)	10000	11500	12000	13500
Total Cost/ha (Rs.)	6500	8000	9000	9000
Net return (Rs.)	---	---	---	---
Percentage return	---	---	---	---

From the above information suggest, which crop should be grown in which region and why?

EXERCISE 8

OBJECTIVE : To find out the depreciation of a thresher by using different methods

EXAMPLE 8

Mr. Ram Lal, a farmer of Bhojpura village purchased a thresher on 14th March, 2004 worth Rs. 20,000. The useful life of the thresher is 5 years and its expected junk value is Rs. 2000. Calculate the depreciation of the thresher in different years of its useful life by :

- (i) Straight line method
- (ii) Sum of the years–digit method (Reducing fraction method) and
- (iii) Diminishing balance method

SOLUTION :

- (i) Straight line method

Formula :

$$\text{Annual Depreciation} = \frac{\text{Purchase price} - \text{Junk value}}{\text{Useful life of the asset in year}}$$

$$Da = \frac{20,000 - 2,000}{5} = \frac{18,000}{5}$$

Annual Depreciation = Rs. 3600.00

Where Da – Depreciation for the particular year 'a'.

Since, this method provides constant rate of depreciation, hence, depreciation will remain same for all the years of useful life of the thresher (Rs. 3600.00 per year).

- (ii) Sum of the years – digit method

Formula :

$$Da = \frac{2W(n-a+1)}{n(n+1)}$$

Where :

- Da – depreciation for a particular year
- a – the year for which depreciation is to be computed
- w – depreciable balance
- n – number of years of useful life

Depreciable balance (w) = Purchase price – Junk value

$$D_1 = \frac{2 \times 18000(5-1+1)}{5(5+1)} = \frac{36000 \times 5}{5 \times 6} = \text{Rs. } 6000.00$$

$$D_2 = \frac{2 \times 18000(5-2+1)}{5(5+1)} = \frac{36000 \times 4}{5 \times 6} = \frac{144000}{30} = \text{Rs. } 4800.00$$

$$D_3 = \frac{36000 \times 3}{5 \times 6} = \text{Rs. } 3600.00$$

$$D_4 = \frac{36000 \times 2}{5 \times 6} = \text{Rs. } 2400.00$$

$$D_5 = \frac{36000 \times 1}{5 \times 6} = \text{Rs. } 1200.00$$

(iii) Diminishing Balance Method

Life of the asset = 5 years

Annual rate of depreciation = $100/5 = 20\%$

In this method a constant percentage rate of depreciation is charged to the remaining value of the asset at the end of each year.

<u>Year</u>	<u>Depreciation (Rs.)</u>	<u>Remaining value at the end of each year (Rs)</u>
1	$\frac{20,000 \times 20}{100} = 4000.00$	16000.00
2	$\frac{16,000 \times 20}{100} = 3200.00$	12800.00
3	$\frac{12,800 \times 20}{100} = 2560.00$	10240.00
4	$\frac{10,240 \times 20}{100} = 2048.00$	8192.00
5	$\frac{8,192 \times 20}{100} = 1638.40$	6553.60

Problem 8

A camel cart costing Rs. 15000.00 was purchased by a farmer Mr. Ram Singh on 1.1.2004. The cart is expected to last upto 31.12.2008 i.e. its useful life is only 5 years. Calculate the depreciation of the cart for the different years during 1.1.2004 to 31.12.2008, through straight line method, sum of years–digit method and Diminishing balance method. The expected Junk value of camel cart is Rs. 2000.00.

Year	Straight line method		Sum of the years–digit method		Diminishing balance method	
	Depreciation (Rs.)	Remaining value at the end of year (Rs.)	Depreciation (Rs.)	Remaining value at the end of year (Rs.)	Depreciation (Rs.)	Remaining value at the end of year (Rs.)
1
2
3
4
5
A. Total dep.	xxx	.....	xxx	.....	xxx
B. Junk value	xxx	.....	xxx	.....	xxx
Total (A+B)	xxx	.....	xxx	.....	xxx

EXERCISE 9

OBJECTIVE: To prepare a Farm budget

Farm budgeting is a method of analyzing plans for the use of agricultural resources at the command of the decision maker. The expression of a farm plan in monetary terms by estimation of receipts, expenses and net income is called budgeting. In other words, farm budgeting is a process of estimating costs, returns and net profit of a farm or a particular enterprise. There are two types of farm budgeting:

- (a) Complete budgeting; and
- (b) Partial budgeting – enterprise budgeting

COMPLETE BUDGETING :

When an estimation of the expected returns and expenses is made for the entire farm as a single unit. This type of budgeting analysis involves complete re-organisation of the farm business. For example, if a farm has diverse operations including crops, livestock, fisheries, the statement showing the estimated returns and expenses of all these enterprises together or as a whole will be complete budgeting of the farm.

It is required when a farm plan is prepared for a new farm or when a drastic change is suggested in the existing plan on an established farm.

PARTIAL BUDGETING:

It refers to estimating the expenses and returns for a part of the business i.e. for individual enterprise or specific part of the farm/one or few activities. For instance, the budget for poultry unit alone or only the dairy or for a particular crop will be called a partial budget. It may be prepared for different implements or different cultural practices.

Partial budgets commonly used to estimate the effects or outcomes of possible adjustments in the farm business before such adjustments are actually made. Partial budgeting analysis is simple, quick and easy.

EXAMPLE 9

It has been observed by the Department of Soil Science in collaboration with the Agronomy department of the Rajasthan Agricultural University that application of 20 Kgs of Nitrogen per hectare in the form of urea as foliar spray on wheat 50 days after sowing along with 60 Kgs nitrogen per hectare added to the soil, increased the yield by 3 qtls. per hectare as compared to the application of 100 Kgs nitrogen in the soil. Here, the economics of these two methods is to be worked out

Partial Budget

Soil versus Foliar Application of Nitrogen on Wheat Crop

Debit		Credit	
Particular	Amount (Rs.)	Particular	Amount (Rs.)
a. Increase in cost per hectare		a. Decrease in cost per hectare	
1. Cost of spraying	30.00	1. Fertilizer cost of 20 Kgs N by urea @ 250.00 qtl.	200.00
2. Threshing & winnowing cost for 3.0 qtl. @ Rs. 25.00 qtl.	75.00	b. Increase in returns per hectare	
3. Marketing cost @ Rs. 10 per qtl	30.00	1. Wheat yield 3 qtl. @ Rs. 750.00/qtl.	2250.00
b. Decrease in return per hectare	---	2. Wheat straw 3 qtl @ Rs. 100.00/qtl.	300.00
A. Total of (a) and (b) =	135.00	Total of (a) and (b) =	2750.00

Net gain (B - A) = 2750 - 135
= Rs. 2615.00

RESULT:

The partial budget analysis shows that the foliar application of nitrogen increases net returns per hectare by Rs. 2615.00 over the soil application.

Problem 9

The digging of groundnut with manual labour may become a problem in view of increasing shortage of labour at the harvesting time. A machine "groundnut-digger-shaker" has been developed for this purpose. This machine can be mounted on the hydraulic lift of a 35 H.P. tractor and is easy to operate. With the help of following information find out whether it will be economical to use the machine in place of manual digging of groundnut or not

1.	Cost of machine	Rs. 37500
2.	Useful life	3750 hours
3.	Junk value	Rs. 4500
4.	Rate of interest	10% per annum
5.	Time required in digging one hectare of groundnut	7.5 hours
6.	Hiring charges of tractor	Rs. 96/hour
7.	Labour required in digging groundnut with machine	7.5 hours
8.	Decrease in yield due to use of machine	0.375 qtl./ha
9.	Labour required in manual digging	200 hours
10.	Price of groundnut	Rs. 1200/qtl.
11.	Wage rate	Rs. 10.0/ hour
12.	Use of machine	200 hrs/year

Partial Budget

Economics of groundnut harvesting per hectare by groundnut-diggershaker v/s manual labour

Debit		Credit	
Particulars	Amount (Rs)	Particulars	Amount (Rs)
a. Increase in costs		a. Decrease in costs	
1. Depreciation for 7.5 hours	---	1. Manual labour	---
2. Interest	---		
3. Tractor charges for 7.5 hours	---		
b. Decrease in returns		(c) Increase in returns	
Decrease in yield	---	Increase in yield	---
A Total increased cost and reduced returns		B Total reduced costs and increased returns	
Net Gain (B-A)=			

Calculate interest on the following amount :

$$\frac{\text{Cost of machine} + \text{Junk value}}{2}$$

RESULT:

EXERCISE 10

OBJECTIVE: To study the valuation of different farm assets.

Valuation of farm assets is necessary for preparation of net worth statement and farm inventory. As far as possible valuation of assets should be appropriate because inappropriate valuation can lead to unsound business decisions. Valuation of different farm assets is done by different methods as mentioned below:

(i) **Valuation of purchased farm supplies:** The valuation of purchased farm supplies such as seed, cattle feed, fertilizers etc. is estimated at the cost or market price whichever is lower. No paper profit accrue and losses due to falling prices are absorbed.

Example :	Cost of seed	=	Rs. 1500/ctl
	Present market price	=	Rs. 1300/ctl
Result:	Present value of the seed	=	Rs. 1300/ctl

(ii) **Valuation of crops and livestock:** In this case valuation is done at Net Selling Price. This means the price which could probably be obtained for the asset if marketed, less the cost of marketing. Crops and livestock which are held primarily for sale can be valued by this method.

Example: Net selling price	=	Market Price - cost of marketing
Price at which wheat can be sold in market	=	Rs. 900/ctl
Cost of marketing of wheat	=	Rs. 30/ctl
Net selling price	=	900-30 = Rs. 870/ctl
Result: Hence, value of one ctl of wheat	=	Rs. 870

(iii) **Valuation of machinery and breeding livestock:** Valuation of machinery and breeding livestock is done by cost minus depreciation method. This method assumes that the purchase price was an approximation of the value of the asset and its value in subsequent years can be determined by subtracting a depreciation allowance from its cost. This method can not be applied to the livestock produced on the farm.

EXAMPLE:

Purchase price of a tractor	=	Rs. 3,00,000
Useful life	=	10 years
Junk value	=	Rs. 25000

RESULT:

Value of tractor at the end of first year = Purchase price – Depreciation

$$\text{Depreciation} = \frac{3,00,000 - 25,000}{10} = \text{Rs. } 27,500$$

Value of tractor at the end of first year = 3,00,000 – 27,500 = Rs. 2,72,500

Value of tractor at the end of second year = Value at the end of first year – Depreciation
= 2,72,500 – 27,500 = Rs. 2,45,000.00

Similarly, its value in subsequent years can be determined.

(iv) **Valuation of buildings:** Valuation of buildings is done by replacement cost minus depreciation method. This method is to value the assets at what it would cost to reproduce them at present prices and under present methods of production. Since, during periods of rising and falling prices, the original cost of construction less depreciation may not serve as a basis for the valuation of buildings.

EXAMPLE:

A hall was constructed in the year 2002. Its replacement cost was Rs. 200000 in April, 2007. Find the value of hall in April, 2007.

Given: Rate of depreciation = 1½% per year on the cost of hall

Solution depreciation per year = $\frac{2,00,000 \times 3}{2 \times 100}$ Rs. 3,000

Depreciation for 5 years = 3000 × 5 = Rs. 15000

RESULT:

Value of hall in April 2007 = Replacement cost – depreciation
= Rs. (2,00,000 – 15,000)
= Rs. 1,85,000/-

(v) **Valuation of land:** The value of land varies from region to region in accordance with physical, economical and social conditions. The value of land has a very little relation to fertility if it has the potential use for residential or industrial purposes. The value of land rises with the expansion of the industrial units, educational institutions, and other establishments. Location (which refers to external factors which surround a farm) also affects the value of land. The location of farm with respect to distance to mandi, railway station, type of road, method of transportation, accessibility to school / college, dispensary, neighboring community etc. have a vital influence on the valuation of land. Valuation of land is estimated by Income Capitalization Method. This method is appropriate for the farm assets (like land) whose contribution to the income of the farm business can be measured and which have a long life. In practice neither the annual income nor the interest rate in future is known with accuracy. Hence, this method is generally used in combination with other method such as the market price.

The capitalization formula: $V = \frac{R}{r}$ can be used for this purpose

Where, V = Value of land in rupees
 R = Constant income over infinite number of years in future
 r = rate of interest per rupee per annum

EXAMPLE

If the income from land is Rs. 15000/- per hectare per year and rate of interest is 10% per annum.
 The value of land = $15000/0.1$
 = Rs. 1,50,000 per hectare

Problem 10

Find out the value of following farm assets from the given information:

- | | | | |
|------------------|----------------------------------|---|------------------|
| (i) Cattle feed: | Cost of purchasing | = | Rs. 500 per qtl |
| | Market Price | = | Rs. 400 per qtl. |
| | Present value of the cattle feed | = | ----- |
| (ii) Bajra: | Price of Bajra in market | = | Rs. 800 per qtl |
| | Cost of marketing | = | Rs. 40 per qtl |
| | Value of Bajra | = | ----- |
| (iii) Thresher: | Purchase price of thresher | = | Rs. 35,000 |
| | Useful life | = | 10 years |
| | Junk value | = | Rs. 3000 |

Find its value at the end of first year.

- (iv) Building: A class room was constructed in the year 2003. Its replacement cost was Rs. 150000 in 2007. The rate of depreciation is 1% per year on the replacement cost of class room. Find its value in 2007. Also name the method used for computing the value of class room.
- (v) Land: The income from land is Rs. 12000 per hectare per year and rate of interest is 10% per annum. Compute the value of land.

EXERCISE 11

OBJECTIVE: To study the Farm Records and Accounts

Farm records and accounts are the books in which various transactions of the farm business and other related information are recorded. Farm accountancy is defined as the art as well as the science of recording in books, business transactions in a regular and systematic manner so that their nature, extent and financial effects can be readily ascertained at any time of the year.

Farm record is a set of books which contains all relevant information like physical and financial information about the farm.

Types of Farm Records and Accounts:

Different kinds of farm records maintained on different farms can be classified into following three categories.

- (i) Physical farm records,
- (ii) Financial farm records; and
- (iii) Supplementary farm records.

Physical farm records

Physical records are related to the physical aspects of the operation of a farm business. They do not indicate about the financial position of the farm business.

Physical farm records include the following records:

- (i) Farm map, soil map and contour map,
- (ii) Charts on physical efficiency,
- (iii) Land utilization record,
- (iv) Crop production and disposal record,
- (v) Livestock production and disposal record,
- (vi) Labour records, daily work diary,
- (vii) Machinery use records,
- (viii) Feed records,
- (ix) Stock/store register; and
- (x) Poultry records.

Farm Map:

It is one of the most simple and brief record of farm features. It gives a visual impression of the whole location of the farm. It shows all the physical features of the farm such as topography, roads, buildings, water channels, source of irrigation etc.

Land Utilization Records

Name of farm: Radhey Shyam Kumawat Krishi Farm Renwal, Jaipur

(Area in Hectares)

Land use	2005-06	2006-07
Cultivated Area		
Irrigated	4.0	4.0
Unirrigated	7.0	7.0
Building, Roads, etc.	0.75	0.75
Garden	-	-
Idle land	0.25	0.25
Total land	12.0	12.0

Cropping Pattern of the Farm:

Crop Enterprises	2005-06	2006-07
Kharif Season		
Bajra	5.00	5.50
Cowpea	1.00	1.50
Guar	1.50	1.00
Groundnut	2.50	3.00
Sub total	10.00	11.00
Rabi Season		
Wheat	2.50	2.25
Mustard	1.25	1.50
Fodder	0.25	0.20
Sub total	4.00	3.95
Total cropped area	14.00	14.95

Production Records: Production records provide standards of performance in the use of resources. The form and type of physical records relating to crops or livestock enterprises depend upon the degree of specialization and type of farming being followed. A simple illustration of keeping production records of farm enterprises is given below:

Production and Disposal of the Farm Produce

Year 2005-06

Crop Enter; prises	Last years balance		Production			Disposal										Balance	
						Domestic consumption		Used as seed		Fed to cattle		Kind payments		Sold			
	Qty. (Qtls.)	Value (Rs.)	Field Nos.	Area (Ha.)	Total Prod. (Qtl.)	Qty. (Qtl.)	Value (Rs.)	Qty. (Qtl.)	Value (Rs.)	Qty. (Qtl.)	Value (Rs.)	Qty. (Qtl.)	Value (Rs.)	Qty. (Qtl.)	Value (Rs.)	Qty. (Qtl.)	Value (Rs.)
Kharif Season	-	-	-	5.0	60	5.0	3,000	-	-	5.00	3000	2.00	1400	48.00	28,800	-	-
Bajra (grain)	-	-	-	5.0	90	-	-	-	-	80	16,000	-	-	10.00	2000	-	-
Byproduct	-	-	-	1.0	9.0	0.50	1,000	-	-	-	-	-	-	8.5	17,000	-	-
Cowpea	-	-	-	1.50	6.0	-	-	0.20	400	4.0	10,000	-	-	1.80	3,600	-	-
Guar	-	-	-	1.50	6.0	-	-	-	-	-	-	-	-	6.0	1,500	-	-
Byproduct	-	-	-	2.50	40.0	1.0	2,000	1.0	2,000	-	-	-	-	38.00	83,600	-	-
Groundnut	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rabi Season	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wheat	10	-	-	2.50	100	25.0	25,000	2.0	2500	-	-	-	-	70.00	84,000	13	15,600
Wheat-Bhusa	50	-	-	2.50	140	-	-	-	-	50	10,000	-	-	80.00	18,000	60	13,500
Mustard	-	-	-	1.25	25	1.0	1,800	-	-	-	-	-	-	24.00	43,200	-	-
Fodder	-	-	-	0.25	150	-	-	-	-	150	3,000	-	-	-	-	-	-
Value of milk consumed	-	-	-	-	-	-	20,000	-	-	-	-	-	-	-	-	-	-
Total	-	-	-	-	-	-	52,800	-	-	-	-	-	-	-	2,81,700	-	-

1. Total receipts = Rs. 2,81,700
2. Total Cash Operating Expenses = Rs. 1,12,600
3. Net Cash Income (1-2) = Rs. 1,69,100
4. Farm Privileges = Rs. 52,800
5. Net Farm Earnings = Rs. 2,21,900

Livestock Production and Disposal record

Year 2005-06

Items	Prev. Balance	Production			Disposal			Balance
		Purchased	Produced	Total	Household consumption	Died/ losses	Sold	
(a) Milch animals								
Buffaloes	3	-	1	4	-	-	1	3
Cows	2	-	1	3	-	1	-	2
Crossbred Cows	-	1	1	2	-	-	-	2
Ghee	-	-	70 Kg	70 Kg	70 Kg	-	-	-
(b) Poultry birds	-	-	-	-	-	-	-	-
Eggs	-	-	-	-	-	-	-	-
(C) Others	-	-	-	-	-	-	-	-

Labour Records:

Labour records can be of two categories:

- (i) **Simple labour records:** It is maintained for the selected enterprises or operations and where there is some specific reason to study efficiency or seasonal requirements
- (ii) **Complete labour records:** This type of record is maintained for the farm as a whole. To obtain a complete record of workers, the amount of time spent by each worker on the farm each day and on each enterprise is recorded.

Labour Record

Crop-Groundnut

Year 2007-08,
Area = 1 hectare

Ploughing and seedbed preparation			Sowing			Interculture			Irrigation			Harvesting & Threshing		
Date	Hours		Date	Hours		Date	Hours		Date	Hours		Date	Hours	
	Man	Tractor		Man	Tractor		Man	Tractor		Man	Tubewell		Man	Tractor
20.6.07	2	2.0	14.7.07	4.0	3	25.7.07	15	-	06.7.07	15	15	26.10.07	85	15
22.6.07	1.5	1.5	15.7.07	10.0	-	14.8.07	20	-	24.7.07	13	13	10.11.07	15	5
23.6.07	1.0	1.0				20.8.07	30	-	06.8.07	13	13			
25.6.07	40	10							16.8.07	13	13			
03.7.07	2.0	1.5							23.8.07	14	14			
04.7.07	1.5	1.5							18.9.07	13	13			
10.7.07	2.0	2.0							12.10.07	13	13			
12.7.07	2.0	2.0												
Total	52	21.5	xxx	14	3	xxx	65	-	xxx	94	94		100	20

Machinery Use Record (Log Book)

Name of Farm Machinery : Tractor of Size 35 H.P.,

Make : Massey Ferguson

Date of Purchase : 08.12.2005

Date	Nature of work done	Period Use			Distance covered	Fuel Oil Consumption (Liter)					Electricity consumed	Repairs	Remarks
		From	To	Hours		Previous balance	Purchased	Total	consumption	Balance			
21.6.07	Ploughing	8.00 AM	2.00 PM	6	-	40	15	55	18	37	-	-	-
23.6.07	Ploughing	9.00AM	4.00 PM	7	-	37	-	37	21	16	-	-	-
24.6.07	Ploughing	8.30 AM	12.30 PM	4	-	16	50	66	12	54	-	-	-
26.6.07	Transport of FYM	7.00 AM	5.00 PM	10	-	54	-	54	10	44	-	-	-
30.6.07	Transport of wheat to regulated market	8.00 AM	10.00 AM	2	50 Km	44	-	44	10	34	-	-	-
3.7.07		7.00 AM	1.0 PM	6	-	34	-	34	18	16	-	-	-
5.07.07	Ploughing	8.00 AM	12.00 noon	4	-	16	-	16	12	04	-	-	-
10.7.07	Ploughing	7.30 AM	9.30 AM	2	50 Km	04	30	34	10	24	-	-	-
	Transport of mustard to regulated market												

Feed Records:

Feed records can be maintained on the specialized livestock farms i.e. sheep rearing, dairying, poultry etc. These records may also be maintained for each separate livestock / flock unit, being fed on a separate ration. The purpose of these records is to determine the feed efficiency.

Month : July 2007

Date	Buffaloes 4			Cows 4			Others		
	Bhusa (Kgs.)	Green fodder (Kgs.)	Concentrates (Kgs.)	Bhusa (Kgs.)	Green fodder (Kgs.)	Concentrates (Kgs.)	Feed (Kgs.)	Green fodder (Kgs.)	Concentrates (Kgs.)
1	20	120	5	16	100	4	-	-	-
2	20	120	5	16	100	4	-	-	-
3	20	120	5	16	100	4	-	-	-
4	20	120	5	16	100	4	-	-	-
5	20	120	5	16	100	4	-	-	-
6	20	120	5	16	100	4	-	-	-
7	20	120	5	16	100	4	-	-	-
8	20	120	5	16	100	4	-	-	-
9	20	120	5	16	100	4	-	-	-
10	20	120	5	16	100	4	-	-	-
11	20	120	5	16	100	4	-	-	-
12	20	120	5	16	100	4	-	-	-
13	20	120	5	16	100	4	-	-	-
14	20	120	5	16	100	4	-	-	-
15	20	120	5	16	100	4	-	-	-
16	20	120	5	16	100	4	-	-	-
17	20	120	5	16	100	4	-	-	-
18	20	120	5	16	100	4	-	-	-
19	20	120	5	16	100	4	-	-	-
20	20	120	5	16	100	4	-	-	-
21	20	120	5	16	100	4	-	-	-
22	20	120	5	16	100	4	-	-	-
23	20	120	5	16	100	4	-	-	-
24	20	120	5	16	100	4	-	-	-
25	20	120	5	16	100	4	-	-	-
26	20	120	5	16	100	4	-	-	-
27	20	120	5	16	100	4	-	-	-
28	20	120	5	16	100	4	-	-	-
29	20	120	5	16	100	4	-	-	-
30	20	120	5	16	100	4	-	-	-
31	20	120	5	16	100	4	-	-	-
Total	620	3720	155	496	3100	124	-	-	-

Feed Record Summary

Unit: Kgs.

Month	Buffaloes 4			Cows 4			Others		
	Bhusa	Green fodder	Concentrates	Bhusa	Green fodder	Concentrates	Feed	Green fodder	Concentrates
July 2007	620	3720	155	496	3100	124	40	200	-
Aug. 2007	620	3720	155	496	3100	124	40	200	-
Sep. 2007	620	3720	155	496	3100	124	50	250	-
Oct. 2007	620	3700	155	496	3100	124	300	1200	-
Nov. 2007	620	3700	155	496	3100	124	300	1200	-
Dec. 2007	620	3700	155	496	3100	124	300	1200	-
Jan. 2008	900	3000	124	480	3200	100	300	1200	-
Feb. 2008	900	3000	124	480	3300	100	300	1200	-
Mar. 2008	900	3000	124	480	3300	100	300	1200	-
Apr. 2008	1200	2400	160	720	2400	64	300	1200	-
May 2008	1200	2400	160	720	2400	64	450	900	75
June 2008	1200	2400	160	720	2400	64	450	900	75
Total	10,020	38,460	1,782	6,576	35,600	1,236	3,130	10,850	150

Store / Stock Register:

In order to know the store/stock position of different articles used at the farm at a particular time, there is need to maintain store/stock register for each and individual farm input.

Store/Stock Register

							Name of article : Urea Quantity in Qtls.	
S. No.	Date	Opening balance	Receipt	Total	Issued	Balance	From whom received/ To whom issued	Cost (Rs.)
1.	15.10.06	10.0	-	10.0	2.0	8.0	Applied in mustard crop	1250.00
2.	1.11.06	8.0	-	8.0	3.0	5.0	Applied in wheat crop	
3.	10.11.06	5.0	-	5.0	2.0	3.0	Applied in mustard crop	
4.	20.11.06	3.0	12	15.0	-	15.0	Purchased from	
5.	22.11.06	15.0	-	15.0	3.0	12.0	Cooperative society	
6.	30.11.06	12.0	-	12.0	2.0	10.0	Applied in wheat crop	
7.	12.12.06	10.0	-	10.0	3.0	7.0	Applied in barley crop	
8.	15.12.06	7.0	-	7.0	2.0	5.0	Applied in wheat crop	
9.	25.12.06	5.0	-	5.0	2.0	3.0	Applied in mustard crop	
							Applied in barley crop	511/20.11.06

Financial Records:

Financial records are mainly related to the financial aspects of the operation of a farm business. These records includes:

- Farm Inventory,
- Farm Cash Accounts or Farm Financial Accounts
- Classified Farm Cash Account and Annual Farm Business Analysis

Farm Inventory:

It is a list of all the physical property of a business along with their values at a specified date. It is the complete list of farmer's assets. For details please see exercise No. 12?

Farm Cash Accounts or Farm Financial Accounts:

These records relate to the annual operation of the business and the profits and losses associated with it. Farm cash account is a record of the results of the operation of the farm over a period of time, usually one season or one crop year. It can be as simple as just keeping a statement of the payment (Expenses) and receipts.

Types of cash Accounts: Important cash records are as follows:

Farm Diary: Diary is meant for daily recording of all events on the farm. It may include weather reports, other event(s) of the day, as well as cash receipts and cash expenses from all resources.

Farm Business Cash Record: It is a record of all cash receipts from and all cash expenses incurred on the farm business. It omits all personal cash expenses and all non-farm cash income. The objective of this record is to measure changes in the farm business in respect of only cash transactions.

Personal Cash Record:

It is strictly a record of all personal expenses of the farm family excluding all the farm costs and usually a recording of the cash income of the family from all sources i.e. farm as well as non-farm sources.

Farm Cash record:

It includes expenses on all items both personal and business and income from all sources according to source wise.

Simple Farm Cash Record

Expenses			Receipts		
Date	Particulars	Amount (Rs.)	Date	Particulars	Amount (Rs.)
July 2006			July 06		
10.7.06	Urea 15 Qtls @ Rs. 500/Qt.	7500.00			
15.7.06	Payment made to hired labour	1000.00			
17.7.06	Purchased diesel oil 500 litre	18000.00			
20.7.06	Purchased DAP 12 Qtls @ Rs. 500/Qt.	6000.00	20.7.06	Sale proceeds of ghee	4000.00
25.7.06	Paid to hired labour for weeding in bajra	800.00			
30.7.06	Payment of electricity bill	1000.00	31.7.06	Sale proceeds of milk	3800.00
August 06			Aug. 06		
5.8.06	Purchased concentrate for animals	2000.00			
10.8.06	Paid to casual labours	500.00			
12.8.06	Purchased insecticides and pesticides	1500.00			
15.8.06	Paid to rural artisans	500.00	15.8.06	Sale proceeds of milk	2000.00
17.8.06	Purchased feed for animals	1150.00			
20.8.06	Repair and service of tractor	1000.00	20.8.06	Sale proceeds of ghee	1000.00
25.8.06	Purchased spade, khurpi, axe	850.00			
26.8.06	Paid to carpenter	550.00	31.8.06	Sale proceeds of milk	1500.00
Sep. 06			Sep. 06		
4.9.06	Purchased feed for cows and buffaloes	770.00			
10.9.06	Payment to hired labour	880.00	10.9.06	Sale proceeds of ghee	400.00
14.9.06	Purchased mobil oil 5 litre	500.00	15.9.06	Sale proceeds of milk	1800.00
14.9.06	Purchased diesel oil 100 litre	3800.00			
20.9.06	Payment of electricity bill	850.00	31.9.06	Sale proceeds of milk	2000.00
	Total	49,150		Total	16,500

Classified Farm Cash Record:

The classified cash record is a modified and more complicated form of the simple cash record. It is meant to provide more details about the farm business. It provides details of the costs on and returns from the different farm enterprises, as well as general summary of the cash costs and returns from the entire farm business.

Classified Farm Cash Account
For the year 2006-07

A-Cash Receipts (Rs.) for the year beginning July 1, 2006 and ending June 30, 2007

S. No.	Date	To Whom or Where Sold	Items & Price per unit	Quantity/ No.	Bajra	Cow pea	Guar	Ground nut	Cowpe a	Wheat	Gram	Milk & milk products	Livestock sales	Money borrowed	
1.	2.7.06	Milk Coop Society Jorpura	Rs. 15 / litre	20	-	-	-	-	-	-	-	300	-	-	-
2.	15.7.06	Milk Coop Society Jorpura	Rs. 15 / litre	130	-	-	-	-	-	-	-	1950	-	-	-
3.	16.7.06	Renwal Market	Wheat @ 1100/Qtl	40	-	-	-	-	-	44,000	-	-	-	-	-
4.	16.7.06	Renwal Market	Gram @ Rs. 2000/Qtl.	5	-	-	-	-	-	-	10,000	-	-	-	-
5.	20.7.06	Jobner Market	Ghee @ Rs. 200/Kg.	10	-	-	-	-	-	-	-	2000	-	-	-
6.	31.7.06	Milk Coop Society Jorpura	Milk @ Rs. 15/litre	160	-	-	-	-	-	-	-	2400	-	-	-
7.	5.8.06	Milk Coop Society Jorpura	Milk @ Rs. 15/litre	60	-	-	-	-	-	-	-	900	-	-	-
8.	6.8.06	From the Bank of Raj. Ltd Jobner	Loan @ 10% Interest	-	-	-	-	-	-	-	-	-	-	-	10,000
9.	10.8.06	Jobner Market	Guar @ Rs. 2000/ Qtl	5 Qtl	-	-	10,000	-	-	-	-	-	-	-	-
10.	10.8.06	Jobner Market	Wheat @ 1200/Qtl	5 Qtl	-	-	-	-	-	6000	-	-	-	-	-
11.	15.8.06	Milk Coop Society Jorpura	Milk @ Rs. 15/litre	150 Litre	-	-	-	-	-	-	-	2250	-	-	-
12.	20.8.06	Jobner Market	Ghee @ Rs. 200/Kg	5 Kg.	-	-	-	-	-	-	-	1000	-	-	-
13.	25.8.06	Milk Coop Society Jorpura	Milk @ Rs. 15/litre	160 Litre	-	-	-	-	-	-	-	2400	-	-	-
14.	28.8.06	Jorpura	Cow	1	-	-	-	-	-	-	-	-	15,500	-	-
15.	31.8.06	Village buyer	Buffalo	1	-	-	-	-	-	-	-	-	20,000	-	-
Total			XXXX	XX	XX	XX	10,000	XX	XX	50,000	10,000	13,200	35,500	XX	10,000

**Classified Farm Cash Account
For the year 2006-07**

B-Cash Expenses (Rs.) for the year beginning July 1, 2006 and ending June 30, 2007

Date	Description of transaction	Seeds	Fertilizers	Electricity	Insecticide & Pesticide	Feed & Fodder	Artisans	Repair of Machinery & building etc.	Labour	Cash rent & custom charges	Diesel & Oil	Interest	Kind payment
1	2	3	4	5	6	7	8	9	10	11	12	13	14
July, 2006													
10.7.06	Urea 15 Qtl @ 500/Qtl	-	7,500	-	-	-	-	-	-	-	-	-	-
15.7.06	Payment to labour	-	-	-	-	-	-	-	1000	-	-	-	-
17.7.06	Diesel oil 500 lit.	-	-	-	-	-	-	-	-	-	18000	-	-
20.7.06	DAP 12 Qtl.	-	6,000	-	-	-	-	-	-	-	-	-	-
25.7.06	Payment to labour	-	-	-	-	-	-	-	800	-	-	-	-
25.7.06	Cowpea seed	500	-	-	-	-	-	-	-	-	-	-	-
30.7.06	Electricity bill	-	-	1000	-	-	-	-	-	-	-	-	-
	Sub total	500	13,500	1000	-	-	-	-	1800	-	18000	-	-
Aug., 2006													
5.8.06	Purchased concentrate	-	-	-	-	2000	-	-	-	-	-	-	-
10.8.06	Payment to labour	-	-	-	-	-	-	-	500	-	-	-	-
12.8.06	Purchased insecticide & pesticide	-	-	-	1500	-	-	-	-	-	-	-	-
15.8.06	Paid to rural artisans	-	-	-	-	-	500	-	-	-	-	-	-
17.8.06	Purchased feed	-	-	-	-	1150	-	-	-	-	-	-	-
20.8.06	Repair & service of tractor	-	-	-	-	-	-	1000	-	-	-	-	-
26.8.06	Paid to carpenter	-	-	-	-	-	550	-	-	-	-	-	-
27.8.06	Payment to labour	-	-	-	-	-	-	-	880	-	-	-	-
28.8.06	Purchased diesel 100 litre	-	-	-	-	-	-	-	-	-	3800	-	-
29.8.06	Interest of loan	-	-	-	-	-	-	-	-	-	-	2000	-
	Sub total	-	-	-	1500	3150	1050	1000	1380	-	3800	2000	-

Note: Similarly, the record is maintained for remaining months of the year.

Supplementary Financial Records:

The supplementary financial records are as follows :

- (i) Capital assets sale register
- (ii) Cash sale register,
- (iii) Credit sale/purchase register
- (iv) Wage register,
- (v) Funds borrowed, repayment register,
- (vi) Farm expenses (paid in kind) register,
- (vii) Non-farm income record.

EXERCISE 12

OBJECTIVE: To prepare the farm inventory

Farm inventory is a list of all the physical property of a farm along with their values at a specified date. It is the complete list of farmer's assets. It indicates how much land does a farmer own, how many implements does he possess, the number of bullocks or livestock he has and so on. But when used in a wider sense, inventory also provides further details such as what type of land does the farmer own—sandy or loamy, irrigated or unirrigated etc., which tractor does he possess and of what horse power, which breed of livestock and of what age does he own etc.

PURPOSES:

- (1) A complete farm inventory taken shows the amount of capital accumulated every year in the business.
- (2) If liabilities are also considered along with the inventory then it will help in finding out the networth of the farm. It will also reveal the changes in net worth.
- (3) It helps in business analysis i.e. to work out various income measures.
- (4) It helps to work out the value of last year's take over of stocks and this year's left overs.
- (5) It enables to determine the depreciation cost.
- (6) It serves as a basis of income statement and also helps the farmer to have a better control on his business.

EXAMPLE 12Farm Inventory of Bajrang Krishi Farm on 1st July 2006 and 30th June 2007

Items	Beginning of the year (1.7.2006)		End of the year (30.6.2007)	
	Quantity (Qtl/No.)	Value in Rs.	Quantity (Qtl / No.)	Value in Rs.
I. Non- Depreciable Assets				
(a) Crop Produce				
(i) Wheat	10	7,000	30	24,000
(ii) Gram	4	6,000	2	4,000
(b) Supplies				
(i) Seeds	1	1500	3	6,000
(ii) Fertilizers	—	—	—	—
(iii) Insecticides	—	—	—	—
(c) Growing Crops				
Cotton American (ha.)	2	30,000	3	50,000
(d) Marketable livestock	—	—	—	—
Sub-total	—	44,500	—	84,000
II. Depreciable Assets				
(a) Farm Machinery				
(i) Tractor	1	2,30,000	1	2,10,000
(ii) Trolley	1	25,000	1	22,500
(iii) Wheat Thresher	1	22,600	1	20,400
(iv) Seed cum fertilizer drill	1	13,500	1	12,210
(v) Other implements and Hand tools	8	9,000	6	7,200
(b) Farm Buildings		8,00,000		7,80,000
(c) Livestock				
(i) Buffaloes, Cows	15	2,00,000	13	1,75,000
(d) Land (ha.)	5	3,00,000	5	3,30,000
Sub-total		16,00,100		15,57,310
III. Cash Assets				
(a) Cash in Hand	—	11,000	—	16,000
(b) Bank Deposits	—	40,000	—	30,000
(c) Shares	—	—	—	—
(d) Other Properties	—	—	—	—
Sub-total		51,000		46,000
GRAND TOTAL		16,95,600		16,87,310

RESULT:

Change in Inventory:

(a) Beginning total:	=	Rs. 16,95,600
(b) Closing total:	=	Rs. 16,87,310
Change (a-b) :	=	Rs. 8,290/-

Problem 12

The following is the list of assets of a farmer along with their values as on 1.7.2006 and 30.6.2007. Prepare the comparative inventory from the following information and work out the change in inventory

S. No.	Items	Beginning of the year (1.7.2006)		End of the year (30.6.2007)	
		Quantity (Qtl/No.)	Value in Rs.	Quantity (Qtl/No.)	Value in Rs.
A. Farm Machinery					
(i)	Tractor	1	2,30,000	1	2,10,100
(ii)	Trolley	1	65,000	1	58,000
(iii)	Sprayers	2	6000	2	5300
(iv)	Thresher	1	70,000	1	63,000
(v)	Ploughs	2	16,000	2	13,000
(vi)	Cultivators	2	12,000	2	9,500
(vii)	Seed cum fertilizer drill	1	4200	1	3800
B. Crop produce					
(i)	Wheat	5	6,000	10	10,000
(ii)	Bajra	2	1200	3	2000
(iii)	Gram	1	2000	5	9,500
(iv)	Guar	—		4	8000
C. Livestock					
(i)	Buffaloes	3	55,000	3	50,000
(ii)	Cows	2	22,000	2	25,000
(iii)	Sheep	5	10,000	5	12,000
(iv)	Goat	5	15,000	5	18,000
(v)	Calves	2	4000	2	5000
D. Farm Buildings					
(i)	Store	1	50,000	1	48,000
(ii)	Garage	1	60,000	1	58,000
(iii)	Cattle shed	2	1,00,000	2	98,000
(iv)	Land (ha.)	4	2,80,000	4	3,00,000

EXERCISE 13

OBJECTIVE : To prepare the Net worth statement and work out the different financial test ratios

The Net-worth statement shows the financial condition and stability of the business at a particular point of time. It is shown as an excess of assets over liabilities. The difference between assets and liabilities shows the distance from insolvency position, greater the difference on positive side, sounder will be the business and vice-versa.

EXAMPLE 13

Net worth statement of Mr. Sohan Lal as on 1st July, 2006 and 30th June, 2007.

Items	Assets		Items	Liabilities	
	Beginning of the year 1.7.06 (Rs.)	Ending of the year 30.6.07 (Rs.)		Beginning of the year 1.7.06 (Rs.)	Ending of the year 30.6.07 (Rs.)
1. Current assets :			1. Current liabilities		
Cash in Bank	10500	7800	Short term loan for seeds	350	200
Sale of wheat	3500	—	Loan for diesel	200	300
A/c receivable	400	—			
Feeds, grains & Supplies	550	1425			
Sale of fodder	677	350			
Sub Total	15627	9575	Sub Total	550	500
2. Working assets :			2. Medium term liabilities:		
(i) Machinery & equipment	35010	30925	(i) Loan for purchase of equipments	25500	19400
(ii) Livestock, buffaloes & cows	21500	19000	(ii) Loan for draught animals	12000	9000
Sub Total	56510	49925	Sub Total	37500	28400
3. Fixed assets :			3. Long term liabilities:		
Land	230000	230000	Long term loan for levelling of land	20000	—
Farm buildings	18000	17840			
Sub Total	248000	247840	Sub Total	20000	—
Total Assets	320137	307340	Total liabilities	58050	28900

Result: Net-worth (Total assets minus total liabilities) as on 01.7.06 = Rs. 262087.00
on 30.6.07 = Rs. 278440.00

Financial Ratios :

$$(a) \text{ Current Ratio (CR)} = \frac{\text{Sum of current assets}}{\text{Sum of current liabilities}}$$

$$(i) \text{ C R on 01.07.06} = \frac{15627}{550} = 28.41$$

$$(ii) \text{ C R on 30.06.07} = \frac{9575}{500} = 19.15$$

$$(b) \text{ Working Ratio (WR)} = \frac{\text{Sum of current assets and working assets}}{\text{Sum of current liabilities and medium term liabilities}}$$

$$(i) \text{ W R on 01.07.06} = \frac{72137}{38050} = 1.90$$

$$(ii) \text{ W R on 30.06.07} = \frac{59500}{28900} = 2.06$$

$$(c) \text{ Net - Capital Ratio (NCR)} = \frac{\text{Total assets}}{\text{Total liabilities}}$$

$$(i) \text{ N C R on 01.07.06} = \frac{320137}{58050} = 5.51$$

$$(ii) \text{ N C R on 30.06.07} = \frac{307340}{28900} = 10.63$$

Comment:

Since all the financial test ratios are greater than one. Hence, the financial position of the farmer is sound.

Problem 13

Following information were obtained by an investigator from a farm near Jobner town.

Items	Beginning of the year 1.7.06 (Rs.)	Ending of the year 30.6.07 (Rs.)
Milch and draught animals	20000	15000
Cash in Bank	800	500
Loan for cow	2500	800
Bullocks	5000	4000
Heifers	4000	4500
Irrigated land	20000	25000
Un-irrigated land	5000	4500
Loan for purchase of tractor	50000	45000
Thresher	6000	4500
Loan for purchase of chaff cutter	4000	3000
Buildings	28000	28000
Sale of farm produce	5500	3500
Cash in hand	1200	—
Tractor	70000	65000
Seasonal loan for seed, fertilizer	2500	1500
Feeds, grain and supplies	4500	5000

- (a) Prepare the net-worth statement and work out the net-worth of the farmer for beginning as well as end of the year.
- (b) Work out the following ratios for beginning as well as end of the year:
 - (i) Current ratio
 - (ii) Working ratio
 - (iii) Net-capital ratio
- (c) Comment on the financial position of the farmer.

SOLUTION :

Networth statement of a farmer

Items	Assets		Items	Liabilities	
	Beginning of the year 1.7.06 (Rs.)	Ending of the year 30.6.07 (Rs.)		Beginning of the year 1.7.06 (Rs.)	Ending of the year 30.6.07 (Rs.)
1. Current assets :			1. Current liabilities		
Sub Total			Sub Total		
2. Medium term assets:			2. Medium term liabilities:		
Sub Total			Sub Total		
3. Long term assets :			3. Long term liabilities:		
Sub Total			Sub Total		
Total Assets			Total Liabilities		
(A) Networth on 1.7.06			=		
Networth on 30.6.07			=		
(B) (i) Current ratio on 1.7. 06			=		
Current ratio on 30.6.07			=		
(ii) Working ratio on 1.7. 06			=		
Working ratio on 30.6.07			=		
(iii) Net capital ratio on 1.7. 06			=		
Net capital ratio on 30.6.07			=		
(C) Comment :					

EXERCISE 14

OBJECTIVE: To prepare the profit and loss statement

Profit and loss statement (Income statement) provides a correct picture of the farm business and form a better basis for assessing the credit worthiness of the borrower. Whereas, the balance sheet is a measure of capital at a point of time. Since the assets and liabilities of a farmer never stop changing by the time it is prepared, it is no longer an exact statement of the current financial production of the business.

The balance sheet information is used by financial institutions to help determine whether there is adequate security for a requested loan. But the profit and loss statement is used by the financial institutions to help in deciding whether the business is likely to be able to repay a requested loan. Therefore, analysis of profit and loss statement is essential in credit analysis.

The purpose of a profit and loss statement is to investigate the profitability of the business over some time period. The profit and loss statement presents a summary of income, related expenses and resultant profit or loss from operations for a given period—normally one year. By assigning the income and expenses to the different enterprises of a farm business, one can determine, where profit (or losses) were generated. By comparing profit and loss statements over a number of years, one can see the rise or decline in the profits.

Development of the profit and loss statement requires the following steps:

- (i) Summary of the receipts of the business from the sale of products.
- (ii) Summary of the expenditures by the farmers on inputs.
- (iii) Summary of changes in inventories of inputs and outputs.

Item (i) is usually referred to gross farm income. It is simply the sum of all receipts from the sale of grains produced, livestock and livestock products.

Item (ii) is the sum of all cash operating expenses. The difference between item (i) and (ii) is the net cash income.

$\text{Net Cash Income} = \text{Total Cash Receipts} - \text{Total Cash Expenses}$

Item (iii) is essential for the development of profit and loss (income) statement.

$\text{Net Change in Inventory} = \text{Closing Inventory} - \text{Opening Inventory}$

The net cash income figure is then adjusted by changes in the inventories, to arrive at the net profit of the farm business.

$\text{Net Profit} = \text{Net Cash Income} \pm \text{Change in Inventory}$

EXAMPLE 14

Profit and loss statement of a farmer for the period 2004-05 to 2006-07

		Amount (Rs.)		
S. No.	Items	2004-05	2005-06	2006-07
A. Cash Receipts				
(i)	Milk sales	4,000	7,500	6,000
(ii)	Livestock sales	20,000	18,000	20,500
(iii)	Crop sales	20,500	22,000	30,000
(iv)	Miscellaneous farm receipts	5,500	8,500	3,500
	TOTAL	50,000	56,000	60,000
B. Cash Expenses				
(i)	Wages to hired labour	4,500	5,000	4,000
(ii)	Seeds, fertilizers, insecticides etc.	11,000	12,000	13,000
(iii)	Livestock	13,000	11,000	10,000
(iv)	Machinery and power	4,000	5,000	7,000
(v)	Interest on operating loan	2,000	2,500	3,500
(vi)	Depreciation, interest on capital, family labour etc.	9,000	8,500	8,000
(vii)	Miscellaneous	15,00	2,000	1,500
	TOTAL	45,000	46,000	47,000
C. Net cash Income		5,000	10,000	13,000
	Net change in inventory	4,200	6,000	7,500
D. Net Profit		9,200	16,000	20,500

RESULT:

An analysis of the above profit and loss statement indicates that the farm business has been steadily progressing over the years. The overall picture shows that the total cash receipts increased from Rs. 50,000 in 2004-05 to Rs. 60,000 in 2006-07, an increase of 20.0 percent. Similarly, the total cash expenses showed an increase from Rs. 45,000 to 47,000, an increase of 4.44 percent during this period. As a result of these changes, the net cash income increased from Rs. 5,000 in 2004-05 to Rs. 13,000 in 2006-07 and net profit from Rs. 9,200 to Rs. 20,500 during 2004-05 to 2006-07. This clearly indicates the steady progress of the farm business over the years. It is also evident from the above analysis that the farmer has capability of utilizing additional funds if put at his disposal to increase his income. The analysis is useful for lending agencies in making credit decisions.

Problem 14

Prepare a profit and loss statement of a farmer from the following information and comment on it.

Profit and loss statement of a farmer for the period 2003-04 to 2005-06

		Amount (Rs.)		
S. No.	Items	2003-04	2004-05	2005-06
A. Cash Receipts				
(i)	Milk sales	3,600	6,750	5,400
(ii)	Livestock sales	18,000	16,200	18,450
(iii)	Crop sales	18,450	19,800	27,000
(iv)	Miscellaneous farm receipts	4,950	7,650	3,150
B. Cash Expenses				
(i)	Wages to hired labour	4,050	4,500	3,600
(ii)	Seeds, fertilizers, insecticides etc.	9,900	10,800	11,700
(iii)	Livestock	11,700	9,900	9,000
(iv)	Machinery and power	3,600	4,500	6,300
(v)	Interest on operating loan	1,800	2,250	3,150
(vi)	Depreciation, interest on capital, family labour etc.	8,100	7,650	7,200
(vii)	Miscellaneous	1,350	1,800	1,350
C.	Net cash Income	-----	-----	-----
	Net change in inventory	3,780	5,400	6,750
D.	Net Profit	-----	-----	-----

EXERCISE 15

OBJECTIVE : To prepare the cash flow statement

Theory : A cash flow statement/map is simply a month by month or a quarter by quarter comparison of the expected cash income and expected cash expenses alongwith the cash position for each month/quarter. It is the difference between the total income and total expenditure. It is relatively easy to predict future income and expenses for each month or quarter, not exact but near enough to be a valuable tool in the planning and management of the business. This indicates whether the cash position for the month/quarter will be plus or minus. A negative cash position in any month/quarter indicates a need for an additional amount of credit. A positive cash position provides an opportunity to reduce the amount of outstanding credit.

EXAMPLE 15

Preparation of Cash Flow Statement from the given information

Items	Total (Rs)	Quarter-wise distribution of receipts and expenses			
		I quarter (July–Sept.)	II quarter (Oct.–Dec.)	III quarter (Jan.– March)	IV quarter (April– June)
1. Cash balance	29500	9000	12000	5000	3500
2. Total sales	49000	8500	13000	4500	23000
3. Money borrowed	15000	10000	5000	–	–
Total cash available	93500	27500	30000	95000	26500
1. Operating expenses	25000	6000	12000	5000	2000
2. Capital expenses	20000	10000	10000	–	–
3. Family living expenses	5000	1300	1200	1250	1250
4. Payment on previous funds	1500	–	–	–	1500
5. Payment of					
(a) Short term loan	8000	4000	–	–	4000
(b) Medium term loan	5000	–	–	–	5000
Total expenditure	64500	21300	23200	6250	13750
Cash balance	29000	6200	6800	3250	12750

RESULT:

The cash balance in this example is positive. Hence, it provides an opportunity to reduce the amount of outstanding credit.

Problem 15

Prepare the cash flow statement from the following information and comment on the cash position.

(i)	Total sales in IV quarter = Rs 25,000
(ii)	Cash balance in IV quarter = Rs 5,000
(iii)	Money borrowed in IV quarter = Rs 5,000
(iv)	Payment of medium term loan in IV quarter = Rs 8,000
(v)	Payment of short term loan in IV quarter = Rs 5,000
(vi)	Payment on previous funds in IV quarter = Rs 5,000
(vii)	Family living expenses in IV quarter = Rs 4,000
(viii)	Capital expenses in IV quarter = Rs 5,000
(ix)	Operating expenses in IV quarter = Rs 5,000
(x)	Operating expenses in III quarter = Rs 8,000
(xi)	Capital expenses in III quarter = Rs 15,000
(xii)	Family living expenses in III quarter = Rs 4,000
(xiii)	Payment on previous funds in III quarter = Rs 2,000
(xiv)	Total sales in III quarter = Rs 10,000
(xv)	Cash balance in III quarter = Rs 15,000
(xvi)	Cash balance in I quarter = Rs 10,000
(xvii)	Total sales in I quarter = Rs 12,000
(xviii)	Operating expenses in I quarter = Rs 8,000
(xix)	Money borrowed in I quarter = Rs 11,000
(xx)	Capital expenses in I quarter = Rs 10,000
(xxi)	Family living expenses in I quarter = Rs 5,000
(xxii)	Payment of short term loan in I quarter = Rs 9,000
(xxiii)	Payment of medium term loan in I quarter = Rs 6,000
(xxiv)	Capital expenses in II quarter = Rs 3,000
(xxv)	Operating expenses in II quarter = Rs 1,500
(xxvi)	Money borrowed in II quarter = Rs 7,000
(xxvii)	Total sales in II quarter = Rs 20,000
(xxviii)	Cash balance in II quarter = Rs 15,000
(xxix)	Family living expenses in II quarter = Rs 6,000

EXERCISE 16

OBJECTIVE : To work out the production efficiency of a given farm

The production efficiency of a farm with respect to any particular crop enterprise can be expressed in terms of percentage as compared with average yield in the locality.

$$\text{Production Efficiency} = \frac{\text{Yield of a particular crop on the given farm}}{\text{Average yield of that crop in the locality}} \times 100$$

EXAMPLE 16

Wheat yield per hectare on the college farm is 36 Qtls whereas, the average yield of wheat in the Phulera tehsil is 24 Qtls/ha. Find out the production efficiency of college farm in respect of wheat production.

Efficiency of college farm in the production of wheat

$$= \frac{36}{24} \times 100 = 150\%$$

RESULT :

The college farm is 50 per cent more efficient in producing wheat than the farms in the Phulera tehsil.

Problem 16

Compute the production efficiency from the following information :

Crops	Production per hectare on the college farm (Qtls./ha)	Average yield in the locality (Qtls./ha)	Production efficiency (2/3) x 100
1	2	3	4
Wheat	45	30	—
Barley	25	21	—
Groundnut	12	9	—
Mustard	10	9	—
Bajra	10	8	—
Gram	10	8	—

Comment :

EXERCISE 17

OBJECTIVE : To compute the cropping intensity of a farm from the given information.

Cropping intensity measures the extent of the use of land for cropping purposes during a given year. It is expressed as a percentage.

$$\text{Cropping intensity} = \frac{\text{Total cropped area}}{\text{Net area available for crop production}} \times 100$$

EXAMPLE 17

(i)	Gross area of the farm	=	50 ha
(ii)	Area under roads	=	2.0 ha
(iii)	Area under buildings	=	2.0 ha
(iv)	Area not suitable for crop production	=	6.0 ha
	<u>Area available for crop production</u>	=	50 - 10 = 40 ha
(v)	Area under crops during the year 2005-06		
	<u>Kharif season crops</u>		
	Bajra irrigated	=	10 ha
	Bajra UI	=	16 ha
	Guar UI	=	6 ha
	Cowpea UI	=	1 ha
	Moth UI	=	1 ha
	<u>Rabi season crops</u>		
	Barley	=	2 ha
	Gram	=	6 ha
	Wheat	=	10 ha
	Mustard	=	2 ha
	Total cropped area	=	34 + 20 = 54 ha

RESULT:

$$\text{Cropping intensity} = 54/40 \times 100 = 135\%$$

Comment : The land available for crop production on the farm was cultivated 1.35 times during the given year.

Problem 18

Calculate the crop yield index from the following information.

Crops	Yield/ha (Qtl.)		Area under crops on the farm 'G' (ha)	Yield on the farm 'G' as a percentage of the locality (3/2) × 100	Per cent yield of the farm 'G' x area on the farm 'G' (5 × 4)
	In the locality	On the farm 'G'			
1	2	3	4	5	6
Mustard	10	12	4		
Wheat	30	25	10		
Barley	20	16	10		
Maize	20	18	5		
Gram	8	10	4		
Bajra	25	30	15		
Total	xxx	xxx	.....	xxxxx	.....

Crop yield index = _____

Comment :

EXERCISE 19

OBJECTIVE : To work out the livestock production index

The livestock production index measures the combined efficiency of production rates of two or more livestock enterprises on a particular farm in comparison with average rates of production of the same livestock enterprises in the area. On farms with two or more important livestock enterprises and no important crop enterprises, the livestock production index is the best measure of production efficiency.

The simplest method of computing livestock production index is to compute a percentage expression for the production rate of each livestock enterprise and then weight each simple index by the proportionate amount of productive man work units applied to each of the livestock enterprises.

EXAMPLE 19

Livestock	Yield of milk per animal (Lit.)		Proportion of productive man work units (PMWU) engaged in livestock production	Yield on the farm 'A' as a percentage of the locality (3/2) × 100	Percent yield on the farm 'A' x proportion of productive man work units (5 × 4)
	In area	On farm 'A'			
1	2	3	4	5	6
Local cow	1000	1150	40	115.00	4600
Cross bred cow	5000	3750	30	75.00	2250
Buffalo	3300	2970	20	90.00	1800
Goat	500	625	10	125.00	1250
Total	—	—	100	—	9900

$$\text{Livestock production index} = \frac{9900}{100} = 99.00\%$$

RESULT:

The livestock production index of farm 'A' is 99.0%. It shows that farm 'A' is 1% less efficient in average rate of livestock production as compared to the locality.

Problem 20

Work out the total production index of a farm from the following information:

Enterprise groups	Production index	Proportion of productive man work units for each group	Production index \times proportion of productive man work units (Col 4 = 2 \times 3)
1	2	3	4
Crops	105	65	....
Livestock	100	35	....
Total	xxxxx	100	....

Total production index =

Comment :

EXERCISE 21

OBJECTIVE : To compute various income measures from the given information

Theory : Income measures are computed to measure the profit/returns to different factors such as farm income, labour income, total farm labour earnings, return on capital investment. They help in measuring farm profit after the year's business has been completed.

EXAMPLE 21

Computation of income measures from the data which were obtained from a farm for the year 2006-07 :

Receipts		Expenses	
Particular	Amount (Rs.)	Particular	Amount (Rs.)
1. Sale of crops		1. Cost of seed, manures, fertilizers chemicals, Feed fodder etc.	45000
(a) Sale of mustard	150000	2. Labour charges	
(b) Sale of wheat	30000	(a) Casual	45000
2. Sale of livestock products		(b) Permanent	15000
(a) On cash	45000	3. Family labour (other than operator)	30000
(b) On credit	15000	4. Fuel charges	
3. Sale of livestock		(a) Electricity	37500
(a) Sale of Cows	30000	(b) Diesel	7500
(b) Sale of Buffaloes	30000	(c) Other	—
4. Sale of farm supplies		5. Repair and maintenance	7500
(a) On cash	7500	6. Interest on short term loans	3000
(b) On credit	15000	7. Miscellaneous	7500
5. Miscellaneous		8. Decrease in inventory	—
(a) Subsidies	7500		
(b) Rent received	15000		
6. Increase in inventory	45000		
Total	390000	Total	198000
1. Value of farm perquisites	=	Rs. 30000	
2. Imputed value of operator's labour	=	Rs. 45000	
3. Average capital investment	=	Rs. 750000	
4. Rate of interest	=	Rs. 10%	

RESULTS:

Computation of income measures from the given data :

1. Farm Income = Total farm receipts – Total farm expenses
= 390000 – 198000
= Rs 192000
2. (Operator's) Labour income = Farm Income – Interest on average capital invested
= 192000 – 75000
= Rs. 1,17,000
3. (Operator's) labour Earning = labour Income + Value of farm perquisites
= 117000 + 30000
= Rs. 147000
4. Total Farm Labour Earnings = Labour earnings + Value of paid and unpaid labour
= 147000 + 90000
= Rs. 237000
5. Family Labour Earnings = Labour earnings + Imputed value of family labour
= 147000 + 30000
= Rs. 177000
6. Return on Capital Investment = Farm Income + Value of farm perquisites – Imputed value of operator's labour
= 192000 + 30000 – 45000
= Rs. 177000
7. Percentage Return on capital Investment = $\frac{\text{Return on capital investment}}{\text{Average capital investment}} \times 100$
= $\frac{177000}{750000} \times 100$
= 236.0%

Problem 21

Following data were obtained from "Kumawat Krishi Farm" for the year 2006-07.

Receipts		Expenses	
Particular	Amount (Rs.)	Particular	Amount (Rs.)
1. Sale of wheat & gram	80000	1. Cost of seed, manures, fertilizers & fodder etc.	35000
2. Sale of cows and Buffaloes	40000	2. Labour charges	45000
		(a) Permarient	20000
		(b) Causal	7000
3. Sale of farm supplies		3. Family labour	
(a) On cash	25000	(other than operator)	11000
(b) On credit	8000		
4. Sale of farm supplies		4. Diesel charges	4000
(a) On cash	6000	5. Electricity bills	6000
(b) On credit	6000	6. Interest on loans	4000
5. Increase in inventory	8000	7. Repair and maintenance	8000
6. Subsidies	5000	8. Decrease in inventory	32000
7. Rent received	10000	9. Miscellaneous expenses	4000
8. Other receipts	5000		
Total		Total	
1. Value of farm perquisites	=	Rs. 15000	
2. Imputed value of operator's labour	=	Rs. 15000	
3. Average capital investment	=	Rs. 300000	
4. Rate of interest	=	Rs. 10%	

Find out :

- Farm Income
- (Operator's) Labour earnings
- Total farm labour earnings
- Family labour earnings
- Return on capital investment
- Percent return on capital investment

EXERCISE 22

OBJECTIVE : Preparation of farm layout and determination of cost of fencing.

Farm layout : It is a systematic planning and arrangement of roads, irrigation channels, drainage channels and buildings on a farm. The improved farm layout minimizes the cost by reducing the time consumed in various farm activities.

Principles of a good farm layout:

The following are the principles of a good farm layout:

- (i) Planning the location of buildings to suit the convenience and efficiency of the farmer;
- (ii) Planning the arrangement of farm buildings with due regard to economy;
- (iii) Planning the number, shape and size of fields to fit the crop rotations to be adopted; and
- (iv) Planning irrigation and drainage channels according to the arrangement of the farm and planning minimum possible outlay on fencing.

Farm buildings:

Agriculture is essentially an out of door occupation, buildings are generally non-productive. Only such buildings should be erected on a farm which are absolutely necessary. The house building is said to be a personal matter but there should not be any large investment on such unproductive enterprise. The interest, depreciation and repairs, taxes and other costs on such a building will generally add to the working expenses of the farm and correspondingly reduce the profit per unit (ha.) of cultivation. As far as possible farm building should be cheap and durable.

Size of Building:

- (i) Cattle Shed : A floor space 3×2 M provides 6 square metre for housing one bullock / one cow/ one buffalo under the average conditions.
- (ii) Labour quarter: A room of 4×3 M or 12 square metre per labour along with a verandah of 4×2 M is an optimum requirement.
- (iii) Godown and implement shed: 4×3 M or 12 sq. metre space is suggested for a farm of 4 hectares.
Garage: the normal size of garage for a tractor with trolley is 7×3 M.
- (iv) Residential building and office: The approximate size for residential buildings and office is 18×9 i.e. 162 square metre space.

Location of Buildings:

The farm building may be located:

- (i) In the centre of the farm,
- (ii) By the side of a highway near the centre of one side of the farm rather than at the corner. Each location has its own advantages. The fields are more easily accessible on

four sides from the centrally located building and hence, there is an economy of time and labour as well as there is better supervision.

To secure the advantages of highway where transport and other facilities are more easily available the buildings are constructed near it. But the drawback of this location is that some fields lie at a comparatively greater distance from the buildings and also there is possibility of the contagious diseases amongst the farm cattle spreading from the animals passing the highway.

Besides location, the following points should be taken into consideration:

The buildings should be located on high land. If the godown and residential quarters are built on a low lying spot, the stored grains will get spoiled due to dampness and the workers health would be adversely affected. Hence, effort should be made to use high land and foundation of buildings should be on stiff soil. It has also to be seen that very productive land is avoided as far as possible.

Arrangement of Buildings: It is desirable that the buildings are well arranged in order to save useless expenses in travel to and from the buildings. The advantages of compact buildings as against scattered ones are less cost, less area required and greater security. The English proverb "The eyes of the master fattens his cattle" is good guide in the arrangement of cattle shed.

Roads, irrigation and drainage channels:

First one broad road about 5 M wide (main road) should be made and then secondary roads of 3 metre width are made perpendicular as well as parallel to it. Position of irrigation channels is fixed with respect to source of irrigation. Every field should be connected with irrigation channels. There should be one main channel parallel to main road. Sub-channels are made perpendicular to main channel. The provision of drainage channels is part of layout. It depends on level of farm. Drainage channels can be constructed either on the surface of land or below the surface. If channels are made below the surface then it will cost more but economise the use of land.

Field layout: The number, shape and size of fields should be in conformity to the physical conditions of the land and type of farming to be followed.

- (a) **Number of fields:** the number of fields should correspond to the number of years needed for one round of the rotation, e.g. in a three year sugarcane-wheat-cotton rotation, the numbers of fields should be three.
- (b) **Shape of fields:** Rectangular fields are to be preferred to square fields because fewer turns are involved while ploughing or cultivating the fields. Thus, there is economy of time and labour. It is convenient to have a field about twice as long as it is wide. Square fields demand less fencing but are not as convenient as rectangular fields in ploughing.
- (c) **Size of fields:** The efficiency of farm operation is associated with the size of fields. The size will depend upon the implements and machines used, the source of irrigation available and the general level of field.

The size of field depends upon:

- (i) **Level of the farm :** If the farm is in one level, plots may be of greater size but in an uneven land smaller sized plots are made. If there are ups and downs, many mends and embankments are made.
- (ii) **Source of irrigation:** Size of field depends upon the source of irrigation. Size increases with the increase in flow of water. It is less in case of well and tube well irrigated farms while it is more in canal irrigated farms.

(iii) **Type of machinery used:**

- (a) Spade – 1/100 hectare plots as in gardens
- (b) Deshi plough – ½ hectare fields
- (c) Tractor – 4–5 ha. Fields

(iv) **Dry and irrigated farming :** In dry farming the fields are of bigger size while in irrigated farming the fields are relatively small.

(v) **Commercial, institutional and research farm:** In commercial farms there are big plots but in instructional and research farms the fields are comparatively of small size.

Difference between the layout of different types of farms

Commercial	Research	Demonstration
1. It is not necessary to have roads touching each field	1. It is essential to have roads touching each field	1. It is not essential
2. Large fields	2. Small Fields	2. Standard type of fields
3. Fewer buildings	3. Number of building is more	3. Typical buildings required for a farm.
4. Fertile land	4. Land according to the nature of crops	4. Land suitable for demonstration

Fencing:

Fencing is done with the following objects:

- (i) Fixing the boundary of the farm and to stop encroachment of land. The trespassing can be stopped as regards cattle, though not effectively from the human beings.
- (ii) Protection from wild animals and cattle.

Types of fencing:

- (i) **Kachcha high mend:** In the absence of adequate funds, kachcha high mends can be built to avoid the trespassing by cattle. If more improvement is called for cactus, munja and agave can be planted on the mends.
- (ii) **Wire fencing with plain wire:** Wooden, iron or stone posts are used. The height of the post should be about 182 cm (46 cm below and 136 cm above the ground), the distance from pole to pole is kept about 3 metre.
- (iii) **Barbed wire fencing:** It is more effective then the plain wire fencing. In India barbed wire fencing is becoming more popular. Barbed wire fencing is more durable though it is expensive.
- (iv) **Tree, bush, shrub fencing:** This type of fencing occupy a lot of space and at the same time some more farm area becomes shady due to which crops can not be grown successfully.

Gates: These are spiked, wooden or iron. They should preferably be in front of a public road.

Cost of fencing: The cost of fencing is governed by the size and shape of fields. A square field requires less fencing per hectare than a rectangular field. An odd or triangular field involves high cost of fencing. Since, rectangular fields provide more efficient use of labour and machinery, they are preferred to square fields though their fencing cost is comparatively higher per hectare.

Computation of cost of fencing:

Given:

- (i) Size of the farm = 5 ha,

- (ii) Sides of the farm are in the ratio of 5:3,
- (iii) Length of one bundle of barbed wire = 90 metre, wt. of one bundle = 20 Kg.
- (iv) Cost of wire – Rs. 42/- Kg of G.I. coated wire
- (v) Distance between two poles = 3 metre, at every 10th pole – two poles extra needed which are kept tapered.
- (vi) Height of pole = 1.8 metre (1.5 metre above ground + 0.3 metre in ground)
- (vii) Size of angle iron = 50 × 50 × 6 mm
- (viii) Weight of one metre of angle iron = 4.5 Kg.
- (ix) Cost of angle iron = Rs. 30 Kg.
- (x) Size of pit = 30 × 30 × 45 cm
- (xi) Cost of digging pit = Rs. 1.5 pit
- (xii) Cost of cement – concrete and filling @ Rs. 1230 per cu. Metre
- (xiii) Cost of stretching and fixing the wires – 2 labour are require for fixing and stretching 250 metre wire (8 lines) wage rate = Rs. 100/labour
- (xiv) Cost of G.I. stapples = Rs. 300
- (xv) Cost of two iron gates of size 8' × 5', wt = 140 Kg, cost = Rs. 37/Kg

$$\begin{aligned}
 \text{Solution: Area of the farm} &= 5X \times 3X \\
 &= 15X^2 \\
 15X^2 &= 50,000 \text{ sq. metre} \\
 X^2 &= 3333.33 \text{ Sq. metre} \\
 X &= 57.735 \text{ metre} \\
 \text{Length of farm} &= 57.735 \times 5 \\
 &= 288.675 \text{ metre} \\
 \text{Breadth of the farm} &= 57.735 \times 3 \\
 &= 173.205 \text{ metre} \\
 \text{Perimetre of the farm} &= (\text{length} + \text{breadth}) \times 2 \\
 &= (288.675 + 173.205) \times 2 \\
 &= 923.76 \text{ metre}
 \end{aligned}$$

Total length of barbed wire, if 6 wires in horizontal line and 2 in diagonal line are taken.

$$\begin{aligned}
 \text{Total length} &= 923.76 \times 8 \\
 &= 7390.08 \text{ metre}
 \end{aligned}$$

The number of bundles of barbed wire required : 7390.08/90

$$\begin{aligned}
 &= 82.112 \\
 &= 82 \text{ Bundles}
 \end{aligned}$$

Total weight of 82 bundles @ 20 Kg per bundle

$$= 82 \times 20 \text{ Kg} = 1640 \text{ kg.}$$

Cost of wire

$$\begin{aligned}
 &= 1640 \times 42 \\
 &= \text{Rs. } 68880/-
 \end{aligned}$$

Number of iron poles required (Distance between two poles 3 metre

$$\begin{aligned}
 &= 923.76/3 \\
 &= 308 + 1 \text{ (one in beginning)} \\
 &= 309 \text{ poles}
 \end{aligned}$$

At every 10th pole – two poles extra needed which are kept tapered to provide strength to fencing.

$$\begin{aligned}
 \text{Extra poles needed} &= 309/10 \\
 &= 30.9
 \end{aligned}$$

Extra poles needed	=	$31 \times 2 = 62$
Poles needed in the beginning	=	2
Total number of poles needed	=	$309 + 62 + 2$
	=	373
Height of pole (Angle iron)	=	1.5 metre above ground + 0.3 metre in ground
	=	1.8 metre
Size	=	$50 \times 50 \times 6\text{mm}$
Weight of 1 metre of angle iron	=	4.5 Kg.
Weight of 1 pole	=	4.5×1.8
	=	8.1 kg.
Weight of 373 poles	=	8.1×373
	=	3021.3 Kg.
Total cost of poles @ Rs. 30/- Kg.	=	3021.3×30
	=	Rs. 90639
Size of each pit for fixing the poles	=	$30 \times 30 \times 45\text{ cm}$
	=	0.0405 cubic metre
Volume	=	0.04 cu. Metre
Total volume of 373 pits	=	0.04×373
	=	14.92 cu. Metre
Cost of digging pits @ Rs. 1.5/pit	=	373×1.5
	=	Rs. 559.50/-
Cost of cement – concrete and filling @ Rs. 1230/- cu. Metre		
Ratio – cement : sand : grit	=	1:3:6
Cost of filling	=	1230×14.92
	=	Rs. 18351.60

Cost of stretching and fixing the wires:

2 labour are required for stretching and fixing 250 metre wire (8 lines):

Labour required	=	$923.76/250$
	=	3.69
	=	4 labour
	=	4×2
	=	8

Wage rate Rs. 100/ Labour

Cost of stretching and fixing wires	=	8×100
	=	Rs. 800

Cost of G.I. staples to fix the wire	=	Rs. 300
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Two iron gates of size 8' × 5'

Weight of two gates	=	70×2
	=	140 Kgs
Cost / Kg.	=	Rs. 37
Cost of two gates	=	140×37
	=	Rs. 5180

The total cost of fencing will be as follows:

(i) Cost of barbed wire	=	Rs. 68,880.00
(ii) Cost of iron poles	=	Rs. 90,639.00
(iii) Cost of digging the pits	=	Rs. 559.50

(iv) Cost of cement–concrete and filling	=	Rs. 18,351.60
(v) Cost of stretching and fixing wires	=	Rs. 800.00
(vi) Cost of G.I. Stapples	=	Rs. 300.00
(vii) Cost of two gates	=	Rs. 5,180.00
Total Cost	=	Rs. 1,84,710.10

RESULT:

Cost per running metre = $1,84,710.00/923.76 = \text{Rs. } 199.95$

Problem 22

Determine the cost of fencing per metre from the following information:

- (i) Area of the farm = 10 ha.
- (ii) Sides of the farm are in the ratio of 3:2
- (iii) Length of one bundle of barbed wire = 90 metre
- (iv) Weight of one bundle of barbed wire = 15 Kg.
- (v) Cost of wire – Rs. 40/Kg. of G.I. coated wire
- (vi) Distance between two poles = 3 metre, at every 10th pole – two extra poles needed which are kept tapered.
- (vii) Height of iron pole – 1.8 metre (1.5 metre above ground + 0.3 metre in ground)
- (viii) Size of angle iron = $50 \times 50 \times 6$ mm
- (ix) Wt. of one metre of angle iron = Rs. 4.5 Kg.
- (x) Cost of angle iron = Rs. 30 / Kg.
- (xi) Size of pit = $30 \times 30 \times 45$ cm.
- (xii) Cost of digging pit = Rs. 1.5 per pit
- (xiii) Cost of cement–concrete & filling @ Rs. 1225 per cu. metre
- (xiv) Cost of stretching and fixing the wire – 2 labour are required for fixing and stretching 250 metre wire (8 lines)
- (xv) Wage rate = Rs. 100/labour/day
- (xvi) Cost of G.I. stapples = Rs. 250
- (xvii) Cost of two iron gates : size $8' \times 5'$, wt. = 125 Kgs, Rate = Rs. 35/– kg.

EXERCISE 23

OBJECTIVE: To study the different cost concepts and to work out the cost of cultivation

Cost of cultivation:

It refers to the total expenses incurred in production of crops per hectare of the land area.

Cost of Production:

It refers to the expenses incurred in producing per quintal of crop output. It is worked out by dividing the cost of cultivation per hectare by the yield of crop.

$$\text{Cost of production per quintal} = \frac{\text{Cost of cultivation} - \text{Value of byproduct}}{\text{Quantity of main product}}$$

To compute the cost of cultivation of crops, following cost items are considered.

Cost items

1. Value of hired human labour
2. Value of owned bullock labour
3. Value of hired bullock labour
4. Value of owned machine labour
5. Value of hired machine labour
6. Value of owned seed
7. Value of purchased seed
8. Value of owned farm yard manure (FYM)
9. Value of purchased farm yard manure (FYM)
10. Value of fertilizers and insecticides
11. Irrigation charges
12. Land revenue
13. Interest on working capital
14. Depreciation
15. Miscellaneous expenses
16. Rent paid for leased in land
17. Interest on fixed capital
18. Rental value of owned land
19. Value of family labour

Cost Concepts:

There are many cost concepts used in Farm Management Studies in India, viz., Cost A₁, Cost A₂, Cost B, and Cost C.

A brief discussion of these cost concepts is as follows:

(i) Cost A₁ : It includes the following 16 items of costs :

1. Value of hired human labour (Permanent and casual)
2. Values of owned bullock labour

3. Value of hired bullock labour
4. Value of owned machinery
5. Hired machinery charges
6. Value of fertilizers
7. Value of manure (Owned and purchased)
8. Value of seed (both farm produced and purchased)
9. Value of insecticides and pesticides
10. Irrigation charges (both owned and hired machines)
11. Canal water charges
12. Land revenue, cesses, and other taxes
13. Depreciation on farm implements (both bullock drawn and used by human labour)
14. Depreciation on farm buildings, farm machinery and irrigation structure
15. Interest on working capital
16. Miscellaneous expenses (artisans, ropes and repairs of small farm implements)
- (ii) Cost A_2 : It is cost A_1 plus
17. Rent paid for leased-in land
- (iii) Cost B : It is cost A_2 plus
18. Imputed rental value of owned land (less land revenue paid there upon)
19. Imputed interest on fixed capital (excluding land)
- (iv) Cost C : It is Cost B plus
20. Imputed value of family labour

This classification originated from the various types of farming system. Cost A_1 relates to an owner farm situation where the farmer contributes land and other resources. If all land is leased in and land rent is to be paid, cost A_2 is the relevant cost. This is also called as tenant cost. Treating all land in the similar way i.e., considering imputed rent to be paid to the owned land also and imputed interest to be paid on the own fixed capital, gives cost B . cost C is a business like concept in which even the imputed cost of family labour is considered.

It can thus be seen that cost C is a very comprehensive concept. Built into it are returns to labour in the farm of imputed value of family labour, the price of capital is provided by way of interest charged on this capital, and the price of land is paid by providing rent as the imputed value of land. The residual is a return to management for his managerial functions which also include risk and uncertainty element that any entrepreneur takes in launching a business.

New Cost Concepts:

To facilitate the computation of returns to different factors of production the cost items can be categorized into following six cost groups :

Cost Groups	Items of costs included
Cost A_1	Sum of item Number (1) to (15)
Cost A_2	Cost A_1 + Rent paid for leased in land
Cost B_1	Cost A_1 + Interest on fixed capital
Cost B_2	Cost B_1 + Rent paid for leased in land + Rental value of owned land
Cost C_1	Cost B_1 + Value of family labour
Cost C_2	Cost B_2 + Value of family labour

New Cost C_3 = Cost C_2 + Cost of management i.e. 10% of Cost C_2

Cost C_3 = Cost C_2 + 10% of Cost C_2

Operational Costs (OC)

It is the variable cost which vary with the level of production. It is defined as follows :

$$OC = \text{Cost } A_1 - \text{land revenue} - \text{Depreciation} + \text{wages of family labour}$$

Overhead Cost (OHC)

It is fixed cost to be incurred irrespective of the size of production. It is defined as follows :

$$OHC = \text{Cost } C_2 - OC$$

Income Measures

Important income measures which are used to study the profitability of crops

Gross Income (GI)

It is the total value of main product as well as by-product

$$GI = Q_m \times P_m + Q_b \times P_b$$

Where:

GI	=	Gross income
Q _m	=	Quantity of main product
P _m	=	Price of main product
Q _b	=	Quantity of by-product
P _b	=	Price of by-product

Return over variable cost

It is the return over variable cost. It is worked out by deducting all items of variable cost from gross income. It is defined as follows:

$$\text{Return over variable cost} = \text{Gross income} - \text{Total variable cost}$$

Family Labour Income (FLI)

It is the return to family labour (including management). It is defined as :

$$FLI = \text{Gross income} - \text{Cost } B_2$$

Net Income (NI)

It is the net profit after deducting all cost items i.e., variable and fixed costs from gross income . It is defined as:

$$NI = \text{Gross income} - \text{Total cost (Cost } C_2)$$

Farm Business Income (FBI)

It refers to the returns to family labour, owned land, owned fixed capital and management. It is expressed as :

$$F.B.I. = \text{Gross income} - \text{Cost } A_2$$

Return Per Rupee (RPR)

It is defined as follows:

$$RPR = \frac{\text{Gross Income (GI)}}{\text{Total Cost (Cost } C_2)}$$

EXAMPLE 23

The following data were obtained by a researcher in a research study conducted on wheat crop in Jorpura village of Phulera tehsil. Compute the cost of production and different measures of costs and returns.

S. No.	Particulars	Value (Rs./ha)
1.	Value of hired human labour	423.60
2.	Value of owned bullock labour	719.32
3.	Value of hired bullock labour	Nil
4.	Value of owned machine labour	776.30
5.	Value of hired machine labour	2367.32
6.	Value of owned seed	924.25
7.	Value of purchased seed	538.26
8.	Value of farm yard manure (FYM)	2546.36
9.	Value of fertilizers	1303.34
10.	Value of insecticides	243.48
11.	Irrigation charges	1569.56
12.	Land revenue	16.98
13.	Interest on working capital	399.42
14.	Depreciation	442.98
15.	Rent paid for leased in land	Nil
16.	Interest on fixed capital	1682.26
17.	Rental value of owned land	7536.60
18.	Value of family labour	5817.40
	Total Cost (Cost C ₂)	Rs. 27307.42
	Gross Income	Rs. 27000
	Yield of Wheat (in qtls.)	42

Results:

Cost and Returns

- (i) Operational Cost (Rs.) = 12271.16 – 16.98 – 442.98 + 5817.40 = 17628.60
- (ii) Overhead Cost (OHC) = 27307.42 – 17628.6 = 9678.82
- (iii) Return over variable Cost (Rs.) = 27000 – 17628.6 = Rs. 9371.40
- (iv) Family labour income (Rs.) = 27000 – 21490.02 = 5509.98
- (v) Net Income (Rs.) = 27000 – 27307.42 = – 307.42
- (vi) Farm business income (Rs.) = 27000 – 12271.16 = 14728.84
- (vii) Return per rupee (Rs.) = $\frac{27000}{27307.42} = 0.989$
- (viii) Cost of production (Rs. Per qtl.) = $\frac{27307.42}{42} = 650.18$

Problem 23

Compute the various measures of costs and returns for wheat crop from the information given in the following table:

S. No.	Particulars	Value (Rs./ha)
1.	Value of hired human labour	400
2.	Value of owned bullock labour	500
3.	Value of hired bullock labour	Nil
4.	Value of owned machine labour	150
5.	Value of hired machine labour	1500
6.	Value of owned seed	500
7.	Value of purchased seed	400
8.	Value of farm yard manure (FYM)	1000
9.	Value of fertilizers	100
10.	Value of insecticides	100
11.	Irrigation charges	1000
12.	Land revenue	10
13.	Interest on working capital	200
14.	Depreciation	300
15.	Miscellaneous expenses	Nil
16.	Rent paid for leased in land	Nil
17.	Interest on fixed capital	1000
18.	Rental value of owned land	3000
19.	Value of family labour	2800
	Total Cost (Cost C ₂)	-----
	Gross Income	Rs. 16000
	Yield of Wheat (in qtls.)	35.00

Compute the following measures of costs and returns from the above information :

- (i) Operational Cost
- (ii) Overhead Cost (OHC)
- (iii) Return over variable cost
- (iv) Family labour income
- (v) Net Income
- (vi) Farm business income
- (vii) Return per rupee
- viii) Cost of production (Rs. Per qtl.)

EXERCISE 24

OBJECTIVE : Economic analysis of different crops and livestock enterprises

Economic Analysis of Different Crop Enterprises

In this case different economic aspects viz. component wise cost incurred (cost and cost structure) in the cultivation of different crops, total cost of cultivation, cost of production and returns from cultivation of major crops in Jaipur district of Rajasthan during 2005–06 have been analysed.

For studying the cost of cultivation of major crops, the following cost items were considered in the cost structure:

- (i) Seed
- (ii) Farm yard manure
- (iii) Fertilizers
- (iv) Plant protection chemicals
- (v) Irrigation charges
- (vi) Human labour – owned and hired
- (vii) Machine labour – owned and hired
- (viii) Interest on working capital
- (ix) Depreciation
- (x) Land revenue
- (xi) Interest on fixed capital
- (xii) Rental value of owned land

It is evident from table 1 that the estimated cost of cultivation of pearl millet, groundnut, wheat and mustard in Jaipur district in the year 2005–06 was Rs. 14830.09, Rs. 22089.16, Rs. 24271.16 and Rs. 20610.32 per hectare, respectively.

Table 1
Components of Cost Incurred in the Cultivation of Major Crops in Jaipur District of Rajasthan, 2005-06
 (Rs./Ha.)

S. No.	Particulars	Pearlmillet		Groundnut		Wheat		Mustard	
1	Seed	150.20	(1.01)	2441.71	(11.06)	1542.44	(6.36)	239.38	(1.16)
2	Farm yard Manure	855.62	(5.77)	957.14	(4.33)	1900.81	(7.83)	687.50	(3.34)
3	Fertilizer	435.29	(2.94)	857.14	(3.88)	806.50	(3.32)	1350.00	(6.55)
4	Plant Protection chemicals	55.00	(0.37)	228.57	(1.03)	173.17	(0.71)	150.00	(0.73)
5	Irrigation charges	1571.83	(10.60)	3437.14	(15.66)	4311.54	(17.76)	2836.25	(13.76)
6	Human Labour	3342.15	(22.54)	4780.65	(21.64)	5002.12	(20.61)	4970.00	(24.11)
A	Owned Labour	2817.05	(19.00)	3640.30	(16.48)	3822.28	(15.75)	4128.75	(20.03)
B	Hired Labour	525.10	(3.54)	1140.35	(5.16)	1179.84	(4.86)	841.25	(4.08)
7	Machine Power	1736.34	(11.71)	2531.43	(11.46)	3663.09	(15.09)	3586.25	(17.40)
A	Owned	843.15	(5.66)	980.65	(4.44)	1089.43	(4.49)	667.50	(3.24)
B	Hired	893.19	(6.02)	1550.78	(7.02)	2573.66	(10.60)	2918.75	(14.16)
8	Interest on working capital	203.66	(1.37)	375.84	(1.70)	391.49	(1.61)	310.94	(1.51)
9	Depreciation	1260.00	(8.50)	1260.00	(5.71)	1260.00	(5.19)	1260.00	(6.11)
10	Land Revenue	20.00	(0.13)	20.00	(0.09)	20.00	(0.08)	20.00	(0.10)
11	Interest on fixed capital	1940.00	(13.08)	1940.00	(8.78)	1940.00	(7.99)	1940.00	(9.41)
12	Rental Value of Owned land	3260.00	(21.98)	3260.00	(14.76)	3260.00	(13.43)	3260.00	(15.82)
	Total Cost	14830.09	(100.00)	22089.16	(100.00)	24271.16	(100.00)	20610.32	(100.00)

Figures in parentheses indicate the percentage of total cost.

The share of rental value of owned land varied from 13.43 per cent in wheat crop to 21.98 per cent in pearl millet crop. The percentage share of interest on fixed capital in total cost was 13.08, 8.78, 7.99 and 9.41 per cent, respectively in pearl millet, groundnut, wheat and mustard. Among the variable items of cost human labour was the most important one followed by machine labour and irrigation charges. Share of human labour ranged from 20.61 per cent in wheat crop to 24.11 per cent in mustard crop whereas, the share of machine labour varied from 11.46 per cent in groundnut to 17.40 per cent in mustard crop. Further, in human labour the share of owned labour was more than that of hired labour as against this in case of machine labour the share of hired machine labour was more than the owned machine labour. Irrigation charges was also major item of cost. Its share in total cost was 10.60, 15.66, 17.76 and 13.76 per cent, respectively in the selected crops. The cost of seed (11.06 per cent) in groundnut crop was another important item of cost.

Cost of cultivation and cost of production :

Cost of cultivation and cost of production of selected crops is presented in table 2. It is clear from the table that operational cost exceeded the overhead cost in case of all the four selected crops. Cost A₁, A₂, B₁, B₂, C₁ and C₂ were calculated as per standard pattern (For details please refer practical exercise No. 23). Both Cost A₁ and A₂ were equal as there was no case of leased – in land. The cost of cultivation (Cost C₂) of pearl millet, groundnut, wheat and mustard in the study area was Rs. 14830.09, Rs. 22089.62, Rs. 24271.16 and Rs. 20610.32 per hectare, respectively. Cost of production of these crops was Rs. 433.95, Rs. 1009.25, Rs. 403.61 and Rs. 1446.34 per quintal, respectively.

Table 2

Cost of Cultivation and Cost of Production of Major Crops in Jaipur District of Rajasthan, 2005-06

Particulars	Pearlmillet	Groundnut	Wheat	Mustard
Cost of Cultivation (Rs./Ha.)				
O.C.	8350.09	15609.62	17791.16	14130.32
O.H.C.	6480.00	6480.00	6480.00	6480.00
Cost A ₁	6813.04	13249.32	15248.88	11281.57
Cost A ₂	6813.04	13249.32	15248.88	11281.57
Cost B ₁	8753.04	15189.32	17188.88	13221.57
Cost B ₂	12013.04	18449.32	20448.88	16481.57
Cost C ₁	11570.09	18829.62	21011.16	17350.32
Cost C ₂	14830.09	22089.62	24271.16	20610.32
Cost of Production (Rs./Qtl.)				
Main Product (Qtl./Ha.)	21.50	20.5	34.12	14.25
By Product (Qtl./Ha.)	22.00	4.0	35.00	0.00
Value of main Product (Rs./Ha.)	12900.00	26650.00	27296.00	24438.75
Value of by – Product (Rs./Ha.)	5500.00	1400.00	10500.00	0.00
Gross value (Rs./Ha.)	18400.00	28050.00	37796.00	24438.75
Cost of Production (Rs./Qtl.)	433.95	1009.25	403.61	1446.34

Returns

The returns from cultivation of selected crops are depicted in table 3. It is evident from the table that gross income and net income from the selected crops was Rs. 18400.00, Rs. 28050.00, Rs. 37796.00, Rs. 24438.75 and Rs. 3569.91, Rs. 5960.38, Rs. 13524.84 and Rs. 3828.43 per hectare, respectively. Further, among the selected crops gross income and net income were highest in case of wheat crop and lowest in pearl millet crop. The return per rupee (B:C ratio) was 1.24, 1.27, 1.56 and 1.19, respectively. The return per rupee investment was also

highest in case of wheat crop. Hence, it could be concluded that among the selected crops wheat was the most profitable crop followed by groundnut, pearl millet and mustard crop.

Table 3
Returns from Cultivation of Major Crops, 2005-06

Particulars	Pearlmillet	Groundnut	Wheat	Mustard
Gross Income	18400.00	28050.00	37796.00	24438.75
Net Income	3569.91	5960.84	13524.84	3828.43
Farm Business Income	11586.96	14800.68	22547.12	13157.18
Family Labour Income	6386.96	9600.68	17347.12	7957.18
Farm Investment Income	8754.91	11160.38	18724.84	9028.43
Returns Per Rupee /B:C Ratio	1.24	1.27	1.56	1.19

Economic Analysis of Livestock Enterprises

OBJECTIVE: To workout the Economics of milch animals.

In this example milch animals are cross bred cows and their number is 10.

EXAMPLE

Computation of Net Income from the given information :

	Particulars	Amount (Rs.)
A.	Capital Expenditure	
	(i) Cost of milch Cows	2,50,000.00
	(ii) Cost of dairy shed/feed store	80,000.00
	(iii) Cost of Manure pit	3,000.00
	(iv) Dairy equipments/Utensils	7,000.00
	Total	3,40,000.00
B.	Fixed Cost	
	(i) Interest on capital expenditure @12% per annum	40,800.00
	(ii) Depreciation in livestock	12,500.00
	(iii) Depreciation on buildings	4,000.00
	(iv) Depreciation in equipments/Utensils	700.00
	(v) Insurance Charges	10,000.00
	Total Fixed costs	68,000.00
C.	Variable (Recurring) Expenses	
	(i) Cost of dry fodder – quantity @ 6 kg/cow/day price = Rs. 3/kg	65,700.00
	(ii) Cost of green fodder – quantity @ 5 kg/cow/day Price = Rs. 2/kg	36,500.00
	(iii) Cost of concentrates – quantity @ 4 kg/cow/day Price = Rs. 7/kg	1,02,200.00
	(iv) Cost of mineral mixture – quantity @ 50 gms/cow/day Price = Rs. 70/kg	12,775.00
	(v) Labour charges	72,000.00
	(vi) Veterinary care	10,000.00
	(vii) Conception Expenses	2,000.00
	(viii) Miscellaneous expenses (Electricity, Water, Repairs etc.)	10,000.00
	(ix) Interest on variable expenses (@ 10% per annum for 6 months)	15,558.75
	Total Variable Expenses	3,26,733.75
	Total Expenses (Fixed + Variable)	3,94,733.75
D.	Income	
	(i) Total Milk production @ 13 litre/cow/day (7 cows in milking stage throughout the whole year)	13 × 7 × 365 = 33215 litres
	(ii) Price of milk	Rs. 15/litre
	(iii) Gross returns from sale of milk	4,98,225.00
	(iv) Sale of calves	3,000.00
	(v) Sale of manure	5,000.00
	Total Income	5,06,225.00

$$\begin{aligned}\text{Net Income} &= \text{Rs. } 5,06,225 - \text{Rs. } 3,94,733.75 \\ &= \text{Rs. } 1,11,491.25\end{aligned}$$

RESULT:

Total Net Income from 10 milch Cows = Rs. 1,11,491.25

CONCLUSION:

It can be concluded from the results of the study that commercial dairy is remunerative activity where returns to capital investment come to 32.79 percent which is more encouraging as compared to returns in agriculture.

Problem

Work out the Economics of milch animals viz buffaloes, cows, goats of your locality. Also compare the profitability and interpret the results.

EXERCISE 25

OBJECTIVE: To estimate the Break-Even-Point from the given information.

Break even analysis is one of the controlling devices which is used by bankers to evaluate a project. It is an important tool of profit planning. It is also called cost-volume profit (CVP) analysis. It facilitates cost control by measuring operational efficiency. At break even point the project neither makes profit nor incur losses.

For calculating break even point we need to understand the following concepts:

- (i) **Fixed Cost:** Fixed Costs (FC) are those costs which remain constant whether there is increase or decrease in production over a given period of time. These costs are fixed in nature and incur as soon as the business is started. The concept of fixed costs remain valid upto a particular level of operation.
- (ii) **Variable Costs:** Variable costs (VC) are those costs which vary according to the level of production attained. They will increase if the production is increased even by one unit or decrease when there is decrease in production.
- (iii) **Selling Price:** Selling price is that price at which the goods are sold.
This is the per unit revenue generated by the business.
 $\text{Total revenue/Total Sales/Income} = \text{Selling price} \times \text{Quantity sold.}$
- (iv) **Contribution margin:** Contribution margin is the difference between total revenue and the variable cost. In other words:
 $\text{Contribution margin} = \text{Total revenue} - \text{Variable cost}$
It may be noted that for calculating contribution margin, fixed cost is not considered.
 $\text{Total revenue} = \text{selling price} \times \text{quantity sold}$

Formula for calculating Break Even Point:

$$\text{BEP} = \frac{\text{Fixed Costs}}{\text{Contribution Margin}} = \frac{\text{Fixed Costs}}{\text{Total Revenue} - \text{Variable Cost}}$$

EXAMPLE 25 (I)

Computation of Break-Even-Point from the given information:

S. No.	Particulars	Amount (Rs. in Lakhs)
A.	INCOME	169.60
B.	VARIABLE COST	
	Cost of Material	81.37
	Cost of Packing Material	32.55
	Salary & Wages	17.13
	Power & Fuel	3.15
	General Administration	1.97
	Interest on Working Capital Loan	2.86
	Sub Total	139.02
C.	CONTRIBUTION MARGIN (A-B)	30.58

D.	FIXED COST	
	Cost of Material	4.28
	Cost of Packing Material	1.71
	Salary & Wages	4.28
	Power & Fuel	0.79
	General Administration	0.35
	Interest on Term loan	0.52
	Depreciation	0.91
	Other Expenses	0.10
	Sub Total	12.94
E.	BREAK EVEN POINT (%)	$\frac{12.94}{30.58} = 0.4231 = 42.32\%$ $= 42.32 \times \text{capacity utilization}$ $\text{capacity utilization} = 80\%$ $80\% \text{ of } 42.32 = 33.86$ 33.86

RESULT:

Break-Even-Point = 33.86 %

Important Considerations:

- (1) Fixed costs and variable costs must be segregated in a judicious manner. This will give a realistic break even point.
- (2) Assumptions regarding percentage to be applied in classifying a particular cost into variable and fixed must be based on trend prevalent in the industry to which the product to be manufactured belongs.
- (3) The basis for calculating break even point should be that year in which optimum operation is expected to be achieved.

EXAMPLE: 25 (II)

Estimation of Break even Point for a wheat threshing and winnowing machine.

Procedure for estimation of the minimum size of operations required to justify the purchase of a wheat threshing and winnowing machine is illustrated by the following example :

S. No.	Particulars	Amount (Rs.)
A.	Initial Costs	
	Price of power wheat threshing and winnowing machine	35,000
	VAT @ 12% of the value of machine	4200.00
	Transport charges of the machine	600.00
	Price of 10 H.P. electric motor	20,000.00
	VAT @ 12% of the value of motor	2,400.00
	TOTAL INITIAL COSTS	62,200.00
	Junk value of thresher and motor	5000.00
	Expected useful life of thresher and motor	10 Years
B.	Annual Fixed Cost	
	Annual depreciation on thresher and motor	5,000.00
	Annual interest @ 10% on half of the total investment	3,110.00
	Annual repair and maintenance charges	2,000.00
	TOTAL ANNUAL FIXED COST	10,110.00
C.	Variable cost per hour	
	Unskilled labour 2 persons @ Rs. 160 per labour per day	40.00
	One operator @ Rs. 200 per day	25.00
	Electricity consumed per hour 8 units @ 5.00 per unit	40.00
	Use-repair	5.00
	TOTAL VARIABLE COST PER HOUR	110.00
D.	Break-Even-Point	
	Output of machine per hour	8 qtls
	Variable cost per qtl	13.75
	Custom charges per qtl.	35.00

$$\text{Break Even Point} = \frac{\text{Total annual fixed costs}}{\text{Custom charges} - \text{Variable costs}}$$

$$\text{B.E.P.} = \frac{\text{FC}}{\text{S} - \text{VC}}$$

Where,

BEP	=	Stands for Break Even Point
FC	=	Annual Fixed Cost
S	=	Custom Charges; and
VC	=	Variable Cost

$$= \frac{10,110.00}{35.00 - 13.75} = \frac{10,110}{21.25} = 475.76 \text{ Qlt}$$

RESULTS:

The minimum quantity of wheat to be threshed to justify the purchase of one power wheat thresher is 475.76 qtls.

Problem 25

With the help of following information compute the minimum size of operation (Break Even Point) required to justify the purchase of a hand operated maize sheller:

S. No.	Particulars	Amount (Rs.)
A.	Initial Costs	
	Price of maize sheller	5,600.00
	VAT @ 12% of the value of sheller	-----
	Transport charges of the sheller	200.00
	Junk value of maize sheller	600.00
	Expected useful life of sheller	5 Years
	Capacity per hour	2 qtls
B.	Annual Fixed Cost	
	Annual depreciation on sheller	-----
	Annual interest @ 10% on half of the total investment	-----
	Annual repair and maintenance charges	350.00
	TOTAL ANNUAL FIXED COST	-----
C.	Variable cost per hour	
	Unskilled labour	15.00
	Supervision @ Rs. 120 per day	15.00
	TOTAL VARIABLE COST PER HOUR	30.00
	Variable cost of shelling per qtl	-----
	Custom charges per qtl.	30.00