REPORT ON VISIT TO KERALA DURING 18-20 JUNE, 2014

Department of Agriculture & Cooperation
Krishi Bhavan
New Delhi

REPORT ON VISIT TO KERALA DURING 18-20 JUNE, 2014

Dr. Jose C. Samuel, Chief Consultant visited Kannur and Kozhicode districts of Kerala during 18-20 June, 2014 to review the progress under National Horticulture Mission (NHM) in these districts. He also visited the Krishi Vigyan Kendra (KVK), Kannur, to see the Integrated Vertical Farming System (IVFS) developed by them. Report on the IVFS has been submitted separately **(Annexure).**

REVIEW OF NHM ACTIVITIES

a) Kannur District

Shri Dinay Chandran, Deputy Director Agriculture (Hort.) Kannur, Ms. Remya Field Assistant and Shri Baiju Pedavoor, Field Assistant, Kaliparamb accompanied during the visit.

The major horticultural crops being grown in the district are coconut, cashewnut, pepper, banana and vegetables. Details of area, production and productivity of some of the major horticultural crops taken up for development under NHM in the district are given in **Table- 1.**

Table1: Area, Production & Productivity of Horticultural crops in Kannur District

Area in ha, production in MT, Productivity in MT/ha

Sl. No.	Crop	2007-08			2011-12			Difference (%)		
		Area	Prod.	Pvty.	Area	Prod.	Pvty.	Area	Prod.	Pvty.
1.	Banana	5000	27063	5.41	4913	28506	5.80	-1.7	5.3	7.2
2.	Pepper	1253	1856	1.48	4961	1928	0.39	295.9	3.9	-73.8
3.	Cashew	19366	25715	1.33	23190	24205	1.04	19.7	-5.9	-21.4
8	Pineapple	175	9225.3	52.72	125	756	6.05	-28.6	-91.8	-88.5
5.	Turmeric	138	451	3.27	126	460	3.65	-8.7	2.0	11.7
6.	Mango	7133	52641	7.38	7647	59681	7.80	7.2	13.4	5.8
Total		**33065.0**	**116951.3**	**3.54**	**40962**	**115536**	**2.82**	**23.9**	**-1.2**	**-20.3**

Source: SHM, Kerala, APP 2014-15

The activities taken up under NHM in Kannur District are area expansion mango, pineapple, banana, flowers, spices, cashew & cocoa, rejuvenation, protected cultivation, creation of water resources and HRD. An expenditure of Rs. 18.66 crore

was incurred till 2013-14 in the district. The outlay for 2014-15 is Rs. 1.39 crore. Summary details of expenditure incurred since 2011-12 in the district are given in **Table2.**

Table 2: Summary details of Expenditure in Kannur District under NHM

Year	Exp (Rs. in lakh)	Main activities
2011-12	252.25	Area expansion, rejuvenation, creation of Water Resource, protected cultivation, INM/IPM Vermi compost, Hort. mechanization.
2012-13	153.18	Area expansion, rejuvenation protected cultivation, vermi compost, HRD, Farm Mechanization.
2013-14	138.53	Area expansion, creation of water resources, protected cultivation, vermi composting, HRD, Hort. Mechanization
2014-15	139.13	About 33% of outlay earmarked for area expansion.

There has been decrease in the area production and productivity of pineapple, which need to be reviewed.

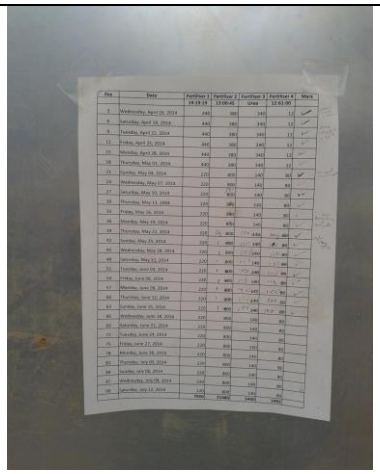
KVK, Kannaur was involved for HRD as well as INM/IPM infrastructure activities. However, the infrastructure created for training of gardeners is not being utilized for the purpose now, as the KVK has discontinued training programme for gardeners.

Observations of NHM activities visited in Kannur District

Mr. K. T. Ayoob, Thazhe Chovva PO, Edakhad Block constructed a naturally ventilated green house during the year 2013-14. Total cost of the structure is Rs. 8.50 lakh. Subsidy assistance of Rs. 3.27 lakh has been paid. He was not present during the time of visit.

Mr. Ayoob has taken up cultivation of salad cucumber. It was objective that there was leakage in cladding material, which has resulted in high humidity and moisture levels inside the green house. This has also resulted in infestation of pest and disease.

Mr. Rajrathnam, Mundon Home, Kadachira, Edakhad Block has constructed a naturally ventilated green house (400 m^2) during 2012-13. Total cost of the structure is Rs. 7.00 lakh. Subsidy amount of Rs. 2.805 lakh has been released to him. He has taken up cultivation of salad cucumber.



Mr. Rajarathnam has been taking good care of the crop, duly maintaining records of temperature, fertilizer doze etc. He said that he has been able to get good price for his crop in Kannur market.

Mr. Sathyanadhan, Kottoor, Kadachira, Edakkad Block has constructed a naturally ventilated green house (400 m^2) during 2012-13. Total cost of the structure is Rs. 7.50 lakh. A subsidy amount of Rs. 2.805 lakh has been released to the farmer.

Mr. Sathyanadhan has harvested one crop of cow pea. He has got a price of Rs. 40 per kg. He was planning to take up the next crop in another 20 days time. He suggested that there was need for better market tie up for selling his produce. Moreover, farmers need to be training on green house cultivation and maintenance of structure.

View of Vermi compost unit set up at Kuthuparamba Higher Secondary School, Kuthusparamba constructed during 2013-14.

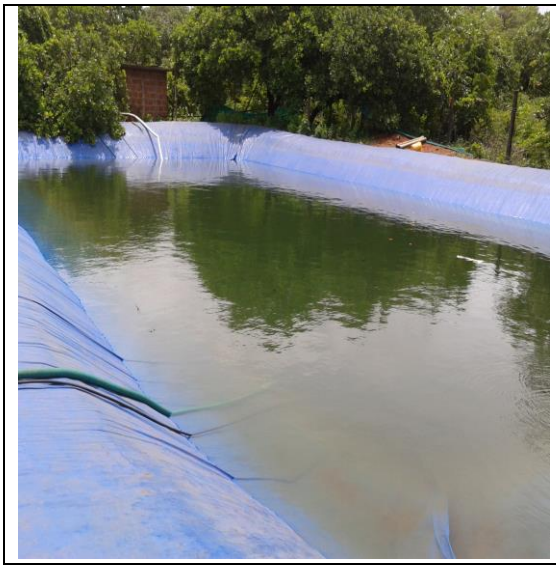
Total cost of the structure is Rs. 1.00 lakh. Subsidy amount of Rs. 0.30 lakh has been released. Mr. Rajan, Teacher of KHSS has been taking keen interest in promoting organic cultivation. Students are being involved in vermi composting as an extracurricular activity, which is a welcome sign worth appreciation. Mr. Rajan suggested the need for organizing training programmes and exposure visits outside the state to learn latest technologies in agriculture.

Mr. Jayaprakashan, Mangatidam, Kutthuparamba Block has purchased brush cutter and garden tiller during 2012-13 by availing subsidy of Rs. 21,732 under horticulture mechanization component of NHM.

Mr. Jayaprakash explained that the brush cutter was very useful for removing the weeds, which was a serious problem in his farm on account of high rainfall. The weed cutter was light in weight. The garden tiller was also useful, particularly for field preparation before monsoon. However, it was difficult to operate it on wet soils. The equipments are being supplied by Regional Agriculture Industrial Development Corporation (RAIDCO), Kerala.

Mr. Mammali Devakaran, Cheruvancheri, Pattiam, Kuthuparamba Block has taken up cultivation of TC banana (Nendran) in an area of 0.4 ha. He has incurred a total expenditure of Rs. 85,000/-. Planting material was purchase @ Rs. 15.00/- per plant through a Departmental nursery. Subsidy amount of Rs. 12,480/- has been paid to the farmer.

Leaf curl was observed in the some of the plants due to nutrient deficiency. TC banana was being cultivated without any system for fertigation.



Water harvesting tank constructed at Shantigiri Ashram, Pattiam, Kuthuparamba Block during 2010-11 (size 14mx12mx4m). Subsidy assistance of Rs. 60,000 was provided for the structure.

The stored water is being used for cultivating cut flowers (Anthuriam). Subsidy assistance of Rs. 35,000 was provided during 2011-12 for anthuriam cultivation. There was ready market for the flowers, which was being sent to Delhi through their representative via Ernakulum.

b) Kozhicode District

Ms T. Geeta, Deputy Director of Agriculture (Hort.) Ms Sabeena, Agriculture Officer, Mukkom and Ms Shabana, Field Assistant, Mukhom accompanied during the visit.

The main horticulture crops being grown in the districts are coconut, banana, cashewnut, cocoa pepper and vegetables. Details of area, production and productivity of some of the main horticulture crops taken up for development in the district are given in **Table 3.**

Table 3: Area, Production & Productivity of Major Horticulture Crops in Kozhicode District

Year	2009-10			2011-12			% Difference		
Name of the crop	Area (ha)	Prodn. (MT)	Pvty (T/ha)	Area (ha)	Prodn. (MT)	Pvty (T/ha)	Area (ha)	Prodn. (MT)	Pvty (T/ha)
Banana	4466	22269	4.99	4473	24175	5.40	0.2	8.6	8.4
Pepper	7972	1010	0.13	3420	615	0.18	-57.1	-39.1	41.9
Cashew	2068	704	0.34	2304	703	0.31	11.4	-0.1	-10.4
Ginger	104	401	3.86	78	246	3.15	-25.0	-38.7	-18.2
Turmeric	295	721	2.44	302	732	2.42	2.4	1.5	-0.8
Total	**14905**	**25105**	**1.68**	**10577**	**26471**	**2.50**	**-29.0**	**5.4**	**48.6**

Source: Mission Director, SHM, Kerala, AAP 2014-15.

Main activities taken up in Kozhicode district are setting up small nursery, area expansion (Mango, cut flower, turmeric, nutmeg, cashew, cocoa), rejuvenation, setting up of vermi compost units, creation of water resources, protected cultivation, horticulture mechanization and HRD.

An expenditure of Rs. 7.02 crore has been incurred in Kozhicode district during the period 2011-12 to 2013-14 under NHM and RKVY. Year wise expenditure details are given in **Table 4.**

Table 4: Summary Details of Expenditure in Kozhicode district

Year	Expenditure (Rs. in lakh)	Main activities
2011-12	238.62	Area expansion, rejuvenation, creation of water resources and vermi compost unit.
2012-13	238.22	Area expansion, rejuvenation, protected cultivation, creation of water resources and HRD.
2013-14	225.64	Area expansion, rejuvenation, protected cultivation, creation of water resources, vermi compost units and HRD.

Vegetable Initiative for Urban Clusters is being implemented in the district since 2012-13.

There has been decline in the area, production and productivity of spices, crops (pepper, ginger and turmeric) in the district which needs attention for taking up remedial measures.

Like Kannur, no activities on PHM have been implemented in Kozhicode district also. Main activity has been area expansion. Protected cultivation has been taken up since the last two years.

Observations on activities visited in Kozhicode District

Mr. Abdul Razak, a progressive farmer from Kappad, has taken up hi-tech cultivation of flowers and vegetables covering an area of 400 m^2 during 2012-13. He has harvested two crops of cucumber. He has imported tomato seeds after his next crops.

The farming Operation in green house is fully automated and has provision for fertigation. Mr. Razak mentioned that he had gained experience in green house farming in the Gulf. However, he was unable to find any competent expert either in State Agriculture University or Agriculture Department who could provide proper guidance to him. Presently, he has engaged a private firm, Bio Farms R & D Centre, Idukki for providing technical support to him. He suggested the need for organizing training programmes on hi-tech cultivation locally by inviting experts in the field.


Mr. Arif Khan, Kundamangalam has taken up cultivation of cut flower (heliconia, sereary pink and ginger varieties) in an area of two ha of leased land during 2013-14. He was marketing the flowers in Delhi market Assistance was provided for 1500 plants @ Rs. 75/- per plant.


Water harvesting structure with lining in the farm of Mr. N. Surendra nath, Makko Panchayat which was consulted in 2013-14. The size of the structure is 13.5 x 10.75 m.

Mr. Anoop's family has availed assistance of Rs. 0.50 lakh for purchase of motorized vending caret under VIUC scheme during 2012-13. The vending cart was observed to be a tempo.

Mr. Anoop mentioned that the tempo was being used for vending fresh fruits and vegetables collected from Farmer Interest Group (Cherukullattur) and sold from the vehicle itself on a daily basis. It was, however, advised that vending cart should have proper mechanism for displaying the vegetables and proper weighing machine.

Issues needing attention of SHM, Kerala

- Investment under protected cultivation has been increasing in Kannur and Kozhicode districts, particularly during last two years, which is a welcome sign. However, there is urgent need for providing training to farmers as well as field functionaries on all aspects of protected cultivation.
- PFDC, Tavanur need to be associated in organizing regular training programmes for cultivation and maintenance of structure.
- There is also need to organize special training programmes for the benefit of progressive farmers who have ventured into hi-tech protected cultivation including automation and precision farming.

- There is a scope for organizing training programmes and exposure visits outside the state for educating the farmers on latest developments in horticulture.
- SHM, Kerala need to play a proactive role in arranging market tie up for marketing the produce under protected cultivation.
- Equipments like weed cutter is in high demand, which need to be encouraged under Horticulture Mechanization.
- Area expansion activity needs to be backed up with adequate extension for checking disease and pest infestation. Leaf curl problem observed in the plot of Mr. Devakaran, Pattiam, Kuthuparamba Block needs immediate attention.
- More efforts need to be made for setting up infrastructure for Post Harvest Management, such as pack houses, cold storages, refrigerated vans, ripening chambers, etc.
- Motorized Vending Carts being provided under VIUC should have facility for display of produce and vending.
- Vending carts being supplied under VIUC scheme should have proper facility for display and vending.

ANNEXURE

REPORT ON

INTEGRATED VERTICAL FARMING SYSTEM

DEVELOPED BY KVK, KANNUR

Integrated Vertical Farming System developed by Krishi Vigyan Kendra (KVK), Kannur

An Integrated Vertical Farming System (IVFS) has been developed by KVK, Kannur. It is also called as GIGGINS FARM VILLA (Growables in Irrigated Grow bags, Goats Integrated for Nutritional Security with Fowl, Azolla and Rabbit Management Vertically and Intensively in Limited Land Available).

The model was developed by Dr. T. Giggin, Assistant Professor (AH), KVK looking into the constraints of lands space in a state like Kerala having high population density with high unit cost of land. Farming was becoming a costly venture in Kerala and the State has to depend on the neighbouring States for meeting food requirements like vegetables, poultry products, etc.

An integrated approach of rearing animals and poultry along with cultivation of fodder in less than one cent land was adopted. For this purpose, RKVY scheme was availed with the involvement of ATMA, during 2013-14. Total cost of the project was Rs. 5.27 lakh, including cost of animals (goats, poultry & rabbits). The cost of the structure alone is to the tune of Rs. 3.50 lakh. Since the structure was located adjacent to a shrubby area within KVK campus, additional expenditure was involved for providing wire mesh for protecting the animals from snakes and reptiles. Moreover imported floor material (Salt Floor) was used to ensure durability of the structure. The floors are designed in such a manner that urine and dropping could be collected at the bottom for further use. Such floor material is now being manufactured locally also, hence there was scope for further reduction of cost.

The KVK has been receiving a lot of visitors to see the IVFS model developed by the KVK. Government of Kerala, in its Budget announcement for 2014-15, have proposed to provide subsidy for such ventures covering an area upto 10 cents. Modalities are, however, yet to be worked out.

Basic details of the VFS are given in **Table 1.**

Table 1: Details of Integrated Vertical Farming System

No.	Component	Description	Area / No
1.	Structure	**Gallery**- Iron structure with steps for cultivation	35 steps
		Ground floor-Poultry shed with Cement floor under goat shed and Layer Poultry Cage under gallery	320 sq. ft
		Fists floor- Plastic slat floor (imported), Iron gril and GI weld mesh structure, Collection System for of manure and Urine	200 sq. ft
		Rabbitary- Hanging Cages and Male and Female, Collection System for of manure and Urine	16 cages of 4 sq. ft each
		Azolla- Tanks of height 20 cm	2 tanks of 20 sq. ft
2.	Automatic Drinker assembly and Feeders	**Poultry**- Hanging Feeders and drinkers	10 nos. each
		Rabbit- Nipple Drinker and Feeder	16 nos. each
		Goat-Drinking Bowl assembly for Goat	10 nos.
3.	Gallery cultivation	Irrigated grow bags or pots, Water Tank of 500 ltrs capacity	300 pots
4.	Manure collection	Flex sheet, PVC channel for urine collection, between pond & shed	200 sq. ft

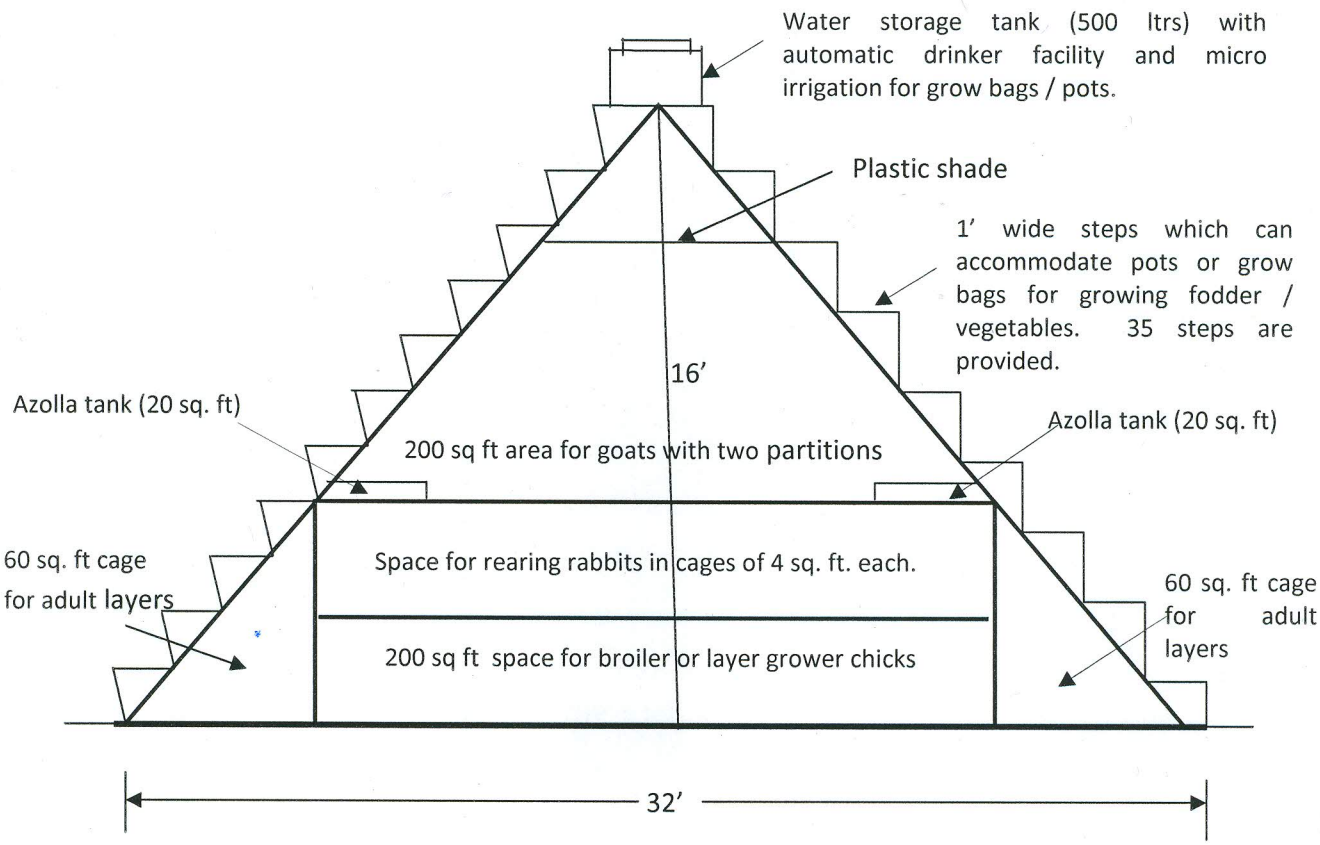
The structure, which is triangular in shape, is 32 ft long, 10 ft in width and 16 ft high. The effective area of the structure is 1000 Sq. ft. with two floors and two galleries. Ground floor accommodates two cages (60 sq. ft. each) at both corners wherein 120 layers are accommodated. The central space (200 sq. ft) can accommodate 500 birds broiler / layer grower chicks per batch. Eleven Goats are accommodated on the first floor (200 sq. ft.) having two partitions, one for male and other for animals with advanced pregnancy or with kids.

Sixteen rabbits, including four bucks are accommodate on the first floor in hanging cages (16 cages of 4 sq. ft. each) in two rows, in front and back side.

Azolla tanks of 20 sq. ft size have been set up above to rabbit cages. Azolla grow rapidly on water, which is source of nutrient to the goats as well as poultry. This is found in abundance locally.

Typical layout of IVFS in depicted in **Fig 1**.

Fig. 1: Typical Layout of an Integrated Vertical Farming System



Steps of 1 ft width have been provided on both sides of the structure which can accommodate pots or grower bags for growing fodder crop for animals. This space could be used for kitchen garden or for growing vegetables or floriculture in grow bags.

A tank with 500 lt capacity has been provided on top of the structure for storing water. Automatic drinker facility has been provided with mechanism to keep the drinking bowls full without any wastage of water. Micro irrigation with fertigation system is also provided for irrigating the fodder crop/vegetables.

KVK has worked out the profitability of the IVFS covering each aspect, viz. goat farming, poultry and rabbit rearing covering a period of five years. Each of the unit is self sustaining and profitable from 2nd year. Summary details are indicated in **Annexure.**

Contact: Dr. T. Giggin, Assistant Professor, KVK, Kanchirangad, Taliparamba, Kannur-670142, Telefax: 0460-2226087, Mob. 09847335759

Annexure

Profitability of Integrated Vertical Farming System

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Income					
Goat (11 No)	1,54,750/-	1,54,750/-	1,54,750/-	1,54,750/-	1,54,750/-
Layers (120 No)	86,700/-	97,500/-	97,500/-	97,500/-	97,500/-
Growers (500/ batch)	3,64,500/-	3,64,500/-	3,64,500/-	3,64,500/-	3,64,500
Rabbits (16)	6,230/-	15,930/-	6,230/-	15,930/-	6,230/-
Total	**6,12,180/-**	**6,32,680/-**	**6,32,980/-**	**6,32,680/-**	**6,32,680**
Non- Recurring Expenditure					
Structure	3,50,000/-				
Goat	78,500/-				
Layers	12,300/-				
Growers	79,000/-				
Rabbits	7,200/-				
Total	**5,27,000/-**				
Recurring Expenditure					
Goat	21,710/-	21,710/-	21,710/-	21,710/-	21,710/-
Layers	59,760/-	70,560/-	70,560/-	70,560/-	70,560/-
Growers	1,50,000/-	2,22,000/-	2,22,000/-	2,22,000/-	2,22,000/-
Rabbits	15,184/-	15,184/-	19,184/-	15,184/-	19,184/-
Depreciation of Shed @ 10%	35,000/-	35,000/-	35,000/-	35,000/-	35,000/-
TOTAL	**2,81,654/-**	**3,64,454/-**	**3,68,454/-**	**3,64,454/-**	**3,68,454/-**
Repayment					
Value of closing stock	-	-	-	-	76,500/-
Total cost	**8,08,654/-**	**3,64,454/-**	**3,68,454/-**	**3,64,454/-**	**3,68,454/-**
TOTAL BENEFIT	**6,12,180/-**	**6,32,680/-**	**6,22,980/-**	**6,32,680/-**	**6,32,680/-**
NET BENEFIT (BENEFIT-COST)	**-1,96,474/-**	**2,68,226/-**	**2,54,526/-**	**2,68,226/-**	**2,64,226/-**
Benefit-Cost Ratio (BCR)	**0.757**	**1.736**	**1.691**	**1.736**	**1.717**
Internal Rate of Return					**130%**

FINANCIAL OTULAY

GOATS

Techno-economic parameters

A.	**General Parameters**	
1.	Breed-Goat	Malabari
2.	Rearing System	Intensive
3.	No. of Bucks	1
4.	No. of Does	10
5.	Age at Maturity	8-10 months
6.	Kidding Interval	8 months
7.	No. of Kidding per Year	1.5
8.	Kidding Percentage	80%
9.	Average litter size (average of single, twinning, Triplet, quadruplet)	2
10.	Sex Ratio	1:1
11.	Mortality Percentage of Kids	10%
12.	Saleable Age of Kids	8 months
B.	**Expenditure Parameters**	
13.	Space Requirement per head for Buck	15-25 sq. ft
14.	Space Requirement per head for Doe	10sq. ft
15.	Space Requirement per head for Kid	4 sq. ft
16.	Concentrate Feed for Adult Bucks (2 months per breeding season)	7.5 kg/month
17.	Concentrate Feed for Adult Does (2 months per kidding)	6.75 kg/month
18.	Concentrate Feed for Kids (1 month)	3.75 kg/month
19.	Cost of Concentrate Feed	Rs.18/kg
20	Cost of Animal (as live weight)	Rs.250/kg
21.	Insurance cost	6.6%
C.	**Income parameters**	
22.	Sale price of Buckling (8 month age, Average 20 kg BW)	Rs.5,000/-
23.	Sale price of Doeling (8 month age, Average 15 kg BW)	Rs.3,750/-
24.	Sale price of Manure	Rs.5/kg
25.	Sale price of Milk	Rs.60/Ltr

FLOCK PROJECTION CHART

Item	1st year	2nd year	3rd year	4th year	5th year
No. of Does purchased	10				
No. of Buck purchased	1				
No. of Kids purchased	NIL				
No. of Kidding per year	1.5	1.5	1.5	1.5	1.5
No. of Kids born Male	12	12	12	12	12
No. of Kids born Female	12	12	12	12	12
No. of Kids survived Male 90%	11	11	11	11	11
No. of Kids survived Female 90%	11	11	11	11	11

NON-RECURRING INVESTMENT (CAPITAL)

1. CONSTRUCTION OF SHED		
Area for Buck	1X 25 sq.ft	20 sq. ft
Area for Doe	10 X 10 sq.ft	100 sq. ft
Area for Kids		
No. of Pregnancy expected per batch	10 X 80%	8
No. of Pregnancy expected per year	8 X 1.5	12
No. of Kids per year	12 X 2	24
No. of Kids survived	24 X 90%	22
So, area required for kids	22 X 4 sq. ft	88 sq. ft
Total Area		*210 sq. ft*
Total cost of construction	**Under common structural expense**	
2. PURCHASE OF GOAT		
Cost of Buck	40 kg X 250 X 1	10,000/-
Cost of Doe	25 kg X 250X 10	62,500/-
Total cost of purchase		**72,500/-**
3. MACHINERIES AND MISCELLANEOUS		
Cost of Feeder	750 X 2	1,500/-
Cost of Drinker	750 X 5	3,750/-
Cost of other equipments		750/-
Total cost of machineries		**6,000/-**
Grand total all the above mentioned items		**78,500/-**

RECURRING INVESTMENT (WORKING CAPITAL)

1. FEED		
Cost of Feed		Rs. 18/kg
For 1 Buck	2 X 1.5 X 1 X 7.5 kg X Rs.18/kg	405/-
For 10 Does	2 X 1.5 X 10 X 6.75 kg X Rs.18/kg	3,645/-
For 22 kids	1 X 22 X 3.75 kg X Rs.18/kg	1,485/-
Total cost of feed for a year		**5,535/-**
2. FODDER		
Cost of fodder slips	300XRs.2/-	600/-
Total cost of fodder		**600/-**
3. LABOUR		
Cost of labour		Own labour
Cost of labour for 1 year	Own labour	NIL
Total cost of labour		**NIL**
4. Insurance@ 6.6 % of purchase cost of Goats	6.6 X 72,500	**4,785/-**
5. Vaccination Charges	25 X 11	**275/-**
6. Medical Expenses	500 X 12	**6,000/-**
7. Electricity and Miscellaneous	500 X 12	**6,000/-**
Grand total all the above mentioned items		**21,710/-**

ECONOMICS OF GOAT FARMING

	Item	Amount
	NON-RECURRING INVESTMENT (CAPITAL)	
1.	Total cost of construction 200 sq. ft	**Common**
2.	Total cost of purchase of animals	**72,500/-**
3.	Total cost of machineries	**6,000/-**
	RECURRING INVESTMENT (WORKING CAPITAL) for a year	
4.	Total cost of feed	**5,535/-**
5.	Total cost of fodder	**600/-**
6.	Total cost of labour	**NIL**
7.	Insurance	**4,785/-**
8.	Vaccination Charges	**275/-**
9.	Medical Expenses	**6,000/-**
10.	Electricity and Miscellaneous	**6,000/-**
11.	**TOTAL NON-RECURRING INVESTMENT (CAPITAL)**	**78,500/-**
12.	**TOTAL RECURRING INVESTMENT (WORKING CAPITAL)**	**21,710/-**

EXPENDITURE

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Cost of Feed	5,535/-	5,535/-	5,535/-	5,535/-	5,535/-
Cost of Fodder	600/-	600/-	600/-	600/-	600/-
Cost of Labour	NIL	NIL	NIL	NIL	NIL
Insurance	4,785/-	4,785/-	4,785/-	4,785/-	4,785/-
Vaccination Charges	275/-	275/-	275/-	275/-	275/-
Medical Expenses	6,000/-	6,000/-	6,000/-	6,000/-	6,000/-
Electricity and Miscellaneous	6,000/-	6,000/-	6,000/-	6,000/-	6,000/-
TOTAL	**21,710/-**	**21,710/-**	**21,710/-**	**21,710/-**	**21,710/-**

CASH INFLOW

1. ANIMALS		
Sale price of Animal		Rs. 250/kg
For 11 Bucklings of 20 kg	11 X 20 kg X Rs.250/kg	55,000/-
For 11 Doelings of 15 kg	11 X 15kg X Rs.250/kg	41,250/-
Income from Sale of Animals		**96,250/-**
2. MILK		
No. of Pregnancy in a year	10 X 80% X 1.5	12
Total Days of Lactation	12 pregnancy X 105 days	1260
Milk production per animal per day		0.5 Ltr.
Total Milk Production per year	0.5 Ltr. X 1260	630 Ltr.
Price of Milk per Litre		60/-
Income from Sale of Milk		**37,800/-**
3. MANURE		
Manure production from adult animals per day per animal		0.5 kg
Manure production per year	11 X 0.5 kg X 365	2007 kg
Manure production from kids per day per animal		0.25kg
Manure production per year	22 X 0.25 kg X 365	2007 kg
Manure production per year		4014 kg
Price of Manure per Kg		5/-
Income from Sale of Manure		**20,700/-**
Grand total all the above mentioned items		**1,54,750/-**

INCOME

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Sale of Bucklings (11@5000/-)	55,000/-	55,000/-	55,000/-	55,000/-	55,000/-
Sale of Doelings (11@3750/-)	41,250/-	41,250/-	41,250/-	41,250/-	41,250/-
Sale of Milk (630 Ltr@60/-)	37,800/-	37,800/-	37,800/-	37,800/-	37,800/-
Sale of Manure (4014 kg@5/-)	20,700/-	20,700/-	20,700/-	20,700/-	20,700/-
TOTAL	**1,54,750/-**	**1,54,750/-**	**1,54,750/-**	**1,54,750/-**	**1,54,750/-**

LAYERS

Techno-economic parameters

A.	**General Parameters**	
1.	Breed-Layer	Gramasree
2.	Rearing System	Intensive
3.	No. of Birds	120
4.	Age of laying	6 months
5.	No. of Eggs per Year	180
B.	**Expenditure Parameters**	
6.	Space Requirement per head	1 sq. ft
7.	Concentrate Feed (upto point of lay)	1.5 kg/month
8.	Concentrate Feed (for laying)	3 kg/month
9.	Cost of Concentrate Feed	Rs.24/kg
10.	Cost of Bird	Rs.90/bird
C.	**Income parameters**	
11.	Sale price of Brown Eggs	Rs.6/-
12.	Sale price of Manure	Rs.2.5/kg
13.	Sale price of Culled Birds	Rs.90/bird

NON-RECURRING INVESTMENT (CAPITAL)

1. CONSTRUCTION OF SHED		
Area for Birds	120X 1 sq.ft	120 sq. ft
Total cost of construction	**Under common structural expense**	
2. PURCHASE OF LAYERS		
Cost of layers	120 X Rs.90/-	10,800/-
Total cost of purchase		**10,800/-**
3. MACHINERIES AND MISCELLANEOUS		
Cost of Feeder	350 X 2	750/-
Cost of Drinker	350 X 2	750/-
Total cost of machineries		**1,500/-**
Grand total all the above mentioned items		**12,300/-**

RECURRING INVESTMENT (WORKING CAPITAL)

1. FEED		
Cost of Feed		Rs. 24/kg
For 120 layers (upto point of lay)	120 X 4.5 X 1.5 kg X Rs.24/kg	19,440/-
For 120 layers (for laying)	120 X 4.5 X 3 kg X Rs.24/kg	38,880/-
Total cost of feed for a year		**58,320/-**
2. FODDER		
Cost of Azolla	Own production	NIL
Total cost of fodder		**NIL**
3. LABOUR		
Cost of labour		Own labour
Cost of labour for 1 year	Own labour	NIL
Total cost of labour		**NIL**
4. Medical Expenses	120 X 12	**1,440/-**
Grand total all the above mentioned items		**59,760/-**

ECONOMICS OF EGG PRODUCTION

	Item	Amount
	NON-RECURRING INVESTMENT (CAPITAL)	
1.	Total cost of construction 120 sq. ft	**Common**
2.	Total cost of purchase of Birds	**10,800/-**
3.	Total cost of machineries	**1,500/-**
4.	**RECURRING INVESTMENT (WORKING CAPITAL) for a year**	
5.	Total cost of feed	**58,320/-**
6.	Total cost of fodder	**NIL**
7.	Total cost of labour	**NIL**
8.	Medical Expenses	**1,440/-**
9.	**TOTAL NON-RECURRING INVESTMENT (CAPITAL)**	**12,300/-**
10.	**TOTAL RECURRING INVESTMENT (WORKING CAPITAL)**	**59,760/-**

EXPENDITURE

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Cost of Birds		10,800/-	10,800/-	10,800/-	10,800/-
Cost of Feed	58,320/-	58,320/-	58,320/-	58,320/-	58,320/-
Cost of Fodder	NIL	NIL	NIL	NIL	NIL
Cost of Labour	NIL	NIL	NIL	NIL	NIL
Medical Expenses	1,440/-	1,440/-	1,440/-	1,440/-	1,440/-
TOTAL	**59,760/-**	**70,560/-**	**70,560/-**	**70,560/-**	**70,560/-**

CASH INFLOW

1. ANIMALS		
Sale price of Brown Eggs		6/-
Sale of Egg produced in 6 months	(180/12) X 6 X 120 birds X Rs.6/-	64,800/-
Income from Sale of Brown Eggs		**64,800/-**
2. MANURE		
Manure production from birds per day per bird		0.2 kg
Manure production per year	120 X 0.2 kg X 365	8760 kg
Price of Manure per Kg		2.5/-
Income from Sale of Manure		**21,900/-**
Grand total all the above mentioned items		**86,700/-**

INCOME

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Sale of Brown Eggs	64,800/-	64,800/-	64,800/-	64,800/-	64,800/-
Sale of Manure	21,900/-	21,900/-	21,900/-	21,900/-	21,900/-
Sale of Culled Birds	NIL	10,800/-	10,800/-	10,800/-	10,800/-
TOTAL	**86,700/-**	**97,500/-**	**97,500/-**	**97,500/-**	**97,500/-**

GROWERS

Techno-economic parameters

A.	**General Parameters**	
1.	Breed-Grower	Gramasree
2.	Rearing System	Intensive
3.	No. of Birds per batch	500
4.	No. of batches	8
5.	Age of selling	45 days
6.	Mortality percentage of Chicks	5%
B.	**Expenditure Parameters**	
7.	Space Requirement per head	0.8 sq. ft
8.	Concentrate Feed for 45 days	1.5 kg/bird
9.	Cost of Concentrate Feed	Rs.30/kg
10.	Cost of Birds	Rs.18/bird
C.	**Income parameters**	
11.	Sale price of Birds	Rs.90/-
12.	Sale price of Manure	Rs.2.5/kg

NON-RECURRING INVESTMENT (CAPITAL)

1. CONSTRUCTION OF SHED		
Area for Birds	500X 0.8 sq.ft	400 sq. ft
Total cost of construction	**Under common structural expense**	
2. PURCHASE OF GROWERS		
Cost of Chicks	8 X 500 X Rs.18/-	72,000/-
Total cost of purchase		**72,000/-**
3. MACHINERIES AND MISCELLANEOUS		
Cost of Feeder	350 X 10	3,500/-
Cost of Drinker	350 X 10	3,500/-
Total cost of machineries		**7,000/-**
Grand total all the above mentioned items		**79,000/-**

RECURRING INVESTMENT (WORKING CAPITAL)

1. FEED		
Cost of Feed		Rs. 30/kg
For Growers	500 X 8 X 1.5 kg X Rs.24/kg	1,44,000/-
Total cost of feed for a year		**1,44,000/-**
2. FODDER		
Cost of Azolla	Own production	NIL
Total cost of fodder		**NIL**
3. LABOUR		
Cost of labour		Own labour
Cost of labour for 1 year	Own labour	NIL
Total cost of labour		**NIL**
4. Medical Expenses	500 X 12	**6,000/-**
Grand total all the above mentioned items		**1,50,000/-**

ECONOMICS OF GROWER PRODUCTION

	Item	Amount
	NON-RECURRING INVESTMENT (CAPITAL)	
1.	Total cost of construction 120 sq. ft	**Common**
2.	Total cost of purchase of Birds	**72,000/-**
3.	Total cost of machineries	**7,000/-**
4.	**RECURRING INVESTMENT (WORKING CAPITAL) for a year**	
5.	Total cost of feed	**1,44,000/-**
6.	Total cost of fodder	**NIL**
7.	Total cost of labour	**NIL**
8.	Medical Expenses	**6,000/-**
9.	**TOTAL NON-RECURRING INVESTMENT (CAPITAL)**	**79,000/-**
10.	**TOTAL RECURRING INVESTMENT (WORKING CAPITAL)**	**1,50,000/-**

EXPENDITURE

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Cost of Birds	NIL	72,000/-	72,000/-	72,000/-	72,000/-
Cost of Feed	1,44,000/-	1,44,000/-	1,44,000/-	1,44,000/-	1,44,000/-
Cost of Fodder	NIL	NIL	NIL	NIL	NIL
Cost of Labour	NIL	NIL	NIL	NIL	NIL
Medical Expenses	6,000/-	6,000/-	6,000/-	6,000/-	6,000/-
TOTAL	**1,50,000/-**	**2,22,000/-**	**2,22,000/-**	**2,22,000/-**	**2,22,000/-**

CASH INFLOW

1. ANIMALS		
Sale price of Growers		90/-
Sale of Growers	4000 X 95% X Rs.90/-	3,42,000/-
Income from Sale of growers		**3,42,000/-**
2. MANURE		
Manure production from birds per day per bird		0.05 kg
Manure production per year	500 X 8 X 45 days X 0.05 kg	9,000 kg
Price of Manure per Kg		2.5/-
Income from Sale of Manure		**22,500/-**
Grand total all the above mentioned items		**86,700/-**

Sale of culled birds (from 2nd year onwards)	**120 X Rs.90/-**	**3,64,500/-**

INCOME

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Sale of Growers	3,42,000/-	3,42,000/-	3,42,000/-	3,42,000/-	3,42,000/-
Sale of Manure	22,500/-	22,500/-	22,500/-	22,500/-	22,500/-
TOTAL	**3,64,500/-**	**3,64,500/-**	**3,64,500/-**	**3,64,500/-**	**3,64,500/-**

RABBIT

Techno-economic parameters

A.	**General Parameters**	
1.	Breed-Rabbit	Soviet Chinchilla
2.	Rearing System	Intensive
3.	No. of Bucks	4
4.	No. of Does	12
5.	Age at Maturity	6 months
6.	Kidding Interval	1 month
7.	No. of Kidding per Year	6
8.	Kidding Percentage	80%
9.	Average litter size	6
10.	Sex Ratio	1:1
11.	Mortality Percentage of Kids	10%
12.	Saleable Age of Kids	45 days
B.	**Expenditure Parameters**	
13.	Space Requirement per head for Buck	4 sq. ft
14.	Space Requirement per head for Doe	2 sq. ft
15.	Concentrate Feed for Bucks	3 kg/month
16.	Concentrate Feed for Adult Does	3 kg/month
17.	Cost of Concentrate Feed	Rs.26/kg
18.	Cost of Animal	Rs.250/animal
C.	**Income parameters**	
19.	Sale price of Kids (45 days old)	Rs.250/kid
20.	Sale price of Manure	Rs.2.5/kg
21.	Sale price of culled rabbits (3kg each)	Rs.150/kg

FLOCK PROJECTION CHART

Item	1st year	2nd year	3rd year	4th year	5th year
No. of Does purchased	12		12		12
No. of Buck purchased	4		4		4
No. of Kidding per year	4	6	4	6	4
No. of Kids born Male	12	18	12	18	12
No. of Kids born Female	12	18	12	18	12
No. of Kids survived Male 90%	11	16	11	16	11
No. of Kids survived Female 90%	11	16	11	16	11

NON-RECURRING INVESTMENT (CAPITAL)

1. CONSTRUCTION OF SHED		
Area for Rabbits		64 sq. ft
Total cost of construction	**Under common structural expense**	
2. PURCHASE OF RABBITS		
Cost of Rabbits	16 X Rs.250/-	4,000/-
Total cost of purchase		**4,000/-**
3. MACHINERIES AND MISCELLANEOUS		
Cost of Feeder	110 X 16	1,760/-
Cost of Drinker	90 X 16	1,440/-
Total cost of machineries		**3,200/-**
Grand total all the above mentioned items		**7,200/-**

RECURRING INVESTMENT (WORKING CAPITAL)

1. FEED		
Cost of Feed		Rs. 30/kg
For Rabbits	16X 0.1kg X 365 X Rs.26/kg	15,184/-
Total cost of feed for a year		**15,184/-**
2. FODDER		
Cost of Fodder	Own production	NIL
Total cost of fodder		**NIL**
3. LABOUR		
Cost of labour		Own labour
Total cost of labour		**NIL**
Grand total all the above mentioned items		**15,184/-**

ECONOMICS OF RABBIT REARING

	Item	Amount
	NON-RECURRING INVESTMENT (CAPITAL)	
1.	Total cost of construction 64 sq. ft	**Common**
2.	Total cost of purchase of Rabbits	**4,000/-**
3.	Total cost of machineries	**3,200/-**
4.	**RECURRING INVESTMENT (WORKING CAPITAL) for a year**	
5.	Total cost of feed	**15,184/-**
6.	Total cost of fodder	**NIL**
7.	Total cost of labour	**NIL**
9.	**TOTAL NON-RECURRING INVESTMENT (CAPITAL)**	**7,200/-**
10.	**TOTAL RECURRING INVESTMENT (WORKING CAPITAL)**	**15,184/-**

EXPENDITURE

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Cost of Rabbits	NIL	NIL	4,000/-	NIL	4,000/-
Cost of Feed	15,184/-	15,184/-	15,184/-	15,184/-	15,184/-
Cost of Fodder	NIL	NIL	NIL	NIL	NIL
Cost of Labour	NIL	NIL	NIL	NIL	NIL
TOTAL	**15,184/-**	**15,184/-**	**19,184/-**	**15,184/-**	**19,184/-**

CASH INFLOW

1. ANIMALS		
Sale price of Kids		250/-
Sale of Kids (First Year)	22 X Rs.250/-	5,500/-
Income from Sale of Kids		**5,500/-**
2. MANURE		
Manure production from rabbits		0.05 kg
Manure production per year	16 X 365 days X 0.05 kg	292 kg
Price of Manure per Kg		2.5/-
Income from Sale of Manure		**730/-**
Grand total all the above mentioned items		**6,230/-**
Sale of Kids (2nd year)	**32X Rs.250/-**	**8,000/-**

INCOME

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Sale of Kids	5,500/-	8,000/-	5,500/-	8,000/-	5,500/-
Sale of Manure	730/-	730/-	730/-	730/-	730/-
Sale of culled rabbits	NIL	7,200/-	NIL	7,200/-	NIL
TOTAL	**6,230/-**	**15,930/-**	**6,230/-**	**15,930/-**	**6,230/-**

PROFITABILITY STATEMENT and BENEFIT-COST RATIO

Item	Amount and Years				
	1st	2nd	3rd	4th	5th
Income					
Goat	1,54,750/-	1,54,750/-	1,54,750/-	1,54,750/-	1,54,750/-
Layers	86,700/-	97,500/-	97,500/-	97,500/-	97,500/-
Growers	3,64,500/-	3,64,500/-	3,64,500/-	3,64,500/-	3,64,500/-
Rabbits	6,230/-	15,930/-	6,230/-	15,930/-	6,230/-
TOTAL	**6,12,180/-**	**6,32,680/-**	**6,22,980/-**	**6,32,680/-**	**6,32,680/-**
Non-Recurring Expenditure					
Structure	3,50,000/-				
Goat	78,500/-				
Layers	12,300/-				
Growers	79,000/-				
Rabbits	7,200/-				
TOTAL	**5,27,000/-**				
Recurring Expenditure					
Goat	21,710/-	21,710/-	21,710/-	21,710/-	21,710/-
Layers	59,760/-	70,560/-	70,560/-	70,560/-	70,560/-
Growers	1,50,000/-	2,22,000/-	2,22,000/-	2,22,000/-	2,22,000/-
Rabbits	15,184/-	15,184/-	19,184/-	15,184/-	19,184/-
Depreciation of Shed @ 10%	35,000/-	35,000/-	35,000/-	35,000/-	35,000/-
TOTAL	**2,81,654/-**	**3,64,454/-**	**3,68,454/-**	**3,64,454/-**	**3,68,454/-**
Repayment					
Value of closing stock	-	-	-	-	76,500/-
TOTAL COST	**8,08,654/-**	**3,64,454/-**	**3,68,454/-**	**3,64,454/-**	**3,68,454/-**
TOTAL BENEFIT	**6,12,180/-**	**6,32,680/-**	**6,22,980/-**	**6,32,680/-**	**6,32,680/-**
NET BENEFIT (BENEFIT-COST)	**-1,96,474/-**	**2,68,226/-**	**2,54,526/-**	**2,68,226/-**	**2,64,226/-**
Benefit-Cost Ratio (BCR)	**0.757**	**1.736**	**1.691**	**1.736**	**1.717**
Internal Rate of Return					**130%**

Pictures of Integrated Vertical Farming System, KVK, Kannur

Unit as a whole

Goat Shed

Fodder

Grower Nursery

Rabbitry

Azolla tank

Layer Birds