LEAGUE OF ARAB STATES

ARAB ORGANIZATION FOR AGRICULTURAL DEVELOPMENT

POULTRY DEVELOPMENT IN DEMOCRATIC REPUBLIC OF SOMALIA

SECTOR REVIEW AND FEASIBILITY STUDY

KHARTOUM, FEBRUARY, 1980

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LEAGUE OF ARAB STATES
ARAB ORGANIZATION FOR
AGRICULTURAL DEVELOPMENT
KHARTOUM.

FOREWORD

Honourable Chairman and Members of the Council of Arab Organization For Agricultural Development,

The Government of Democratic Republic of Somalia requested from the Arab Organization For Agricultural Development (AOAD) a mission of consultants to assess the present situation of poultry industry in Somalia and to identify possible projects for future preparation, appraisal and implementation. To fulfil this request, AOAD recruited a team of experts covering the areas of poultry nutrition, production, breeding, disease and economics.

The team proceeded to Mogadishu on 20th November, 1979. The AOAD mission conducted a series of discussions with experts in the Ministry of Livestock, Forestery and Range, By-Product Unit, Maize Milling and oil seeds factories ; serum and vaccine institute. Visits were also paid to government poultry farms at the KM7, 13 and 15 in Mogadishu and at Hargeisa and the co-operative, backyard and settlement poultry producing units.

The mission reviewed the various studies and plans for the development of the poultry industry in Somalia and was thus

able to identify the poultry development project which consists of two sub-projects ; the Mogadishu egg unit and the Hargeisa poultry complex. Production capacity of the unit sub-project is approximately 10 million eggs annually and that of the complex sub-project is about 10 million eggs and one million broiler in addition to a small amount of spent hens as a by-product in the two sub-projects. The mission feels that the identified project, pending its further preparation and appraisal, in addition to those projects included in the three years development plan are sufficient for the development of poultry industry in Somalia in the coming five years. Furthermore, financial and economical analyses have indicated the viability of the identified project.

I would like to thank the experts for conducting the study very efficiently. My deep gratitude is due to the Government of Democratic Republic of Somalia and H.E., The Minister of Livestock, Forestery and Range for the appreciable care they have given to the AOAD mission and for facilitating the progress of the study. I sincerely hope that this study will effectively contribute to the development of the poultry industry in Democratic Republic of Somalia.

Dr. Hassan Fahmi Jumah,
DIRECTOR GENERAL

Khartoum, February, 1980

1. SUMMARY

SUMMARY

At the request of the Somali Government, the Arab Organization for Agricultural Development (AOAD) recruited a mission of consultants to review and assess the present situation of the poultry industry in Somalia, and to identify feasible project for the future development of the poultry industry. The mission identified the poultry Development project as a suitable project that contributes greatly to the agricultural economy of Somalia. The project through increasing the supply of poultry products will provide a cheap source of protein for the urban poor and will gradually shift an increasing part of the local consumption from red meat to white meat and thereby increase exports of the former type.

The project identified in this study is composed of two sub-projects; The Mogadishu egg unit and the Hargeisa poultry complex. The unit will consist of 4 poultry houses, one rearing house equipped with 3 tier cage system to brood and rear 25,000 day old chicks (DOC) and 3 laying houses equipped also with 3 tier cage system to house about 22,000 pullets each. The houses are all of the open sided type and are fully mechanized for watering, feeding and egg collection.

The Hargeisa poultry complex consists of two units, the first is the laying and parent stock unit (LPU). The LPU will raise imported hatches of 3250 parent stock annually. The parent stock will follow a brood-rear-lay system. It will contain also a grading and packaging plant in addition to hatchery building with hatching capacity of about 25000 chicks weekly.

The second unit, the broiler production unit (BPU), will consist of 20 open side floor system houses. The total housing capacity of the BPU is 1 million broiler annually, reared in 5 batches. The BPU will contain also a 3 ton/hour feed mill, in addition to a processing plant of 500 birds/hour.

Total cost during the project development period, PY1 - PY2 is estimated at So. Sh. 9.2 million for the unit and So. Sh. 47 million for the complex. The foreign exchange component of total cost is So. Sh. 6.7 million for the unit and So. Sh. 25 million for the complex. This puts the total cost of the projects at an estimated So. Sh. 56.2 million out of which So. Sh. 31.7 million in foreign exchange. Capital costs, including contingencies of the project is estimated at So. Sh. 48.1 million, and operational costs at So. Sh. 8.1 million.

At full development, PY3, the annual production generated by the unit is approximately 10 million eggs, and that of the complex is about 10 million eggs and 1 million broilers, in addition to a small amount of spent hens as a by-product in the two sub-projects. The value of this annual production is estimated at about So. Sh. 6 million for the unit and So. Sh. 30 million for the complex. No serious problem is anticipated in the marketing and distribution of the project's output, despite the substantial increase in the supply of these products.

The financial rate of return (FRR) of the unit is estimated at 26% over 20 years and a sensitivity analysis indicates that this would drop to 15% in the event of cost increasing by 20% and 13% in the event of revenues decreasing by 20%. The FRR of the complex is estimated at 27% over 20 years and a

sensitivity analysis indicates that this would drop to 18% in the event of cost increasing by 20%.

The economic rate of return (ERR) of the project's two sub-components is roughly estimated at 22% over 20 years.

PART 1

POULTRY INDUSTRY IN SOMALIA

2. BACK GROUND

2. BACK GROUND

2.1 General :

Somalia has a total area of about 637,000 km^2. The country is located on the Horn of Africa, with three thousand kilometers of coastline on the Gulf of Aden on the North and the Indian Ocean on the East. It is bounded by Kenya in the South and South-West, Ethiopia in the West and Djibouti in the North-West.

The topography varies from a hot and arid coastal plain which gives way to sparsely wooded savannah, to rugged mountains, agricultural plateaus, and lowland of varying fertility and rain fall. Much of the country is arid, water supplies are scattered and often unreliable, and periodic droughts bring hardship to both the people and their livestock. Only a small proportion of the land, approximately 13% (including the two irrigable river valleys, the Shebelli and the Juba) is arable, and this is approximately equal to 8 million hectars.

Of the population of approximately 3.5 million, about two thirds are nomads and semi-nomads, who depend on livestock for their livehood and about 20-25% are farmers cultivating land along the Juba and Shebelli rivers and in the higher-rainfall, Bay and North-West regions. The small monetary sector of the economy provides only limited opportunities for employment.

The employment situation in urban centres had deteriorated by 1975 as a result of the migration from rural to urban centres during the drought of 1974 and 1975, and the growing disparities

between urban and rural wage levels. The government has taken several steps to tackle the problem of open unemployment, but providing productive employment in the future will require, however, a much greater attention because of the limited absorptive capacity of manpower in the modern sector and the enormous resources that will be needed to absorb an increasing number in agriculture and fisheries, if the policy of the government is to avoid rapid population growth in the pastoral sector.

These problems of unemployment are, however, confined mainly to the unskilled, with skilled workers, particularly those in the administration and professional classes in short supply. This shortage of qualified manpower is partly a result of the migration of about 100,000 Somalia to work in the oil exporting Arab countries. Projects currently being developed are facing difficulties in procuring their required manpower of skilled workers and it appears that the trained manpower will still remain the most important constraint on development.

With regard to food consumption and nutrition, recent studies[1] has estimated that a minimum diet of 2200 calories per man/equivalent would cost a family of five So. Sh. 3,240 per year, using current food prices, consumption patterns, and the nutrition content of food consumed. A recent pilot household survey indicated that 70% of both rural and nomadic families had annual incomes below this level. At the same time, 42% of the urban families did not reach this minimum. There is thus substancial evidence of inadequate food intake in much of the population.

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(1) ILO/JASPA : Economic Transformation in a Socialist Framework, Addis Ababa, 1977.

It is to be noted that the Somali people do not suffer from protein deficiency since meat, milk, and milk products form a decent percentage of the every day diet of all segments of population. Domestic demand for livestock and meat is, thus, growing, despite the fact that the export demand for livestock has undoubtedly raised the prices.

2.2 Agricultural Development

While the existence of several minerals in Somalia has been confirmed, exploration is still in the early stages and commercial viability remains to be proved. Somalia's prospects, therefore, center on agricultural and livestock development in which progress will depend upon careful management of scarce land and water resources. There exists a good potential for agricultural development in Somalia as can be seen from the fact that of the 8 million hectar suitable for cultivation, only 720,000 hectars are now being cultivated. This potential has to be exploited in order to feed the expected increase in population, to improve nutrition, and to provide productive employment for a considerable part of the increase in labour force. It is important, in this connection that measures should be taken to create a productive base for agro-industry and supplementary services, to take into account the linkages that exist among the two sectors, and to develop a mixed farming system which fully integrate livestock and crop production in suitable areas. It should be noted, however, that despite the importance of the agricultural and livestock (including forestry, and range) sectors, they received only a small fraction of government development funds. The share of these sectors as can be seen from the following table did not exceed 21.3% of development funds spent in 1971-73, and

TABLE (2.1) Sectoral Development Allocations in 1971 - 1973 and 1974 - 1978

	1971 - 1973 Actual expenditure		1974 - 1978 Planned expenditure	
	Million Sh.	%	Million Sh.	%
Livestock	51.1	7.8	162.1	4.2
Forestry and Range	5.0	0.8	51.2	1.3
Agricultural & Irrigation	83.2	12.7	1.124.5	29.1
Fishery	4.5	0.7	78.0	2.0
Rural Water Supply	64.2	9.7	85.2	2.2
Industry and Mining	117.5	17.8	770.5	19.9
Services	331.4	50.5	1.592.0	41.2
Total	656.9	100.0	3.863.4	100.0

Source : Calculated from : Five Year Development Programme 1974 - 1978. Ministry of Planning and Co-ordination, Mogadishu 1974.

that while its relative share of planned expenditure has increased in the 1974 - 78 development programme, actual expenditure was different, and despite the government's initial intentions, industry and mining, and infrastracture, have received more public investment than these sectors.

2.3 Status of Livestock

About 55% of the land area in Somalia is suitable only for extensive livestock production , and the majority of the people are traditional pastoralists. Those pastoralists constitute two-thirds of the population, and are not only wholly dependent on livestock, but they have long experience of the difficulties of handling stock under this often harsh conditions imposed by sparse grazing and water supplies.

The development of the Somali livestock sector is important since in addition to providing the pastoralists with their basic subsistence, the livestock sector generates a surplus which is marketed and largely exported. Exports of life livestock and livestock products is the major component of Somali exports, and in 1977, it accounted for about 80%.

It can be seen from Table 2.2, however, that over the past few years Somalia's merchandise exports have fallen with quasi stagnation in livestock and declines in banana and fish exports. At the same time, imports have remained relatively stable over the last three years. These past developments suggest that it may be opportune to readjust policies and to direct resources increasingly towards productive investment and economic growth, particularly in the field of agriculture and livestock. Resource mobilization for this purpose should be

sought through better management of public enterprises, a more useful role for the private sector and a broadened capacity to absorb external capital.

Prospects of Somali exports of livestock look attractive in the near future. Regional demand for live animals and red meats is expected to rise rapidly in various Middle Eastern countries. In most of these countries there is little scope for increasing domestic livestock output and production costs are generally high. Most of the growth in demand will therefore be met by imports.

In addition, projection of future prices shows that in general the prices prospect for Somali livestock over the next 5 to 10 years appear to be favorable. Competition from low cost Australian exports may exert some downwards pressure but this will probably be balanced by the rapid rise in demand in the middle East, the quality preference for Somali stock, and Somalia's location which enables it to export animals to the Middle East on the hoof and thus protects it from intense competitions in canned and frozen meats.

A recent study by the IBRD concluded that Somalia's share in Arabian livestock import markets by 1980/81 would provide for a 50% increase over present sheep and goat and 100% over present cattle exports. These targets seem feasible provided favorable weather conditions continue and conditions regarding shipping facilities organization as well as intensification of veterinary services, and control over the development of domestic demand for red meat are met.

Beside being responsible for the major part of the foreign

TABLE (2.2) Major Somali Exports (F. O. B.) based on F.E. Record (So. Sh. Million)

	1975		1976		1977	
	Value	Percent	Value	%	Value	%
Bananas	80.9	14.4	88.2	17.3	53.1	11.8
Live animals	364.4	64.7	301.9	59.2	299.5	66.7
Meat & meat products	59.3	10.5	37.1	7.3	32.1	7.1
Hides & Skin	20.7	3.7	44.4	8.7	23.6	5.3
Fish & Fish products	17.4	3.1	23.3	4.6	21.2	4.7
Grains	14.4	2.6	11.3	2.2	11.9	2.6
Oil	6.3	1.1	4.1	0.8	7.7	1.7
Total	563.4	100	510.3	100	44.90	100

Source : Central Bank of Somalia.

exchange earnings in Somalia, the livestock sector is also a major source of income to the government through taxes and levies imposed on livestock exports.

2.4 The Poultry Sector

Despite the major role of livestock in the national economy of Somalia, the poultry sector is still up to present time, in an embryonic stage. The country has only not more than 10 commercial farms producing eggs, and are operated generally at less than full capacity. On the other hand commercial production of broilers has not started in Somalia yet.

The development of the poultry sector is an urgent task facing the Somali Government, since it will help in providing a cheaper source of protein in the domestic market. This, in addition to the improvement in the nutrition of the poor, will help in reducing domestic demand for red meat. The reduction in domestic demand for red meat is a necessary factor to exploit the market potential available for Somali exports of livestock in the Arab countries. This is an important point due to the existing stagnation of Somali export, and the meed to increase it to finance required imports for development.

Possibilities of future Somali exports of poultry products seem improbable, at least in the short and medium term. The industry is still underdeveloped compared to many other Arab countries, and there is a general shortage of experienced and trained personnel in this rather new field of operation.

3. PRESENT SITUATION OF POULTRY INDUSTRY

3. PRESENT SITUATION OF POULTRY IN SOMALIA

3.1 Features of Poultry Production

Poultry products are very scarce on any Somali market. The general observer would have to look for poultry product if he needed it. It is very common to go through a whole market area without noticing one or two villagers selling eggs. The eggs are sold individually at 0.7 to one So. Sh. per eggs. The first look at Somalia would give the impression of no poultry what-so-ever in the country. The first glance impression is very much picturing the status of poultry in Somalia. The poultry industry in Somalia has not been hatched yet. In recent years government started putting a three years development program for poultry (1979 - 81). The program was partially (20%) completed due to many constraints facing all segments of the industry. Now with the growing need for poultry meat and eggs a number of project as a start of the first real industry in Somalia are under way. The earlier FYDP has been revised to start more intensive production units to fullfill the needs and cut short the phases of production other countries went through. In this report a concul ion for the organisation of the project into a plan of development of the poultry sector in Somalia will be outlined. To review the status of poultry in Somalia one has to classify the poultry keepers into two classes :-

a) Private homes in rural and urban communities or backyard.

b) Poultry farms owned by the government or by institutions or the private sector.

3.1.1 Backyard Poultry

The Somali population is divided into 3 groups of people, the nomads which constitute 75% of the population, rural farmers which constitute about 15% of the population and urban dwellers which constitute 10% of the population. It is clear that very small percentage of nomads keep poultry. The opposite is true with all rural population, almost 100% keep poultry around the house. The urban population poultry keepers are about 30%. The total number of backyard poultry has to be estimated on the basis of the above population structure. The field visits indicate that each family keeps about 15 - 20 chicken in all with about 10 - 15 mature ones. The average family size is about 6 - 7 persons. The estimates for the total number of poultry under the above circumstances is about 1.8 - 2.4 million birds. This would mean that approximately 1.2 - 1.8 million laying hens are kept in the backyard. If one adopt the very conservative estimate of 50 eggs for annual production per bird (most undeveloped countries backyard chickens range between 40 - 80 egg annually) the total eggs produced in the country is about 60 - 90 million eggs annually. If we assume the villagers would replace 50% of the flock annually (high estimate) this would give approximately 1500 - 2250 ton of poultry meat annually.

The poultry in the backyard is very hetrogenous type of birds. The plumage color is different in color from black to white, red, barred with all colors. The skin color is white, yellow, or even slate with green hanks. The shanks are some with feather. The number of toes are four and five. The comb type observed were single, duplex, butter cup, and pea comb. The eggs are either brown shelled or white, birds were full

of lice but they look healthy. The poultry house is a small round hut made of straw with very narrow top.

The baby chicks are usually cared of by the old hens and left out in and around the house to pick their feed. For most places visited, people keep one or two males of different colors. The chicks were hatched naturally and the brooding season from August to February. The poultry products are marketed when cash is needed. It is a common practice to sell the extra males at 3 - 4 months of age.

3.1.2 Institutional Poultry Farms

This group of farms will include all poultry farms in Somalia. The Governmental farms are km. 1, km. 13, Qoryoley, Km. 15 (under construction) and Hargeisa. The National Settlement Agency Supervise the Kurtun wary, Sablaale, and Dujuma farms. The national fishery development Agency is responsible for Barawa farms. The other training farms like Abreen area, and Boncai are only supervised by the Ministry. The prison, police, hospital and the college farms are separate identify & are run by the owner institute.

Table (3.1) gives the capacity of each farm and the number of houses on each one plus its existing situation.

The Ministry of Livestock is only giving technical assistance, feed, baby chicks and medicine to other farms listed above which are not owned by it. The Ministry had imported in 1973, 3000 chicks of White Leghorn and 2000 R.I.R. from Kenya. The R.I.R. chicks died the first week of arrival. The chicks were believed to be from Pulorum infected parents.

In 1976 the Ministry had also imported 1500 broiler chicks from Belgium under the assumption of using them for breeding, but they were sold when known that they are commercial broilers.

In 1977 two batches of chickens were imported. The first one was 20,000 W.L. from Italy and this is the batch now present at Km. 13 and 7. The second batch was 2000 Babcock layers. Since the Babcock layers. Since the Babcock were commercial layers with no males, they were kept for one production year and then sold.

The type of poultry houses in Somalia are all open sided houses. The houses are constructed in such a way that chicken dropping will fall outside the house for easy collection and to keep houses clean . Ventilation in most houses is very good and litter is in excellent conditions. The houses sometime are not in the right wind direction. The houses are also built with no measure of isolation distance in mind. The houses also have many brick holes on the sides which will allow wild birds and rodents to get to the poultry houses. The brooding houses are all bricks with ceiling ventilation. The brooding was mainly done by Somali made hoover type brooder. The managerial practices for brooding, rearing and laying birds were very unskillful. The birds were not debeaked or vacinated nor trained for nest laying.

The hatchery building at km. 7 farm is well equipped with incubators and hatchers with total capacity of 40,000 eggs. The hatchery have a total of 9 incubators and 2 hatchers, see hatchery layout Annex II Fig. (1).

The km. 13 farm consist of two brooder houses and 21 laying

houses with a total capacity of 50,000 layers, see Table (3.1) This farm is considered to be the first poultry production unit in the country. The farm facility is adequate to produce 3-5 million eggs annually. See Annex II Fig.(2) for detailed layout for the farm. The farm occuping 1 km^2 of land. The total labour force is about 90 people.

The km 7 farm is on the outskirt of Mogadishu. This farm is mainly a demostration farm for student majoring in Animal science. The farm has 7 houses 6 of them are 15 X 12 M and the Seventh is 20 X 15 meter in dimension. The total farm area is about 120.000 M^2. The total labour area is about 120.000 M^2. The total labour force for this farm is about 45 workers. At km. 7 the eggs are hatched to supply baby chicks to most of the Somali farms. The baby chicks are usually reared at km. 13 till 3 months of age then transfered to its final distenation or other locations. Both the Kurtunwary and Qoryoley farms have two laying houses see table (3.1) for details on all farms.

The km 15 poultry industry project is still under construction for the prefabricated houses foundation. The infrastructure is almost completed. After completion of the foundation, the farm can be in gear within two month. This farm will consist of 2 brood and rear 2 tier cage system houses and 6 two tier cage laying system houses. The total farm capacity is to produce 10 million eggs annually. This farm will be the first real introduction to the poultry industry in Somalia.

The Hargeisa farm was built with facilities to produce 5 million eggs annually. This farm will be described in detail later on in the identified project by the AOAD team.

TABLE (3.1) Over All Farm Capacity in Somalia

Location	No. of Birds Capacity	No. of brooding rearing	Poultry houses laying	No. of birds on the farm
km 7	14.000	-	7	78000
Km 13	50.000	2	21	11.000
Qoryoley	4000	-	2	800
Kurtunwarey	4000	1	2	1000
Sablaale	3000	-	4	21000
Dujuma	5000	-	5	-
Barawa	5000	-	6	3083
Afgoi (pirson)	5000	-	4	-
Agric School	600	-	3	
Police Hospital	2500	-	2	700
Hargeisa	50.000	2	8	-
Abreen Area	2000	-	2	-
Boncai	3000	-	2	-
Doorale (private)	10.000	2	7	-
	156.100			26483

The private farm on the road to Wuarmahum near Afgoi called " Doorale" was established in 1965, and is considered to be the first private poultry farm in the country. The capacity of the farm is about 10,000 layers. The farm is not working at the present time for lack of interest by the new owner.

3.1.3. Statistics of Poultry Production in Somalia

Tables (3.2, 3.3 and 3.4) summarises the status of poultry in Somalia. The available records on km. 13 and 7 farms gave the information listed in all above mentioned tables. Table (3.2) compares the mortality rates and the percent production in different years at km. 13 and 7 farms. Mortality rates were higher in January and from July to November. The mortality rates at all farms all year were running at a normal loss. Some figures were somewhat high like those of November 1977 and during January - March 1979. They were high mainly due to Newcastle outbreak. The production rates were at below average levels. The effect of hatch time on rate of production was not clear with no difference in mean production between birds hatched in March, June, July, August and October. All birds at different hatch time gave their peak production from April or May till August, (Table 3.3). The overall ; hatchability at km. 7 was 6 - 10% lower than normal. The inexperience of the employees would account for the above 6 - 10 percentage points lower hatchability, (Table 3.4). The analysis of 1979 batches showed that 75% of the batches gave about average percent hatchability. The April and May batches showed below average hatchability and a higher percentage of dead embryo. The flock fertility was about average standard percent. (Table 3.1) shows that the percent of farm utilization is about 17% with 50% of the total farms having no chickens on the farm at present.

TABLE (3.2.a) Mortality Rate and Percent Production for Five Different Batches Kept at Km. 13 in 1976

Hatchtime	March		June		July		August		October	
Month	Mort %	% Prod.	Mort%	%Prod.	Mort%	%Prod.	Mort%	%Prod.	Mort%	%Prod.
March	-	-	-	-	-	-	0.5	55.8	3.3	9.7
April	-	-	-	-	1.8	50.9	0.7	51.1	1.8	49.8
May	0.1	52.0	0.6	49.7	1.0	46.1	0.6	52.2	1.9	53.1
June	0.6	41.9	0.5	38.7	5.3	40.7	0.9	46.6	2.8	45.8
July	0.5	41.9	0.1	43.8	2.9	36.3	4.1	44.2	1.3	45.8
August	0.0	43.4	0.3	47.9	1.2	38.8	0.3	44.9	1.2	45.7
October	1.2	15.9	0.8	20.1	5.7	24.1	1.5	24.3	4.6	23.5
November	12.8	6.8	1.7	16.5	1.6	17.5	7.8	8.7	1.8	11.5
Average	12.8	33.6	0.7	36.1	2.8	36.3	2.0	41.0	2.3	35.1
* Birds	787		1609		1242		1038		985	

TABLE (3.2.b) Mortality Rate, Percent Production, and Total Number of Birds at Km. 13, and Km. 7 Farms

Location	Km. 13						Km. 7		
	1977			1979			1979		
Month	Mortality	%Prod.	*Birds	Mortality	%Prod.	*Birds	Mortality	% Prod.	*Birds
January	-	-	-	12.0	34.0	6706	-	-	-
February	-	-	-	11.4	51.6	5554	-	-	-
March	1.4	38.7	2953	6.1	59.5	4922	-	-	-
April	1.2	50.9	4153	4.4	59.1	4619	-	-	-
May	0.7	48.3	8408	4.0	56.6	4413	-	-	-
June	1.6	33.8	10198	1.8	55.6	4234	-	-	-
July	7.9	29.0	11632	2.7	54.7	4156	1.7	3.9	4507
August	2.2	33.6	10851	3.7	51.3	4043	0.8	20.8	7724
September	-	-	-	4.2	46.7	3892	2.9	37.4	6761
October	3.3	23.3	8897	-	-	-	2.6	37.5	6582
November	4.1	34.2	8604	-	-	-	-	-	-
Average	2.8	34.2	8211	5.6	52.1	4726	2.0	24.9	6393

TABLE (3.3) Average Yearly Eggs Set, Chicks Hatched, and Percent Hatchability at Km. 7 From 1974 - 1979

Year	Total eggs Set.	Total Chicks Hatched	% Hatchability
1974	3814	2716	71.2
1975	4096	2833	69.2
1976	8608	6708	77.9
1977	8234	5284	64.2
1978	5722	3312	57.9
1979	8794	6596	74.9
Average	6545	4575	69.3

TABLE (3.4) Analysis of 1979 Hatches at Km. 7 Per Batch

Month	Total eggs	Total in & dead	Total Chicks	% Hatch.	% Fert.	% Dead
January	3960	725	3235	81	-	-
February	11876	2731	9145	77	-	-
March	11817	2186	9631	81	-	-
April	7871	2923	4948	63	-	-
May	9632	3648	5984	62	-	-
June	9737	1949	7787	79.9	93.9	13.8
August	7890	1888	5996	75.9	93.0	16.9
September	7566	1522	6039	79.8	92.5	12.6
Average	8794	2196	6596	74.9	93.1	14.4

3.2 Availability of Poultry Feeds in Somalia

3.2.1 Wheat Bran

A roller-flour mill dependent entirely on wheat imports has been established at Mogadishu. The mill is now working up to 93% of its capacity. The present and projected production of wheat bran from Mogadishu mill is presented in Table (3.5). The wheat cultivated area in Somalia is about 3,000 ha. with an estimated production of 1500 tons of grains. The potential production of wheat bran is expected to be 350 tons per year. The total expected production of wheat bran would be of the order 4,390 tons/year.

3.2.2 Sorghum and Maize Bran

Somalia has six maize and sorghum mills in the public sector and 11 in the private sector. Three are new mills with a total capacity around 60,000 tons of maize annually. The remaining 14 mills have a total bran is (Ministry of Industry 1977) 0.5% and 2.5% of the processed grains in the new and old mills respectively.

The cultivated areas is approximately 400,000 ha. for sorghum and 170,000 ha. for maize (JASPA Report 1977). According to ADC, Sorghum and maize are purchased annually. From the annual purchased grains 300 tons of bran will be recovered from the new mills (60,000 tons X 0.5%) and 2500 tons will be produced in old mills. The potential maize and sorghum bran is expected to be approximately 300 tons/ year. The amount will go up to about 5500 tons/year and the milling capacity is enough to deal with the purchases of ADC.

TABLE (3.5) Production of Wheat Bran in Mogadishu Flour Mill

	Production (Tons) Per day	Per Year
1. Wheat grinding capacity (Tons)	60	18,000
2. Capacity utilized in 1976 (200 days)	58	11,200
3. Wheat bran recovered in 1976	13	2,587
4. Bran recovery of crushed wheat (kg/ton)	224	224
5. Bran recovery at full capacity (300 days)	13,44	4,034
6. Ex. factory sale price (So. Sh/ Kg)	0.43	0.43

1) Agricultural Statistics, Ministry of Agriculture, Mogadishu (1976)

2) Economic Transformation in a socialist framework, International labour office (JASPA). An employment and basic needs oriented development strategy for Somalia (1977).

3.2.3 Oil Cakes

The main oil seed crops in Somalia are sesame, cotton and groundnut. There are 70,000 ha. cultivated with sesame and the annual production of sesame seed was approximately 30,000 tons (0.4 tons seeds/ha.) in 1975 (Agricultural Statistics). It is believed that by 1982 the area cultivated with cotton will be of the order of 10,000 ha. yielding around 6,000 tons of cotton seed per year. The area cultivated with groundnut is 10,000 ha. and the annual seed production can be in the order of 8,000 tons.

The edible oil industry which produces cake is composed of :-

(a) One mill in the public sector with a capacity to process 6000 tons/year.

(b) Small size oil expelling units in the private sector, the number of which is not known.

The mills in the public sector could not work at their full capacity in 1977 and were operating for 110 days crushing 1227 tons of sesame cake (Ministry of Industry).

It is believed that only 6000 tons of sesame will be crushed in the public sector yielding 3600 tons of sesame cake (cake is 60% of the seed) in 1978. The balance (24,000 tons) will be available to small mills and camel driven plants in the private sector. The sesame cake in the private sector should be in the order of 15,000 tons. The total potential production of sesame cake in Somalia is expected to be 18,800

tons in 1978. It is believed that 50 - 60% of this annual production (10,000 tons/year) will be available for use in the animal feed industry.

In the near future it is likely that 6000 tons of cotton seed will be available from the area cultivated with cotton ; thus about 3000 tons of cotton seed cake may be available for animal feed industry.

Groundnut seeds are not processed in Somalia and therefore no groundnut cake is produced. If the groundnut is not processed, an amount of 4,000 tons of groundnut cake will be available form an annual production of 8,000 tons of groundnut seeds (agricultural statistics 1975).

According to the above indicated estimates, the potential production of oil seed cake which will be available for animal feed industry in Somalia in the near future could be as follows:-

a) 10,000 tons of sesame cake
b) 3,000 tons of cotton seed cake
c) 4,000 tons of groundnut cake

3.2.4 By-Products of Slaughter Houses and Meat Production Plants

It is extremely difficult to survey the by-products of all the municipal slaughter houses in Somalia. This section will therefore deal only with the meat scraps, bones and blood produced in Kismayo Meat Factory, Sopral Meat Factory and Mogadishu Slaughter house.

Meat scraps is available at the rate of 8 kg, 25 kg and 18 kg per head of cattle at Kismayo, Sopral and Mogadishu slaughter houses respectively. The total available amounts of meat scraps from cattle, camels, goats and sheep are estimated to be 3,323 tons/year[1].

There is no plant in Somalia for producing soluble blood meal. However, the potential production of blood meal from Kismayo, Sopral, and Mogadishu slaughter house is in the order of 252 tons/year.

Bones obtainable from Kismayo, Sopral and Mogadishu slaughter houses are estimated to be 4050 tons/year[2]. Approximately 1108 tons/year of bone and meat meal can be obtained from Sopral, Kismayo and Mogadishu. Kismayo meat factory is equipped with a plant for producing the meat and bone meal. This plant has a capacity to produce 2 tons of meat and bone meal per day (Ministry of Industry) However, the factory has never been able to utilize its full capacity. Thus the production during the last 3 years had been as follows [2]:

(a)	1974	107 tons
(b)	1975	139 tons
(c)	1976	109 tons
(d)	1977	60 tons

It seems that lack of knowledge on the aspects of utilization of these products in animal feeding is the reason of the poor performance of Kismayo Meat Factory.

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(1) UNIDO Report, Ministry of Industry, Mogadishu (1978)
(2) UNIDO Report, Ministry of Industry, Mogadishu (1978)

3.2.5 Fish-Meal

There are two fish-meal plants in Somalia ; one at Laskore and the other at Bolimog. The annual capacity of the two plants are as follows :-

(a)	Laskore	450	tons
(b)	Bolimog	600	tons
	Total	1000	tons

However, the capacity of Laskore is being utilized only up to 10% due to inadequacy of fish catch. The plant at Bolimog is not working due to some mechanical trouble in the freezing plant. In the light of these circumstances the present annual production of fish-meal is as follows :-

(a) Bolimog ; Production during the year 1974 was 39 tons ; thereafter the plant does not seem to have worked.

(b) Laskore ; Average annual production ranges between 250 - 300 tons.

(c) Somali Fishing Company produce about 300 tons of fish-meal.

It is, therefore, estimated that the present annual fish-meal production is in the neighbourhood of 600 tons. However, attempts are being now made for increasing the fish catch in Somalia ; fishmeal production is expected to be reasonably improved.

3.3 Poultry Diseases

According to available records, accurate incidence figures of poultry diseases in SDR are not available. The diseases which have been recorded include New Castle Disease, Fowl Typhoid, Fowl pox, Spirochestosis, Laucosis, Avian Encepholomyeltitis, Helminthiasis, Coccidiosis and Nutritional Deficiences.

3.3.1 New Castle Disease (Avian Pneumoencephalitis)

The disease is an actue rapidly spreading viral infection of domestic poultry and other birds. It is manifested by respiratory signs which are often accompanied by nervous derangements.

Although the disease was known through out the history of Veterinary Service in Somalia, the virus was isolated only in 1970. No data exist regarding its incidence. However, the severity of the disease is reflected in the number of doses used for vaccination. During 1976 and 1977 100,000 doses (La sotta strain) were produced locally, whilst 120,000 doses were imported in the period 1978 - 1979.

3.3.2 Fowl Typhoid

This is a Salmonella infection. The disease may be egg transmitted, but has a greater tendency to spread among growing or mature birds.

Full awareness of the malady began in 1975 when kilometer 13 farm became enzootic due to fowl typhoid infection. A very high mortality is said to have occurred (figures are not given),

the infection is still lingering in the farm.

3.3.3 Fowl Pox

The disease is a slow-spreading virus infection of chicks. It is characterised by formation of Nodules in the skin progressing to scab formation and of diphtheritic membranes in the respirtory and upper digestive tracts. Extensive infection in a flock results in morbidity, decline in egg production with impaired fertility.

The first authentic case was reported in 1975. The incidence and effects of the disease in Somalia are hitherto not known.

3.3.4 Fowl Cholera

This is an acute or chronic, generalized or local infectious disease of domestic poultry and wild birds. The onset of the disease is often sudden, resulting in high morbidity and mortality rates. The infection is mainfested in enteritis, haemorrhages and congestion.

Although the disease appears among the list of infections which occur in the SDR, its impact on poultry population is not yet clear.

3.3.5 Spirochetosis

This is an acute or chronic febrile bacterial disease of birds, characterised by listesness and leg weakness. The disease is transmitted through droppings or indirectly through blood

sucking arthropode notably Argue Persicus.

Existence of the infection in the Country was recorded as early as 1954. Hitherto, it is not assuming any alarming status to focus attention on.

3.3.6 Leucosis

The disease is a contagious Malignancy of lymploid cells caused by a virus inducing neoplostic transofrmation of lymphoctyles within the follicles of bursa of fabricius. Metastasis of malignant lymphoctyes subsequently occue to cause a diffuse or focal involvement of liver, spleen and other organs. The disease affects birds which are 4 months of age or older.

In S. D. R. the disease was only observed in the late 1978 in one bird in the course of routine post-mortem examination performed on birds submitted to the " Serum and Vaccine Institute", Mogadishu.

3.3.7 Avian Encepholomeclitis (Epidemic Tremors)

This is a viral disease of chickens marked by a-taxia and tremors of the head, neck and limbs. These signs are present either at hatching or are delayed until several weeks of age commonly appearing at 7-10 days old. The infection is apparent in adult birds.

The first report of the disease in the Country was in 1976; the diagnosis was made on histopathological examination. No attempts were made to isolate the causative agent.

3.3.8 Coccidiosis

The disease is a parastic infection inflicted by a protozoan Clinically the infection is recognized by bloodly droppings. In Somalia, the causative agent was found to be EIMERIA NECATRIX.

The ailment appeared with introduction of the semi intensive poultry industry in the country in 1974. Losses from this infection reached its climax in 1978 in a flock of 3.320 birds kept at Kilometer 13 farm. The toll was estimated to be 800 birds at that particular outbreak.

3.3.9 Digestive Tract Helminthiasis

Damage from parasitism is best measured in terms of reduced or delayed production. The signs in affected birds are those of unthrifitiness, retarded growth, in-active anaemic birds with depressed appetite in an environment where sanitation has broken down.

This was the situation prevailing during 1977-1978 in km 13 poultry farm and dragging along thereafter. Infection with round worms, especially Ascaridia galli in the cause.

3.3.10 Nutritional Deficiencies

3.3.10.1 Viatamin A Deficiency

Vitamin A is required for the normal development and repair of apithelial structure and for normal development of bones. Its value regarding immunity against disease, lies in being the first line of defence ; the epithelial tissues. Vitamin A and its precursors are relatively unstable in feed stored for a long time before being fed.

During 1978 the deficiency was noticed in many birds of km. 13 farm when the birds were fed with aging imported vitamins and minerals concentrates. Results observed were poor hatchability poor quality of eggs and a decline in livability of the flock.

3.4 Economic Aspects of Poultry Production

3.4.1 Government Policies and Programmes

Poultry production in Somalia is basically dependent on traditional backyard producers. Modern commercial production of poultry was introduced in Somalia during the five year Development Plan 1974-1978 (FYDP). The single poultry project originally included in the FYDP was intended to establish small demonstration centres at each of seven towns, each with a capacity to produce 135,000 eggs annually for local sale and 65,000 chicks for distribution. This strategy was modified early in the FYDP in favor of a smaller number of much larger units, with greater emphasis on production than demonstration and with the aim of achieving some substitution to increase red meat exports as well as an improvement in urban nutrition.

It was within this new strategy, that work started to establish the km. 13 and km. 15 farms, and to expand and develop the km. 7 farm as a hatching and rearing unit for eggs supplied from the km. 13 farm to supply young birds to households and other government and private enterprices. At Hargeisa farm with planned capacity of 5 million eggs annually was partially completed.

Table (3.6) shows the planned and actual expenditure on poultry projects during the FYDP, and while there were some

significant achievements, the program made only very modest progress towards the fulfilment of the sectoral objectives and of individual projects. This was due in part to the objectives being over ambitious in the first place, and in part to a continuing tendency to underestimate the level of technical experience and time required to the successful implementation of projects in this rather new field.

The FYDP achieved only 52% implementation over the plan period. This was due, in part to the increase in the costs of various projects as a result of the world wide inflation and the increase in oil prices, and in the other part to the disastrous drought of 1973-74. These developments led to financial stringency, which in turn led to delays in the implementation of the investment program and underutilization of existing capacity.

3.4.2 Cost Levels

Almost all settled families in the Country side in Somalia, raise some poultry. The estimation of cost levels for this traditional backyard sector is impossible and therefore our review will be concentrated on the modern commercial sector. Even in this latter sector, precise review and evaluation is quite difficult because of the lack of reliable data, the low standard of record keeping and accountancy and the lack of an internal monitoring process.

All the operating poultry farms in the modern sector in Somalia are Government owned. These farms are operated like Government departments : all costs are paid from the government budget, and all revenues are collected by the government.

TABLE (3.6) Planned & Actual Expenditures on Poultry Projects During the Five Year Development Programme

(So. Sh. '000)

Project	Planned Cost Under FYDP	Allocations under the Devel.Budget	Actual Total Expenditure
Model Poultry Farm	4,103	11,135	8,358
Poultry Farm-Hargeisa	-	4,687	3,565
Poultry Farm Km. 13	-	3,080	2,587
Development of Poul Km. 15	-	8,261	6,360
Quryoley Dairy & Poul. Farm		500	247

Source : J. A. Wilby, Op. Cit., Annexes 1 & 2.

The farms suffer from overstaffing as a result of the government employment policies ; even though there is an acute shortage of trained and experienced staff. There is also a considerable underutilization of existing capacity due to the lack of spare parts, unavailability of day old chicks and other inputs required for poultry production. Finally there is the conventional methods of raising poultry with the lack of modern production techniques adapted to local conditions. All these factors lead to a tremendous increase in costs and economic inefficiency.

As a result of these constraints, these poultry farms can not cover their cash operating expenses, and the operating income before depreciation is generally negative as can be seen from Table (3.7) and (3.8).

3.4.3 Marketing and Prices

The amount produced of eggs and spent birds are too small, and there is every indication that demand in Mogadishu alone far exceeds the supply. There appears to be no problem in marketing poultry products, even though such products were not customarily a part of Somali diet.

Poultry products produced in government farms are sold to hospitals, hotels, embasis and resturants in Mogadishu and the rest is sold to retailers (mostly women).

Prices of inputs and outputs of poultry products are determined by the government, and since the start of State poultry production in 1974, they were not changed. Eggs are sold in government farms at So. Sh. 0.4/ each up to present time, even

TABLE (3.7) Operating Costs and Revenues Km. 7 Farm.

(So. Sh.)

Year	1976	1977	1978	1979
Wages	60.000	75.000	80.000	90.000
Fuel	36.000	36.000	36.000	32.000
Feed	150.000	186.000	180.000	180.000
Medicine	100.000	150.000	117.000	105.300
Overhead	75.000	80.000	94.000	76.000
Miscellaneous	39.000	38.000	38.000	36.000
Total Operating Costs	460.000	559.500	546.000	519.300
Revenue	365,341	370,622	41,525	134,167
Total Operational Profit (loss)	(94,659)	(188,878)	(522,475)	(385,133)

N. B.

The farm was cleared out from February 1978 - January 1979.

TABLE (3.8) Km. 13 Poultry Project

(So. Sh.)

	1976	1977	1978	1979 (Jan - Nov)
Wages	98.000	102.000	120.000	150.000
Feed	200.000	186.600	180.000	162.000
Medicine	25.000	22.500	22.500	20.250
Fuel	45.000	45.000	45.000	40.500
Overhead	70.000	80.000	85.000	76.950
Miscellaneous	80.500	81.000	83.700	85.330
Total Operating Cost	538.500	510.500	534.700	535.030
Revenue	313.520	532.724	315.671	492.339
Total Operational Profit (loss)	(224.980)	22.224	(219.029)	(102.691)

so the price in various markets in Mogadishu is So. Sh. 1 and sometimes eggs are sold by retailers at the farm gate for So. Sh. 0.7.

In Hargeisa, where there is no commercial production of poultry up to now, the price of eggs varies between So. Sh. 3- 4 in 1979. The price of pullets is So. Sh. 80 per bird while roasters and old hens are sold for So. Sh. 30 - 40 per bird.

These price differential of poultry products in the major cities of Somalia which tend to be much higher than the transportation costs, reflect the fact that the national market is not one market, and this is basically due to the backyard nature of most of the production and the inefficient methods of marketing.

3.5 Major Problems and Constraints

Most of the major problems and constraints on the development of the poultry industry in Somalia have their common origin with those existing in other sectors. They arise with the attempt of the government to push the development effort in a country at an early stage of development. These major problems and constraints can be summerized as follows :

3.5.1 Inadequacy of Foreign Exchange Availabilities :

This constraint is responsible for the inadequacy of required imports of day old chicks to achieve the full utilization of existing poultry farms, the unavailability of feed additives required for improving feed efficiency and feed utilization and the lack of vaccines and drugs to minimize

mortality rates and catastrophic losses and incidents of disease outbreaks.

3.5.2 The low productivity of Para-Statal Organizations :

These organizations in the poultry field suffer from excessive employment of unskilled workers due to the government policies, the inability of the managers to surface discipline, the lack of proper incentives and last but not least the reluctance of the government to change the price of various inputs and outputs to reflect various changes in the economic conditions.

3.5.3 Shortage of Qualified Manpower :

This shortage is pronounced in the field of poultry keeping, and elementary hygeinic measurements. There is also lack of qualified assistants for unit managers and skilled labour for maintenance works such as mechanics, electricans etc.

In addition to these major problems and constraints, there are some more concrete problems related specifically to the poultry sector, These problems can be summerized as follows :

- Feed formulae are not adequate to meet the basic requirements for laying, growing and broiler birds.

- No prior schedule for the replacements of flocks which cause the farm to keep birds up to the second and third year.

- Some management equipment are not available such as

debeakers which cause great loss in birds due to canabalism ; and modern moving and starting equipments.

- Lack of comunication between various farms and the Serum and Vaccine Institute. There is also lack of supervision from the Institute on the health and sanitary conditions of the farms, and contingency money is not available to help the managers to act swiftly in case of emergencies.

- Lack of poultry disease specialists has led to improper hygenic practice on the farms such as the disposal of dead birds in front of poultry houses, dried foot bath, no seperate care taker for infected houses, improper use of drugs, and the improper vaccination programme.

3.6 Proposed Improvement Programme of the Poultry Sector

The programme to improve the poultry production in Somalia has to consider the following :

a) How to develop a research unit for training personnel and carry out research needed on type of feed, houses, managements which fits best in the country.

b) How to reach maximum efficieney with existing poultry farms.

c) How to raise the productivity of the backyard poultry hens.

d) How to organise and start a new poultry industry complex and run it with complete efficiency.

e) How new research findings can reach farmers & industrial complex through the extension people.

f) Coordination and organization among various sectors of the poultry industry.

For training students the km 7 and km 13 should be considered the basic units for training centre. The centre should train all 25 - 35 Animal production majors during the summer time. The centre can traine these student with attracting salary and give them full participation in doing the farm work. Such a programme is highly needed for college graduates majoring in Animal Science. These students have received practically nothing about poultry in the general course of Animal Husbandry. The students joining the Animal Husbandry Department on their junior year should also receive training at the farm. These students have better background with about 16 courses in Animal science after graduation. These student should receive their training both during summer and school year. They should be singled out each for his interest and assigned a special project to carry on all year around. Students at the high school interested in poultry should also have chance in helping the college students carrying their programme. Students should be trained in all practical matters of poultry production. A selection of few bright students can form the neuclous of a research group to look into problems facing the industry in the country.

To reach maximum efficiency with existing farms one would need to think about 3 avenues : type of birds used, type of feed, and the disease control program. These three points are main points in reaching up to standard production in each farm. The genetically superior bird should be made available to all farmers. The balanced feed along with tight programme for preventing diseases should be advised and implemented on each farm.

The productivity of backyard poultry can be improved through the distribution of 4-8 weeks old superior birds to farmers at reasonable price. The birds should be vaccinated before distribution. The birds can be reared at km 13 till distribution. It is recommended to distribute pure W.L. and N. H and test the farmer's preference. A cross between N. H. and W. L. can also be tested in some regions because birds might be more tolerant to local conditions.

The organization of the poultry industry will be discussed in a later chapter of this report.

The new research in the area of poultry can reach the farmers by a group of extension poultry men trained at km 13 and 7 farms. They should organize meetings for farmers to discuss problems and constraints. They should convey their findings to the research unit at the training centre. The problems solved has to be conveyed back to the farmers as soon as possible. Problems of feeding, disease out break, management should be seminared on frequently with farmers. Also organization of marketing should be done through a new society of meat and egg producers in Somalia.

The coordination among various sectors of poultry should be under one administration. The administration should have a forecast of expected future work in the industry. The administration should be headed by deputy director for poultry sector. All component of poultry production should be under his supervision, for faster and easier way to meet the farmers' needs.

The importance of the private sector in the poultry industry will be imenant in the near future. The group of future producers would have to be encouraged and professionally served to stay in business and profit the industry.

PART 11

POULTRY DEVELOPMENT PROJECT

4. PROJECT IDENTIFICATION

4. PROJECT IDENTIFICATION

4.1 PROJECT OBJECTIVES & JUSTIFICATIONS

After surveying the present status of the poultry industry in Somalia a discussion was carried out with the Ministry staff to identify a project for improving the efficiency of poultry production. The project was considered to be a next five years development plan for the poultry sector in Somalia. Consideration was also given to the existing facilities owned by the Ministry, projects under construction and also future proposed ones.

It was agreed that Somalia now is in need for a project to put all pits and pieces together and shape all this in a modern twentieth century poultry industry complex. To fulfil these needs a project was identified for developing the poultry sector with slight emphasis on improving the backyard poultry. This project, the " Poultry Development Project" (P. D. P.) will coordinate and put guidelines for the poultry units in the Country. It will also suggest some new units.

The AOAD team after reviewing the situation in Mogadishu and Hargeisa suggested two components for the P. D. P . The first component consists of another unit to be added to the poultry industry project at km 15 to double its production capacity to 20 million eggs. The idea is to use all the facilities already on the site more economically. These facilities can serve both units adequately. It is considered that the 20 million eggs produced at km 15 along with the proposed Roumanian project for 30 million eggs will be sufficient for Mogadishu area for the next five years.

The second component for P.D.P. includes a poultry complex at Hargeisa to produce 10 million eggs and 1 million broiler annually. The price of poultry products in Hargeisa are double the price in Mogadishu due to the high demand compared to available supply. The Hargeisa complex will consist of a layers and parent stock unit (L.P.U.) to produce 10 million eggs and 1 million chicks annually. The second unit will be a broiler production unit (BPU) , to raise 1 million chicks up to 8 weeks and dress them for ready to cook.

At the L.P.U. some houses will be added to the existing facilities to follow an easier to implement cycle of production. If one decides to use existing facilities, he will have to import baby chicks (8600) every 8 weeks. This will cause a cycle of too much work every week on the farm once all houses are full. It will be at least a weekly work of either receiving baby chicks or transfer of pullets to laying houses, or selling old birds after production. Finally the cycle with this much unusual effort will produce only about 7-8 million eggs annually compared to the proposed output of 10 million eggs annually.

4.1.1 Mogadishu Egg Unit

The existing poultry industry project " KM 15 " UNDP SOM, aims to produce 10 million table eggs annually. The P.D.P. goal is the expansion of this km 15 project to include additional facilities to produce another ten million eggs annually. The addition of new facilities will improve the profitability of the old and the new proposed expansion project considerably, due to the efficient utilization of the infrastructure, housing, storage area, water supply, water tanks, offices and egg

grading facilities already built. The project, after its expansion, will provide Mogadishu area with about 166,000 eggs monthly.

The expansion of the project takes into account the very high cost of construction in the country due to high inflation rate. It is recommended to use rearing and laying houses equipped with 3 tiers cages which will be perfect under Somali weather conditions. This recommendation will also serve as an experimental test for the two systems of 2 tier & 3 tier under one location. The cost of foundation and construction due to this recommendation will be cut in half compared with the already built houses. The cost of equipments will also be much less with 4 houses than 8 houses. If the same company will provide equipment for the expansion, this recommendation should be put forth to them to use their Nevada and California System.

4.1.2. Hargeisa Poultry Complex

The poultry development project adopts the idea of spreading the industry to the north region with a complex at Hargeisa to produce 10 million eggs and 1 million broilers annually. It is known that Hargeisa area is a very active commercial. The availability of poultry products with relatively cheaper prices might switch consumertastes to eating poultry and eggs. The more consumption of poultry meat and eggs in Hargeisa, the more livestock saved from slaughtering in the Country, and the more available animals for export.

The Hargeisa complex will be divided into two components: one for commercial egg type layer & parent stock and the other for broiler production. The layers & parent stock unit (LPU)

will be incorporated with the existing facilities to produce 5 million eggs annually. The existing facilities cosist of 8 laying houses (See fig 9 Annex II) 2 brooder houses, offices, storage area, and hatchery building. The complex recommends the modification of this farm to increase the capacity to 10 million eggs annually. It will also add a new unit for parent stock houses to produce approximately 1 million broiler chicks. The complex will also add a new hatchery building as well as the modification of the existing hatchery building to house the grading and packing facilities of eggs. The complex will produce approximately 83,000 eggs monthly along with 83,000 broiler monthly or about 97 ton of broiler meat monthly. The broilers will be processed at a poultry processing plant at the broiler production unit (LPU). The feed supply will be through the proposed feed mill with a capacity of 3 ton/hr at the (L.P.U.).

4.2 Project Major Components

The poultry Development project (P.D.P) consists of two major components ; the first is the Mogadishu egg unit (M.E.U) to produce 10 million table eggs annually and the second is the Hargeisa poultry complex (H.P.C). The Hargeisa poultry complex will consist of two units one is called the layers and parent stock unit (L.P.U) to produce 10 million table eggs annually. The second unit is called the Broiler production unit (B.P.U.) to raise, feed and dress and pack 1 million broiler annually.

4.2.1 Mogadishu Egg Unit (M.E.U)

The M.E.U. will need 50,000 commercial egg type baby chicks annually to be imported.

The importation time and the production cycle will be detailed in a later chapter. The baby chicks will be imported in batches of 25,000 every 27 weeks. This would mean that two batches will be imported annually. The mortality during brooding and rearing will give approximately 21,500 pullets to be housed for each batch. The unit will need one rearing house (3 tier cages) and 3 laying houses. The baby chicks will be kept in the rearing house till 18 weeks of age. This would mean a brood-grow system. The cages used in the rearing house will be fully automatic. Due to lack of experience in the country and non-availability of trained personnel this system will need training personnel abroad. The PDP adopted this view of automation since the existing facility is fully automatic also. The 3 laying houses will be filled with different age birds according to production cycle. The laying houses will receive pullets at the beginning of the 19th week of age. The pullets will be sold as spent hens after 52 weeks of production , or at the age of 76 weeks.

4.2.1.1 Existing Ration

Energy is very important in formulating diets due to the cost of the nutrient. Also, the level of energy in the diet is critical because the bird will consume feed, within a certain range, in relationship to her energy needs. This means that precise formulation must be based upon the real or anticipated energy consumption of the birds. The levels of the many nutrients in the diet must be such that when the birds are satisfying their energy needs they are also satisfying their needs for the amino acids, vitamins and minerals.

In other words, the daily nutrient intake of each bird is

more important in formulation than the actual dietary levels specified by the national Research Council or their Agency. This also means that records of feed consumption and chemical composition of the diet are extremely important. So to formulate a balanced diet, it is necessary to adjust the metabolizable energy, crude protein, amino acid composition, calcium phosphorous, vitamins and minerals. Tables 6,7,8,9,10,11 and 12 Annex II, give the most recent requirements for all purposes of poultry production. An examination of km 7 feed mill pre mixes indicated that they do not conform with these requirements (Table 4.1).

The prices for feed ingredients used at the km 7 feed mill are recorded in Table (4.2). It should be understood that prices follow the law of supply and demand. The prices in Somalia for most ingredient are under some Government control. It also shows some changes from 1975 till 1979 as listed in the Table (4.2). The product added for vitamins and Minerals PL 101 is being imported from abroad. The composition of such vitamin mineral mix is listed in Table (4.3).

The existing feed mill has a capacity of 1 ton/hr. The mill only formulates all required poultry ration in 2 days weekly working one shift. The mill is also furnished with a pelletting machine/

4.2.1.2 Proposed Formula For Laying Hens

The best way to obtain feed formulae is by using a computer. In this way, it would be possible to produce the least cost mix for the different purposes of production. So , it is not actually important only to formulate a diet which is nutritionally sound without considering the cost of feed stuffs and the

TABLE (4.1) Poultry Feed Produced in The Feed-Mill At Km 7

Calculated Contents :	I	II	III
Digestible Protein %	17.0	19.5	20.7
Productive Energy, Kcal/kg.	18.10	19.20	21.70
Ca, %	2.5	1.0	1.2
P. %	0.8	1.0	1.0
Methionine, %	0.4	0.5	0.5
Cystine, %	0.3	0.3	0.3
Crude Fibre, %	4.8	4.7	2.9
Crude Fat, %	7.1	7.0	5.0

Vita-Minerals, Pfizer PL LOL added at the rate of 3 kgs/ton fed.

Ingredients used ; kgs			
Meat and Bone meal	4.5	5.4	6.3
Blood meal	2.7	3.2	3.8
Fish meal	4.5	5.4	6.3
Sesamcke	13.4	16.1	18.8
Maizemeal	50.0	50.0	65.0
Maizebran	25.0	20.0	-
Sea shells	4.0	-	-
Pfizer, PL LOL	0.25	0.30	0.35
	104.35	100.40	100.55

Mixture I for layers.
Mixture II for Young Chicks
Mixture III for broilers.

TABLE (4.2) Changes of The Cost of Feed Ingredients in The Last Five Years (Price So.Sh./100 kg)

Ingredient	1975	76-77	78	79
Fish meal	100 *	160	200	200
Crushed bone & meat	100	100	150	150
Crushed Bone	70	90	150	150
Blood meal	80	80	180	190
Sesame cake	100	130	130	130
Cotton seed cake	80	120	120	120
Maize	120	120	125	120
Wheatbran	45	45	45-62	50-62
Maizebran	75	75	75	75
Lime	150	300	525	525
Table salt	500	550	550	550
Vitaminerals	2500	2500	2500	2500

* Cost does not include transportation & or porters ... etc.

TABLE (4.3) Simple Layers Diet For Hot And Moderate Weather

	Diet A		Diet B
Ingredients	Moderate	Hot	Hot
Corn	66	58.5	63.3
Soy bean meal (44)	16	22.5	20.
Meat meal (54)	4	4	4
Alfalfa Meal (17)	3	1.5	3
Limestone	8	8.5	8.5
Salt	0.5	0.6	0.6
Premix	0.5	0.5	0.6
Added Fat	2.0	3.8	0
	100.0	100.0	100.0
Energy K Cal/kg.	2943	2940	2788
Protein %	15.5	17.5	17.1
Calcium %	3.3	3.5	3.5

selling prices of the product to insure that the diet is economically sound as well. In attempting to formulate rations to increase the efficiency of producing poultry meat and eggs, one must consider several factors, other than nutrition such as : Strain of bird, environment, management and feeding practices. So, formulating for laying hens is slightly different than for meat birds, than breeders.

In laying hens nutrient intake is very critical in maximizing production. Each bird should consume at least 610 mg sulfur amino acid per day, 730 mg of lysine, 170 mg of sodium, 3.4 g of Calcium and 650 mg of phosphorous per day. A single layer diet should be adequate under moderate temperature (Mogadishu area) where birds will normally consume about 100 g of feed. Table (4.4) gives some suggested layer formulae for both moderate and hot climate. The problem of feeding laying hens in warm climate is because birds will decrease their consumption of feed. In a diet is the same for both birds the bird in the warm environment will eat less than 100 g and therefore will not consume enough of the essential nutrients. This will cause a loss in production and a decline in egg size and poorer shells.

4.2.1.3. Development of Poultry Diseases Prevention Programme - (Layers)

In order to attain optimum production in a flock, birds should be kept under healthy conditions. The disease prevention management should include :-

4.2.1.3.1 Sanitation :

It is important that poultry houses and hatcheries in a farm should be kept clean. Debris have to be removed continously, empty poultry houses, feeders and waterers are to be cleaned, washed and disinfected. The foot bath at the entrance of each house on the farm should be cleaned once a week and a disinfectant added.

Table (4.4.) gives the use to which various disinfectants may be put :

TABLE (4.4) Use of Disinfectants

Use Area	Chlorine	Iodine	Phenol	Quaternary ammonia	Formaldehyde
Hatchery equip.	+	+	+	+	+
Water Disinfection	+	+	-	+	-
Personnel	+	+	-	+	-
Egg Washing	+	-	-	+	+
Floor	-	-	+	-	-
Foot Baths	-	-	+	+	-
Rooms	±	+	±	+	+

4.2.1.3.2 Disease Control Programme

4.2.1.3.2.1 Vaccinations :-

The following immunization schedule gives the possible use of vaccines against poultry diseases which are envisaged to be of threat to the laying flocks, (Table 4.5).

The vaccination programme for the control of New Castle disease has to be monitered in the vaccinated flocks by the haemagglutination inhibition test in order to assess their New Castle diseases antibodies. This protocal has to be carried out at regular intervals after vaccination. La sota strain vaccines are to be used and be administered intranasally.

TABLE (4.5) Layer Vaccination Programme

Age At Immunization	1 day	2 week	4 week	6 week	8 week	12 week	18 week
New Castle Disease	+	+	-	+	+	-	+ & every 3 months thereafter
Infectious bronchities	-	+	-	+	-	+	
Fowl Pox	-	-	-	-	-	+	+
Fowl typhoid	-	-	-	+		+	+
Fowl Cholera	-	-	-	+	+	+	+

Records of the vaccination operation giving dates of vaccinations and vaccines used have to be kept. Such records are of vital importance when difficulties arise following vaccination. The following tables show proposed forms for such a record :-

TABLE (4.6) Vaccination Record

Flock No. .. Breed No. ... Males No. ... Females No. ... Date Started ...

Age to be Vaccinated	Date to be Vaccinated	Vaccinated Against	Type of Vaccine	Method of Vaccination	Vaccine Producer	Vaccine Serial No.

4.2.1.3.2.2 Anthelmintic Drugs

Ascaridia Galli :- is the round worm afflicting the most damage among poultry in S.D.R.

The antibiotic Hygromycin B has been found to be most effective in the prevention of this infestation. It is given in the feed over a period of 6 weeks as follows :-

(i) Pullets : Feed 12 gms of hygromycin B per ton of feeding; starting at 12-14 weeks of age.

(ii) Layers : Feed 12 gms of the Hygromycin B per ton of feed

For treatment piperazine salt is advocated.

4.2.1.3.2.3 A Vitaminosis And Mineral Deficiences

Poultry " Vitamin-Mineral " should be added to the poultry rations at the rate of 2 kg per ton.

4.2.1.3.2.4 Control of Arthropods And Insects

It is recommended that carbaryl (SEVIN) spray or Malathion be used at regular intervals.

4.2.1.3.2.5 Pharmaceutical Products Needed For The Prophylaxis and Therapoutic Treatment of Poultry Diseases :-

Table (4.7) lists drugs used prophylactically or therapoutically in hacterial infections, of poultry, coccidiosis, and deficiences.

TABLE (4.7) Drugs against Bacterial Infections, Coccidiosis And Defiencies In Poultry

Amprolium	Prophylaxis and treatment of cocciodiosis.
Floxaid-Powder-Soluble in water	Prevent repiratory diseases, stress, providing essential vitamins.
Poultry Vitaminerals -	Vitamin-mineral food supplement.
Furozalidon	Microelements, control of salmonellosis and coccidiosis.

4.2.1.3.2.6 Dead Birds And Disposal of Debris

Dead birds and debris from the poultry farm and hatcheries should not be permitted to accumulate. This refuse must be disposed of daily and in such a way to prevent transmission of diseases. Carcasses of birds are to be collected in one protected container each day, identified on the legs by the date and number of the house concerned, and be submitted to laboratory as soon as possible for examination. Carcasses sent have to be accompanied with a report indicating the history of the flock, morbidity and mortality rates, previous medication and report of egg production. Table (4.8) gives an example of an outline that should be completed and submitted to the laboratory with the carcasses.

TABLE (4.8) Flock History For Laboratory Diagnosis

Submitted by _____ Date _____

Flock owner _____

No. of birds on farm _____ AGE _____

No. of birds submitted _____ % of flock showing symptoms_

Symptoms noticed (checks) :-

Coughing _____	Trembling _____
Sneezing _____	Diarrnoea _____
Swollen heads _____	Lame _____
Eye discharge _____	Swellon hocks _____
Paralysis _____	Dark Combs _____

Additional Discription of the Disease

_____

_____

Mortality pattern (Number of birds)

Week beginning Sat Sun Mon Tuse Wed. Thurs. Fri.

Previous Medication _____

_____

Report of egg production _____

4.2.2. Hargeisa Poultry Complex (H.P.C.)

The H.P.C. will consist of two units, layers and parent stock unit and broiler production unit.

4.2.2.1 Layers and Parent Stock Unit : (L.P.U)

This unit will consist of different items : 4 brooding, 9 laying houses, hatchery, grading and packing egg plant, storage area, offices for head quarter, 4 parent stock houses. 2 water tanks, housing facilities for resident manager on the unit plus 5 housing accomodations for supervisors and skilled labourers, see Fig. (9) Annex II for relationship between items :-

a) The 4 brooding houses are actually two already built and two other proposed for expansion to 10 million eggs annually. Each of the two old houses can brood about 4300 baby chicks up to 6 weeks of age, the new proposed brooding houses can each brood 3600 baby chicks up to the above age. The chicks starting the 7th week should be moved to the rearing & laying houses. The total capacity of all four brooding houses is 25800 baby chicks. This number of baby chicks will be imported every 27 weeks to parallel the cycle at the M.E.U. the 800 extra baby chicks is recommended for the expected higher loss in mortality in floor brooding than cage brooding. All four houses will fill only 3 of the laying houses for each brood.

b) Of the 9 laying houses, 8 were built in two rows of 4 each. These eight houses are already on the farm

now. The proposed ninth house is to complete a cycle of production to produce the 10 million eggs annually. It is assumed that the first brood will fill 3 houses, second brood will fill the 2nd three and third brood will fill the last three and the farm will be in full operation. The fourth brood will replace the first three houses.

The capacity of each house is about 7300 pullets of light commercial leghorn egg type. This number can be increased up to 10-15% due to slat construction in the houses. It is recommended for the first five years of the project to stick with the above bird density. The total number of pullets per batch will be about 21900 pullets housed.

c) The grading and packing plant will be located in the now called the hatchery building. The building should be modified for equipments and cold storage. This building is very close to the laying house for easier delivery of eggs.

d) The 4 parent stock houses will be needed to house 9750 meat type breeders baby chicks. These chicks will be imported in batches of 32500 chicks each 18 weeks. The houses will be used as a brood-grow-lay system. The above number of parent stock will be enough to produce the (million broiler required after the unit being in full production). These houses will be added to the existing farm on the west of the laying houses in one row to allow future expansion.

e) The hatchery building will consist of an incubator with capacity of 75-90 thousand eggs. The building and equipment should be provided by the proposed P.D.P. plan. The hatchery is required to produce about 83000 chicks monthly or about 20,000 weekly. The eggs required to produce this amount of baby chicks is 25,000 eggs weekly. The hatchery can extend to setter capacity of 150 thousand and change the hatching system to twice weekly, this modification will double the production of baby chicks from 1 million to two million.

4.2.2.2 Broiler Production Unit (B.P.U)

This unit should be located at a distance of about ½ km from the L.P.U. on the other side of the newly constructed road to Gibel. This unit will include facilities to raise 1 million broiler annually, processing plant to process 500 birds/hr, feed mill to produce 3 ton/hr, water tank, resident manager house, labour housing and offices for employees.

a) The houses needed to raise 1 million broiler a year will be 20 houses of 10,000 bird/house. The 20 houses will brood 200,000 each brood or about 100,000 monthly. Under the regular conditions a house can be filled with 5 batches every year. The total capacity of houses is 5 X 10,000 X 20 = 1,000,000 broilers. The broiler houses should be in two columns with 10 meter apart and each two houses consist of a section which can be filled and cleaned out as one unit. The distance between every section in rows should be 30 meters. If the farm capacity is doubled, two new columns can be added to this

proposed structure. All these broiler houses will be built according to P.D.P.

b) To process 1 million broiler annually in a period of about 280-300 days, a processing plant with capacity of 500 birds/hr is needed. The processing plant working plan will be on a one shift basis, at the beginning. The plant can double its capacity with working 2 shifts daily.

c) The feed mill with capacity of 3 ton/hr can produce finished feed of about 7200 ton annually. The feed mill will have the capacity of providing all feed required for the Hargeisa complex when operates one shift daily. The future expansion would have to consider a double shift for the feed mill.

4.2.2.3 Proposed Formula For Broiler Breeders

As mentioned earlier the broiler must consume sufficient nutrients on a daily basis in order to grow at its maximum rate. Each bird from 0-3 weeks of age should consume a diet containing 23% protein, 0.9% calcium, 0.7% phosphorous, 1.2% lysine, 0.50% methionine and 0.43% cyctine. of course there are many more nutrients but these are the most critical. The above description is for a diet containing 3200 kcal metabolizable energy per kg. The levels of the various nutrients can be lower or higher but it is very important that changes occur in all mutrients at a proportional rate so the nutrient intakes is sufficient. The only way to formulate broiler diets in hot or moderate weather is to increase the energy level and all other nutrients. This is usually done with the use of added fat and using additional say or meat and using synthetic amino

acids at a higher rate. Broiler diets for hot and moderate weathers are included in table (4.9). The consumption of feed will affect requirements of nutrients. Table (4.10) illustrates how the chemical composition of the diet should be changed to adjust for the reduced feed consumption.

Table (4.9) Broiler Diets For Hot and Moderate Climate

Ingredient %	Moderate W. % Diet.	Hot weather Diet.
Corn	54	46
Corn Gluten (60%)	0	6
504 (44)	29	0
504 (48.5)	0	29
Meat (54)	10	8
Limestone	0	0.7
Fat	6	9
Salt	25	0.3
Premix	75	1.0
Energy Kal/kg.	3190	3304
Protein	23.0	26.0
Calcium	0.92	1.02
Methiouim.	0.57	0.63

TABLE (4.10) Nutrient Specifications For Layers Feed Based on Feed Intake

Feed Intake	Protein%	Sulfu AA%	Lysine%	NA%	CA%	P%
77.1	18.0	0.789	0.945	0.21	3.3	0.84
81.6	17.5	0.746	0.892	0.21	3.3	0.79
86.2	17.0	0.706	0.845	0.20	3.3	0.75
90.7	16.5	0.671	0.801	0.19	3.3	0.71
96.3	16.0	0.639	0.765	0.18	3.1	0.68
99.8	15.5	0.610	0.730	0.17	3.0	0.65

4.2.2.4 Development of Poultry Diseases Prevention Programme - Parents and Broilers

4.2.2.4.1 Sanitation

Parent houses are to be cleaned and disinfected before stocking and 67 weeks after when the parents flock is culled.

In the case of broilers, houses have to be cleaned and disinfected at intervals of 8 weeks.

4.2.2.4.2 Disease Control Programme

4.2.2.4.2.1 Vaccination : the following immunization schedule shows the possible use of vaccines against poultry diseases in broilers and parents Tables (4.11) and (4.12).

New castle disease immunity has to be monitered at regular intervals post - vaccinations by the heamogolutination inhabitition test to assess their New castle disease antibodties.

TABLE (4.11) Broiler Vaccination Programme

Age at Immunization	1 day	2wks.	3wks.	4wks.	6wks.
New Castle Disease	+	+	-	-	+
Infection Bronchitis	-	+		-	-

4.2.2.4.2.2 Coccidiostats

The development in intensive poultry production makes it essential to control coccidiosis. This especially so in Somalia when the infection is prevailing in the two Government poultry farms. The key to an effective control of the disease is to design and apply a programme of total health and management control.

Amprolium has been found to be the classical coccidiostat currently in use. The drug can be used prophylactically as well as therapeutically. The disease prevention programme for broilers involves the administration of the drug (at the rate of 30-60 gms/of 100 litres of drinking water) birds of 3-6 weeks old

TABLE (4.12) Parent Stock Vaccination Programme

Age at Immunization	1 day	2wks	4wks	6wks	8wks	12wks	18wks
New castle	+	+	-	+	+	-	+
Inf. Bron.	-	+	-	+	-	+	-
Avian Encep	-	-	-	-	+	-	-
Gumboro	-	-	+	-	-	-	-
Fowl Pox	-	-	-	-	-	+	-
Fowl Cholera.	-	-	-	+	+	+	-
Fowl Typhoid	-	-	-	+	-	+	+

Vaccination records are to be kept.

for a period of 3-6 days.

4.2.2.4.2.3 Anthelmintic Drugs

Hygromycin B is the drug of choice. This is given in the feed of parents at the rate of 12 gms/ton of feed continuously.

4.2.4.2.4 Arthropods And Insects Control

It is recommended that carbaryl (sevin) sprays or malathion dusting be used regularly.

4.2.2.4.2.5 Dead Birds

Dead birds have to be submitted to the laboratory for examination as soon as possible. Carcasses sent have to be properly identified and accompanied with a report giving background information. Example of an outline is given in 4.2.1. 3.2.6.

4.3 Detailed Description of Major Components

4.3.1. Mogadishu Egg Unit

4.3.1.1 Production Units

The production units at Mogadishu KM 15 egg production farm will need an additional 4 houses. These aditional houses will be one for rearing and 3 for layers.

4.3.1.1.1 Land

The land required to accomodate the new four houses will be the area needed for the houses plus the isolation distance. The proposed rearing house can be located within 30 m from the planned two rearing houses with total area of approximately 300 m^2. The other 3 laying houses should be located to the East of the already planned six layer houses at the site. They should be grouply located so they can be in coordination with the cycle of the other six houses. Area for the three new houses will be about 6000 m^2 . The total area for the unit is about 9000 m^2.

4.3.1.1.2 Buildings

The 4 rearing and laying houses will be all open type houses naturally ventilated. The rearing house will be 66 X 12 X 3 in dimension. The laying houses will be 69 x 12 x 3 with an 828 m^2. The width of the houses was chosen to be 12 m due to the good circulation of wind in the area. The general and most common recommendation for open type houses is to be no wider than 10 m or even less. This recommendation allows for the times when air movement stops . An open poultry house with a width more than 12 m will cause problem in ventilation specially in warm air still days. The ventilation equipment can hardly do any good to improve the situation with wider houses. The houses will be concrete floor foundation to fit the type of cage equipment that will be installed. The recommended 3 tier cage system would require the consultation with the company providing cages for foundation lay out. Most companies would require a concreting floor of about 12-15 cm with base foundation for each row of cages. The hight of cage base will depend on the manure pit required, it is usually common to build apit of 60-75 cm deep. The house side will be made of column 3 meter apart with brief walls up to 1 meter high from the ground. The side of the house with the entrance will be all briks with two windoes 1.5 X 2.0 meter on the narrow side of the house. The end of the house will have a door of 2.5 X 2.75. The door from the entrance room to the house will be about 1 meter X2 meter. The inside wall between the entrance room and the house should have also two windows on each side of the door 1 X 1.5 meter. The roof will be truss type made of wood with a cover corrugated iron sheets lined under neath with styrofoam. The rest of the house walls above the 1 meter bricks will be chicken wire all along the long sides of the house end. The chicken

wire will be covered from inside with plastic curtain operated by a winch " top-down system " to raise and lower the curtain along the house.

4.3.1.1.3 Equipments

The whole new egg unit will need an additional 1000 plastic pullet crates, water pressures system for cleaning, refrigerators, 20,000 egg flats of different colors, 2500 plastic egg box carriers, a car and a pick up. The rest of the equipment will be :-

a) For the rearing house a 4 rows of 3 level batteries with total capacity of 25000 pullets. The cages are used for the rearing of pullets from the first day of life until the 18th week of age. For each cage, there should be 2 stainless nipples for drinking in the back of the cage. The feed trough should also be galvanized sheet with anti waste profile. The cage should be as full opened doors, equipped with facilities for baby chicks in their first week of brooding. The cage dimension will be 0.65 x 0.55 deep. This dimension is what is known now as reverse side cages and has preven to be better from the managerial and production points of view.

The feeding system would include running hopper for distribution of feed along with a complete automatic drive unit for feed distribution. It also includes a galvanized feed bin with capacity of 35 cubic meter complete with hopper for bin loading and for loading feed into the hopper of the feed distribution.

The watering system should include a storage water tank with connected by-pass with the main tank plus all pipes for feeding the water inside the house. The installation should also include a special tank for medicine administration through the water flow. The manure removal is automatic with scrapers, channels, motor, elevator, removing chain and complete drive unit. The electric equipments consist of control panel for feed distribution, loading hoppers, filling the bin scrapers, manure removing chain and set of thermometers. The lighting cosist of 40 lamps placed in rows inside the house at a distance of 3 meters apart. The system also require a manual automatic control for lighting period with the light intensity also controlled.

The heating system should be manufactured to be adequate for providing enough heat during the brooding period in the rearing house.

b) For the 3 laying houses each house will be equipped with 5 rows of automatic batteries complete with nipple drinkers and feed trough made of galvanized sheet. The cages are fully openable door with 37 cm, inside hight, 43 cms outside height, 45 cms wide, and 40 cms deep.

The feeding, watering manure removal, electric and light system are the same as in the rearing houses with slight modification for the 5 row batteries. The electric system will also include panel for egg collection. The egg collection system will have a conveyer to move the eggs from each tier to down level with drive unit to place the eggs in front of each row of cages.

4.3.1.1.4 Personnel

The Mogadishu egg unit will run by one Agriculture college graduate as manager. The unit will need one supervisor, 2 skilled labourers, 4 unskilled labourers and 4 watchmen.

4.3.1.2 Feed Consumption

The feed consumption for the laying unit at Mogadishu is included in Table (4.13). There are two rations with varying level of protein and metabolizable energy would be offered to the growers and layers. The rations consist mainly of raw materials available in the project area at reasonable prices. The ration used will be the one formulated at the feed mill at km. 7 . The feed efficiency under the project condition would be 2.1 kg of poultry feed for each kg of egg produced. Detailed calculations of feed consumption for the birds at different phases of project development are included in Table 2, Annex II.

4.3.1.3 Budget Estimates For Implementation of Disease Control In The Project - Layers

4.3.1.3.1 50,000 Baby Chicks as layers will be reared each year.

4.3.1.3.2 Vaccines

Vaccination costs are estimated at USS 3,590 per year. Details are given in Table (4.14).

TABLE (4.13) Feed Consumption (ton) in the Mogadishu Egg Unit

Group	No. of Birds	First Year (ton)		Second Year (Ton)		3rd Year (ton)	
		G *	P *	G *	P *	G *	P *
A	25,000	23	424.5	-	326.5	-	-
B	25,000	2.25	-	229.5	738.6	-	-
C	25,000	-	-	231.80	395.6	-	355.4
D	25,000	-	-	-	-	231.8	738.5
E	25,000	-	-	-	-	231.8	366.7
	Total	233.2	424.5	461.3	1460.6	463.6	1460.6
Cost of feed ***		326.5	551.8	645.8	1,898.8	649.0	1898.8

* Growing Ration

** Layer Ration

*** Cost of Grown mash and layer meal are 1.40 So. Sh. and 1.30 Sh. respectively per kg cost in 1000 Sh. Sh.

TABLE (4.14) Estimated Cost of Vaccines For Layers

(U. S. $)

Vaccine	First Year	Second Year	Third Year
1. New Castle	480	480	480
2. Infections Bronchitis	288	288	288
3. Fowl Pox	404	404	404
4. Fowl Cholera.	1209	1209	1209
5. Fowl Typhoid.	1209	1209	1209
Total	3590	3590	3590

4.3.1.3.3 Disinfectants

It is planned that four houses for layers be built. A quantity of 3200 liters of 1% solution of disinfectant is required each year for disinfection of the buildings. Estimated cost of the disinfectant is : US$ 320/year.

4.3.1.3.4 Anthelmintics

Fifteen kilogrammes of Hygromycin B is required costing :- US$ 4500/year.

4.3.1.3.5 Miscellaneous Medicaments

An amount of US $ 2000 is considered sufficient for each year.

Total estimates/ year

1. Vaccines	USS	3,590.
2. Disinfectant	"	320.
3. Anthelmintics	"	4,500.
4. Miscellaneous Med.	"	2,000.
	USS	10,410

4.3.2 Hargeisa Poultry Complex

The Hargeisa poultry complex will consist of two units. The first one is table and hatching egg farm. The first unit also will include egg processing centre and the hatchery for baby chicks. The second unit will include a broiler farm, processing plant for poultry and feed mill.

4.3.2.1 Production Units

The first production unit which will be called layers and parent stock unit will consist of the all premiss already on the farm plus new additional buildings. The 8 layer houses will need an additional house with the same dimension. The egg processing centre will need cold storage room added. A new building for the hatchery is required. Four new building for parent stock and a manager residence, and labour housing is also needed.

4.3.2.1.1 Layers And Parent Stock Unit

(a) Land

The additional land needed for this unit will be about 36,000 m^2. This land will include an isolated distance from

the layer farm of 100 m. The area also will include the building of a new layer house. The hatchery building will require about 600 m^2. The resident manager housing facilities will need about 80m^2. The housing and facilities for labourers will require about 150 m^2, and an additional storage area of about 100 m^2 will be added to the old storage place. Additional offices for management staff will require about 50 m^2.

(b) Buildings

1. The new added laying house will be identical to the 8 laying houses already on the farm. The house will be built on the East side of the farm toward the existing entrance with an isolated distance of about 20 m from the house to the West.

2. The parent stock houses will be also of an open type style like that of Mogadishu egg unit. The same building specification will be applied to the houses. The dimension of houses will be 58 x 12 x 3 m. The floor will be concrete without any enforcement and all flat. The entrance room will be 3 x 12 m. The same specification for walls, narrow sides, roof, doors, window and plastic curtain installation like the Mogadishu egg unit houses. The houses will need water pipe along side for waterers.

3. The storage area added to the existing one will be built the same way except that it can have 2 meter walls of bricks and the rest of walls to ceiling wire mesh. The doors of the new storage should be on both sides with dimension 2x2 meter. This storage area will be in the back of old storage area with dimension 10 x 10 m. The additional office space will be like the existing ones on the front of them forward

the road to Gebile. The dimension of the 3 offices will be 3 x 3 m. each . The general managers office will be on the far east side adjacent to the new offices with 4 x 4 m dimension and a 2 x 3 m entrance for personnel secretary . On the west side of the offices a laboratory for disease control will be established for on the farm diagnosis and rapid test. The houses for 5 supervisers and skilled labourers will be brick type houses adjacent to each other and, each will consist of living area 2 x 3 m and bed room 4 x 3 m. The kitchen facility and the shower facility will be in the back and front of the houses respectively.

4. The resident manager housing facilities will consist of 2 bed rooms, one is 4 x 4 m and the other is 4 x 3 m. The kitchen and bathroom will be in a hall 2 x 4 close to the bed rooms and on the other side living area of 4 x 3 m. With a terrace infront of it.

5. The hatchery building should be arranged so that to ensure the shortest route for the eggs through the hatchery. The hatchery floor must be tile floor with a glazed finish. The floor slope of 2.5 cm each 3.5 meter is required. The gutter on one side of the rooms will be about 15 x 15 cm. The gutter should run to only one end. It should be covered with a steel plate with holes. A trap of size 80 x 40 x 40 cm should be provided to collect all other hatchery waste from going through the sewar system. The trap is vocered with a steel plate in half in which 1.2 cm holes have been bored. A 100 cm pipe should be extended through the concrete when the trap is being built. The top of the pipe should be 5 cm below the top of the trap. The walls inside should be oil painted and the ceiling should be concrete. The ceiling hight will depend on the type

of machine installed. Most machines will not require more than 3 m high ceiling. The building should include :-

- Entrance room and a reception and office
- Bath room, show and dressing room
- Egg receiving and grading room
- Fumigating room
- Cold storage room
- Incubators area
- Hatcher room
- Chick handling room
- Room for handling day old prior to storage & shipping.
- Repair stop
- Cleaning and disinfecting room
- Storage room
- Disposal pit for all hatchery refuse
- Water tank to hold 30 m^3
- Generator room.

For the egg grading and packing plant it will be needed a cold storage room 7 x 9 equipped with two cooler, 18000 B.T.U. each.

(c) Equipments

1. The two brooder houses in the layers, parent stock unit will each need the following equipments :

	Items	Items per old brooder-houses	Items per new Brooder Houses
-	Water fountain day old	100	200
-	Starter trays	50	100
-	Round automatic drinkers	50	100
-	Semi-automatic feeders pan type	100	200
-	Gas brooder	5	5
-	Gas tanks	15	15
-	Pullet Crates for all the unit	500	-

- Each house will need electric installation and lighting system. Each house will also need water tank for medicin administration with watering system with all the farm.

2. The layer houses on the layers and parent stock unit in Hargeisa will each need the following equipments :-

-	Automatic waterers (Round)	75
-	Automatic feed chain 252 meter feed trough with cleaness and trough support and corners with corner support and chain adjusters and supports.	1
-	Community nests of 15 holes	100
-	Egg baskets for egg collection	25
-	Each house will need electrical, lighting and waters system to be installed.	

3. For the 4 parent stock houses the following equipments will be needed for each house :-

-	Plastic water fountain day old	70
-	Starter trays	35
-	Automatic feed chain 232 meter	1
-	Feed trough with cleaners and trough support and corners with corner support and chain adjusters and supports	
-	Gas brooder including one for males in separate chick guard area	5
-	Gas Tanks	10
-	Automatic waters	35
-	Community nests with 15 holes	50
-	Egg baskets	10
-	Egg handoing table	2

Each house will be also equipped with electric lighting and watering system. The above houses will also require a dead birds pit for disposal of dead birds. The layers and parents unit will also need 2 precision debeaker plus two regular debeakers. The layer farm will be using egg flats from the processing egg plant. The parent farm will require different coler flat for transfer to the hatchery daily. The number of egg flats needed for parent farm will be 2000.

4. The equipments needed for offices will be desks and chairs to furnish 6 offices plus furniture for the general manager office and his personal secretary. Office will be also equipped with typewriters, Zerex machine and cabinet and files and shelves. The houses for labourers will be a living area and bed room. The kitchen will be equipped with stores, refrigerators and cabinet area adequate for all. The resident manager house will be equipped with one living room, 2 bed rooms, kitchen equipment and water heater. The equipments needed for the

disease control laboratory will be 2 deep freezer, 1 refrigerator, reagents, incinerator, stove, glass ware, pench with 2 sinks, and autopay table.

5. The hatchery equipments will be :-

- Incubator with capacity of 108-110 thousand egg is required for hatching parent stock eggs. The adequate hatcher of size 36 - 37 thousand weekly is needed to produce about 25,000 broiler baby chicks weekly. The incubator is complete with plumbing and cooling system. It also should include extra flats, loading pullets with loading buggies. This with a two years of spare parts.

- Equipments for setter room as cooler complete with humidistat and hygrometer, wall exhaust fan with automatic wall shutter, centrifugal round hood exhaust fan with roof air intake, and a humidifier with manual starter, oil heater unit will be installed in the room.

- The hatcher room will require, cooler with water reculating pump. Centrifugal roof exhaustfan , roof air intake with a motorized shutter, humidifier and oil heating unit.

- Egg cooler for egg storage room
- Fumigation room
- Tables for egg receiving room (64 x 64 cm) two tables.
- Three tables for chick handling room with 5 racks
- Cleaning and disinfecting equipment
- Two stand by generators to serve the hatchery and the other layers and parent stock unit.

- Water pressure system
- Equipments for candling and transfer
- Plastic egg trays, and 250 plastic egg boxes
- Small refrigerator
- Work shop equipment
- Vaccum egg lift
- One tray washer and chick box washer
- Egg cases
- Incinerator
- Chick boxes
- Plastic egg carriers
- Office furniture and reception and lunch area facilities

6. The grading and packing plant equipments will include :-

- 2 cold storage cooler with capacity 18000 B.T.U. each
- 2500 plastic egg box carrier
- 20000 egg flat
- Skid plat form
- Refrigerator
- Complete grading and packing line consist of, powered flash candle conveyer or with rubber covered rollers for receiving eggs, and special illumination for viewing exterior and interior egg quality. The receiving end of the convey or where eggs are transferred from 30 dozen cases to rubber covered rollers in six- a breat formation is illuminated by a small over head lamp for examination of exterior defects, the flash candling area rotate the eggs rapidly over a set of mercury vapour lamps, singulator to change the six breast formation into single file, a blood spot detector, and in line scales, to grade eggs to large, medium and small

end down, an automatic unit for packaging. At this plant there will also be shelves for storage and equipment for carton set up.

For all the layers parent stock component, additional equipment needed are : 2 refrigerator of deep freezers, 2 floor scales, 1 tractor, 1 truck, 1 chick truck 2 pick ups and 1 landrover and 1 car.

(d) Personnel

For all the layers and parent stock component the following workers will be needed :-

1 General Manager for the farm, Agricultural graduate with 5 years experience in poultry.
1 Veterinary doctor for the hygine laboratory
2 Assistants fresh agricultural graduate or high school (Agriculture)
2 Supervisors for the packaging and hatching eggs
1 Forman for all component
7 Skilled labourers with poultry back ground
28 Unskilled labourers
6 Night watchmen
7 Drivers
1 Mechanics
2 Assistant mechanics
1 Repairman
2 Assistant repairmen
6 Doormen

The Management Head Quarter will need :

1 General project manager 10 years experience
1 Assistant to G.P.M.7 years experience
2 Typist
1 G.P.M. personnel secretary
2 Clerks
2 Purchase representatives
2 Sales men.

4.3.2.1.2 Hargeisa Broiler Unit

The Hargeisa broiler unit will include the 20 broiler houses, poultry processing plant, and feed mill (3 ton/hr.).

a) Land

The land needed for the broiler unit can be secured on the east of the existing layers houses. The other option will be another area on the opposite side of the road new being under construction to Gebali. The total land required for the broiler houses including extension to two million broilers plus area for processing and feed mill is about 55000 m^2.

The above area would include areas for offices, labourers housing facilities and resident manager house.

b) Buildings

The 20 broilers houses will be 86 X 12 X 2.5 m dimension. The broiler area is about 83 x 12 m. The entrance and care-taker and feed delivery room is about 3 x 12 m. The houses will be the same like those at the parent stock farm in style. The

same specifications for floor, walls roof, windows and doors.

The resident manager house and the labour facilities will be exactly like those on the layer and parent stock component. The office facilities in design like those on the other farm. The number of offices here will be only 3 offices. The layout of the resident manager house, feed mill, processing plant for poultry are shown in figures 4,6,8and 9 Annex II.

The processing plant building will consist of the following :-

- General office with reception hall and general facilities.
- Lunchroom along with nearby bath and shower and dressing facilities.
- Hall for blood tunnel and defeathering area
- Boiler room
- Poultry by-product facility
- Hall for evisceration and packing area
- Repairshop
- Freezing room
- Cold storage room
- Ice storage room
- A machine room and ice making machine
- Office for shipping dressed poultry
- Receiving dock with truck bay.

The building should be made of brick tiled walls up to two meters high for easy cleaning. The rest of the walls should be oil painted. The roof should be concrete and the floor tiled. The plant should be provided with a pit for condemened birds.

The receiving dockbay will be about 3.5 meters with a hard surface sloped to the gutter. The bay will be covered with an overhead roof 4.5 m high. The dock platform should be the standard height for trucks used in the country with a width of about 2.2.2.5 Meters.

The bleeding tunnel will be about 1.5 m to give a 1½ minute bleeding time. The slope of the tunnel will be 0.7 cm for each 30 cm for adequate draining. The light at the slaughter station will be about 30 candle power. For the defeathering area a hot and cold water outlet should be installed along with a steam mixing valve with hose. The evisceration line length and equipment arrangement usually depend on the manufacture recommendations. The chilling and packing area should be arranged to provide protection from both moisture and mechanical damage. The plant foundation should be capable of supporting maximum load. The floor should be constructed for maximum drainage.

The width should be about 2.5 - 3 meters to facilitate movement of equipment.

The feed mill building should be according to the manufacture specifications. It should include area or slite for materials, area for dozing and weighing equipments, grindings section, mixing section, area for storage of finished feed and silos and weigher for finished products.

c) Equipments

The equipments required for each broiler house are as follow :-

Items	Number
- Water fountain for day old chicks	50
- Starter trays	50
- Round automatic drinkers	100
- Gas brooder	10
- Butan gas tank	10
- Floor scales for all the farm	2
- 1500 chicken crates for all the farm	
- Chain feeding with 336 meter feed trough, 2 cleaners, 133 trough supports, corners and corner supports, 336 metre of chain , chain adjusters and supports and time clock.	1

Also electric, lighting and watering system should be installed for each house.

2. The resident manager house will be furnished the same way as the one on the layer and parent stock unit. The offices & labour facility will be identical to the ones on the other unit in terms of furniture.

3. The processing plant equipments will be as follows :-

- Water pump with a capacity of 25,000 gallons/hr
- Office furniture.
- Refrigerator
- Poultry by product processing equipments
- Repair shop equipments
- 1500 Plastic carcass crates
- Freezer room with capacity of 40 ton

- Cold storage room with capacity of 20 ton
- Ice making machine
- Complete processing equipments, as stunner, bleading line , scalder, plucker, finisher, eviscerating caronsel, dripping shackles, bagging and packing table one weighing scale. Spare parts for two years should be included.

4. The equipments needed for 3 ton/hr feed mill are as follows :-

- Intake conveyor for grain with hopper and 10 ton run over grid.
- Intake elevator to rotary grain cleaner and magnet system.
- 2 grain bins 40-50 tons capacity each.
- Collection conveyor from grain bins and elevator to hammer mill bin, both 10 tons/hr.
- Hammer mill 3 ton/hr capacity with auger discharge to meal elevator cooling fan and cyclone, inlet hopper with permanent magnet,
- Meal elevator from hammer mill to meal top convey or over concentrate bins elevator, has intake hopper for bagged, already ground concentrates.
- 4 concentrate bins each holding 20 tons. The discharge auger should be push button operated. Any other ingredients can be added from sacks.
- Hopper weighter of 500 kiles capacity.
- Meal mixer of 500 kg capacity and a mixed meal bin of 750 kg capacity below mixer.
- Weigh bin with elevator and weigher to weigh meal into 25 and 50 kg sacks.

This whole component mill also need a water tank with capacity of 60 m^3, stand by generator with capacity of 400 KW, one tractor, one pickup, one refrigerator truck for delivery of poultry meat, one 10-15 ton truck for moving live broiler and feed, one land rovers.

d) Personnel

The personnel needed to run all the component will be :-

1	Manager Agricultural graduate with 5 years experience
2	Assistant managers either high school or Agricultural College graduate.
1	Veterinary doctor for the processing plant of general hygine
2	Formen
6	Guards
5	Drivers
50	Unskilled labourers
1	Mechanic
1	Assistant mechanic
1	Repairman
4	Skilled labourers

4.3.2.2 Feed Consumption for Hargeisa Poultry Complex

The Hargiesa poultry complex will use the feed formulated at the proposed feed mill. It is recommended for the first 3 years of the project to import concentrates 10% and add it to soy been and c rn from Hargeisa . The diet for broiler, layers & parent stock should satisfy the requirements listed in Table (4.15). The feed consumption for each production

cycle (layers, parent, broilers for the first three years is shown in Table (4.16, 4.17).

4.3.2.3 Estimated budget for implementation of disease central in the project parents and broilers.

4.3.2.3.1 The project is proportionated into three phases. Each phase is one-year period involving :-

9,750 birds as aparent stock
1,000,000 birds as broilers.

4.3.2.3.2 Estimated cost of vaccines required to protect this number of birds are given in Table (4.18). It is estimated that a sum of USS 30,161 is required/year.

4.3.2.3.3 Disinfectants

An approximate quantity of 22,000 litres of 1% solution of disinfectant is needed each year for disinfection of the houses cost of the operation will be : USS 2,200/year.

4.3.2.3.4 Coccidiostats

A 60 kilogramme of amprolium is required to effect prevention of the disease each year of the project. This will cost USS 420/year.

4.3.2.3.5 Anthelmitics

A 3 kilogramme quantity of Hygromycine B is required to induce proohylaxis. Estimated cost of the antibiotic will be USS 900/year.

TABLE (4.15) Feed Consumption for Laying Biros At Hargiesa Poultry Complex

Group	Birds	1st Year		2nd Year		3rd Year	
		G*	P*	G*	P*	G*	P*
A	25800	238.4	432.4	-	332.6		
B	25800	2.3	-	236.8	752.2		
C	25800			239.2	402.9	-	362.0
D	25800					239.2	752.2
E	25800					23.92	373.5
	Total	240.7	432.4	476.0	1487.7	478.4	1487.7
Cost of Feed		336.9	562.12	666.4	1934.0	669.8	1922.3

* Growing Ratien 1,40 S.Shs. ** Laying ration 1.30 S.Sh.

TABLE (4.16) Feed Consumption For Broilers at Hergeisa Poultry Complex

Item	1st Year	2nd Year	3rd Years
No. of birds	337,558	1,028,569	1,024,381
ton of feed	1,448	4,412	4,394
Total feed Cost *	2,317	7,059	7,030

* The same price of feed at the feed mill in Mogadishu in 1000 Sh. at 1.6 Sh/Kg.

TABLE (4.17) Feed Consumption For Parent Stock At Hargeisa Poultry Complex

Group	Birds	1st Years		2nd Years		3rd Years	
		G	P	G	P	G	P
A	3250	46.4	91.7	-	45.7	-	-
B	3250	46.4	29.9	-	107.5	-	-
C	3250	23.7	-	22.7	137.4	-	-
D	3250	-	-	46.4	85.3	-	52.1
E	3250	-	-	46.4	22.2	-	115.1
F	3250	-	-	19.8	-	26.6	134.5
G	3250	-	-	-	-	46.4	78.7
H	3250	-	-	-	-	46.4	14.6
I	3250	-	-	-	-	0.9	-
Total Feed		116.5	121.6	135.3	398.1	120.3	395.0
Total Cost		163.1	158.1	189.4	517.5	168.4	513.5

* Grower ration 1.4 So. Sh./Kg.

** Layer ration 1.3 So. Sh/kg.

TABLE (4.18) Estimated Cost of Vaccines For Parents And Broilers

(US $)

Vaccine	Parents	Broilers	Parents	Broilers	Parents	Broilers
	Cost	Cost	Cost	Cost	Cost	Cost
1. New Castle	156	6000	156	6000	156	6000
2. Infectious Bronchitis	546	14000	546	14000	546	14000
3. Avian Enceph-alo- Myelities	030	-	030	-	030	-
4. Gumboro	064	-	064	-	064	-
5. Fowl Pox	819	-	819	-	819	-
6. Fowl Cholera	2478	-	2478	-	2478	-
7. Fowl Typhoid	2478	-	2478	-	2478	-
Total	6571	20000	6571	20000	6571	20000

Estimated Cost For One Year = USS 30,161

TABLE (4.19) Production Weeks of The First Three Production Years For Different Batches and Total Eggs in /000

Batch	First Year		2nd Year		3rd Year	
	Weeks	* Eggs	Weeks	* Eggs	Weeks	* Eggs
A	F 28	3,015.6	L 24	2,140.1	-	-
B	F 1	7.7	L 51	5,148.0	-	-
C	-	-	F 26	2,803.5	L 26	2,352.3
D	-	-	-	-	F 51	5,081.5
E	-	-	-	-	F 24	2,585.2
Total	29	3,023.3	101	10,091.6	101	10,019.0

* Means First 28 weeks ** L 24 means first 24 weeks.

Mogadishu Egg Unit:(Production)

Table (4.20) Total Egg Production at Mogadishu Egg Unit
(in 1000 eggs)

Project Year	Total Egg produced	Total Eggs Sold to consumers	Total eggs cracked and broken
First	-	-	-
2nd	3,024	2,872	152
3rd	10,092	9,587	505
4th	10,092	9,587	505

Table (4.21) No. of Spent Hens Sold At Mogadishu Egg Unit

Project Year	No. of Spent hens	Total livebody wt in 1000 kg.	Tonage of dressed meat from spents
First	-	-	-
2nd	-	-	-
3rd	36,966	50.3	30.2
4th	18,483	25.2	15.1

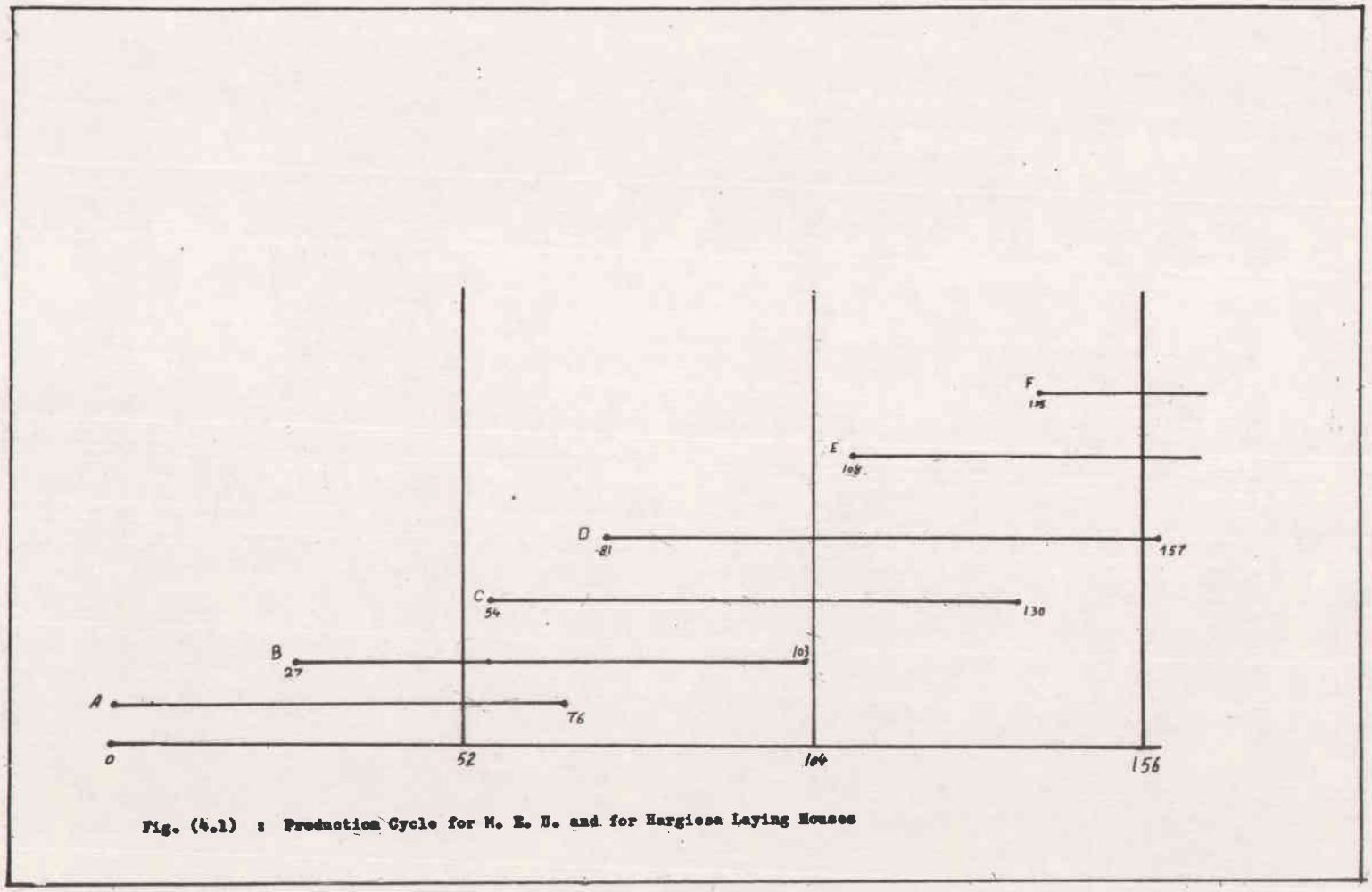

Fig. (4.1) : Production Cycle for M. E. H. and for Hargiese Laying Houses

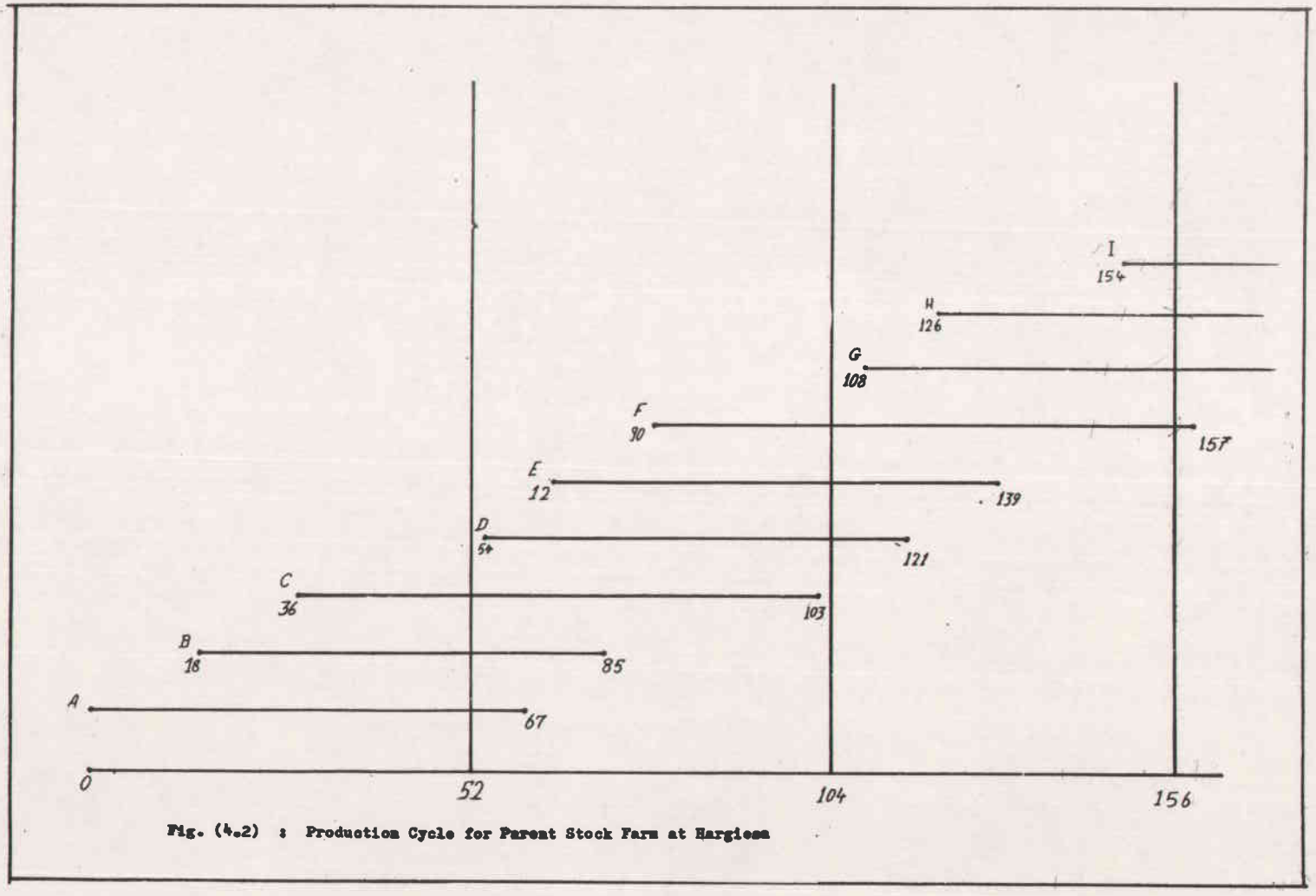

Fig. (4.2) : Production Cycle for Parent Stock Farm at Hargiesa

Table (4.22) gives the number of birds sold as spent and their produced tonage of meat from M. E. U.

The number of spent birds was calculated on the basis of 1.25% Mortality each month.

4.4.2 Hargeisa Poultry Complex

At Hargeisa P. C. two cycles for production are needed ; one for the layers of table eggs, and the second for the parent stock meat type brooders.

4.4.2.1 Commercial Egg Type Layers

The commercial egg type layers will be raised at H. P. C. to produce the 10 million table eggs. The cycle of production will be exactly like that at M.E.U. It is planned to raise the first batch of 25800 baby chicks till 6-7 weeks of age at the brooder houses on the farm. The chicks are then divided equally between 3 laying houses. The goal is to house about 7300 pullets at maturity in each of the three houses. The higher number of baby chicks brooded at H.P.C. than MEU is mainly due to expectation of more loss in floor brooding than cage brooding. The second batch to fill the brooder houses will be 27 weeks after the first one with the same size. This second batch after brooding will fill another 3 laying houses. The third batch will fill the last three houses. The fourth batch is supposed to replace the first as indicated in figure (4.1).

The same production standard as M.E.U. were considered in calculating total eggs produced. The only exception was that the percentage of cracked and soiled eggs at Hargeisa was 7.5%

instead of 5% at M.E.U.,(Table (4.22). For meat produced from spent hens the same laying period mortality was excepted. The percent of culled condemned birds was counted as 7.5% in this case,(Table (4.23).

4.4.2.2 Parent Stock Meat Type Breeder at Hargiesa

The parent stock chicks at Hargeisa reared at the L.P.C. will be imported in batches every 18 weeks. Each batch will consist of 3250 female day old chicks. The number of males imported should be 650. This male percentage is double the recommended 10% for most meat-type breeders. This high percentage of imported males is mainly to avoid any unexpected loss in males during brooding and rearing. The males of meat-type breeders are more sensitive than females and usually suffer extremely high mortality during any disease outbreak. Because of the inexperienced employees in Somalia it is reasonable to import 20% for each batch until a high skill of poultry husbandry has been developed among workers.

The production cycle in figure (4.2) gives complete details for imported day-old chicks and old hens sold for the first three productive years of the project. The project will import 3 batches of 3900 chicks each for the first year and their often. At the second production year (project 3rd year) the project will sell 3 batches of spent parents. This cycle will sell 3 batches of spent parents at every project odd year starting year 3, then 2 batches of spent parent on every even year after the third year.

The farm structure at the end of the first year production (52 weeks after first batch) will be as follows, Batch A in

TABLE (4.22) Total Eggs Produced at The Layer & Parent Stock Unit 1000 eggs (in '000 eggs)

Project Year	Total Eggs produced	Total Eggs Sold	Total eggs cracked and broken
First	-	-	-
2nd	3,079	2,848	231
3rd	10,280	9,509	771
4th	10,280	9,509	771

TABLE (4.23) Total Meat Produced at Hargeisa from Spent Hens at Layer Farm

Project Year	No. of Birds	No. of Birds - 92,5% processed	Live body-wt in ton 1.47.	Tonage of dressed meat basis
First	-	-	-	-
2nd	-	-	-	-
3rd	37230	34438	50.6	30.4
4th	18615	17219	23.3	15.2

TABLE (4.24) Total Meat Produced at Hargeisa from Broiler Farm

Project Year	No. of birds 95 of broiler in 1000	No. of birds process- 97.5% (in 1000)	Total live wt ton 1.8	Total dressed meat in ton 65 %
First	-	-	-	-
2nd	320.6	312.6	562.7	365.8
3rd	977.1	952.7	1,714.9	1,114.7
4th	973.2	948.8	1,707.9	1,110.1

production for 26 weeks, batch B in production for 8 weeks and batch C at the age of 16 weeks, see Tables(4.24, 4.25).

The above number produced of baby chicks will be all reared at the B.P.U. in Hargiesa. The expected number of birds to be dressed at the processing plant will be 95% of the total chicks brooded. The percentage of condmenation at the processing plant is considered to be 2.5%. The total tonage of meat produced at the broiler production unit is listed in Table (4.26) on the basis of 65% dressing percentage.

The calculation of day old chicks was on the basis of 10% egg production than standard (Annex II). The proportion of hatching eggs is 88% of that laid, and the hatchability is considered to be 80%. The number of table eggs produced at

the parent stock farm is listed in table (4.27). The number of males and females parents sold at the end of their production cycle is listed in table (4.27). The number of birds sold at the end of the production cycle was calculated on the basis of 15% mortality during the production period. The total meat produced was calculated on the basis of 5% condmned and 65% dressing percentage.

TABLE (4.25) The Total Number of Baby Chicks Produced Each Batch and Their Production Time

Batch	1st Year		2nd Year		3rd Year	
	Weeks In Production	Baby Chicks in 1000	Weeks	* B.C.	Weeks	* B.C.
A	F 26	263.4	L 15	93.3	-	-
B	F 8	74.1	L 33	282.6	-	-
C	-	-	F 41	356.8	-	-
D	-	-	F 24	246.6	L 17	110.2
E	-	-	F 6	49.2	L 35	307.6
F	-	-	-	-	F 40	352.3
G	-	-	-	-	F 22	228.8
H	-	-	-	-	F 4	25.5
	34	337.5	119	1,028.6	118	1,024.4

TABLE (4.26) Total Meat Produced at Hargeisa From Spent Hens at Parent Stock Farm

Project Year	No. of Birds	Dressed 95%	Live body wt & ton.	dressed meat ton 65%
First	7902	7506	24.9	16.2
2nd	-	-	-	-
3rd	-	-	-	-
4th	5268	5004	16.4	10.8

TABLE (4.27) Total Eggs Produced at Hargeisa Parent Stock Farm in 100 Eggs.

Project Year	Total eggs	Total eggs old	Total eggs craced	2.5% *
First	-	-	-	
2nd	74.65	72.78	1.87	
3rd	144.19	140.58	3.61	
4th	141.56	138.02	3.54	

* Shall egg stronger hen by hen eggs.

4.5 Project Dynamics And Chicks Flow

4.5.1 Mogadishu Egg Unit

The cage system used on this unit, which is going to be integrated with other houses has many advantages. The pullets in cages have less mortality than those on littered floor, the pullets are free from coccidiosis, the labour requirement is less and the eggs are cleaner.

The rearing house will use brood and grow system, which would mean that commercial day old chicks of the egg type will be brooded and reared up to the time of transfer to laying houses. The time of transfer will be after the 18th week of age or at the beginning of the 19th week. Each batch of baby chicks will provide pullets for (25000) on laying house. The management cycle for the four laying houses is as follows :-

TABLE (4.2) Rearing And Laying Cycle At M. E. U.

Week Since First Batch	Batch	Rearing In- out	First In-out	Laying In-Out	3rd In-Out
1	A	1 18	19 76		
27	B	27 45		46 103	
54	C	54 72			73 130
81	D	81 99	100 157		

The above cycle was adopted for two reasons, first to give time between batches for adequate cleaning and preparing next batch under Somali conditions ; Second and more important to give more time to get red of the spent birds after production since their is no processing plant in the country till now. After these three years (or what ever management chooses to do) the cycle should be new batch every 20 weeks as follows.

TABLE (4.29) Alternative Rearing and Laying Cycle At MEU

Week	Batch	Rearing In-Out		House One In-Out		House Two In-Out		House Three In-Out	
1	A	1	18	19	76				
20	B	20	38			39	96		
40	C	40	58					59	116
60	D	60	78	79	136				
70	E	60	98			99	156		

The above cycle will give more efficient way in filling the houses with shorter down period in between batches. If the 20 weeks interval batches are used, the total eggs produced for the first production year will be 3,193,800 and for the second production year 11,333,900, and for the third production year and there after will be 12,003,300 eggs. The space provided for each chick up to six weeks is about 180 cm^2. After these six weeks the space provided will be about 355 cm^2 per pullet up to 18 weeks of age.

The chicks will usually starte in one cage unit, some of the birds are then moved to another unit or units when they reach six weeks of age. The feeder usually provide 2.5 cm per chick for the first six weeks of chick life. It is preferable to provide papers on the wire with feed for the first day so chicks can find feed easily. The feeding programme during brooding and growing should be a full feed programme. The management should not practice any restricted feeding the first 2-3 years until it has highly skilled personnel trained for such programme.

The laying cages will provide water supply by troughs running the length of the cage unit (or nipple system). The birds will be fed automatically. A service aisle between cages with a width of about 85 cm will be provided. The eggs will be collected automatically by being transfered to one level then collected in one space. The eggs will be moved twice to the grading and packaging plant every day. Eggs is to be cooled after that in the cold storage facilities at the grading plant. There are at least three colour egg flats between the laying houses, grading unit, and the marketing retailers. The storage facilities can hold the egg production of 10 days . Eggs should be marketed from the farm tri-weekly.

4.5.2 Hargeisa Poultry Complex

4.5.2.1 Layers And Parent Stock Unit

a) Layers

The layers farm at Hargeisa will be operated on the same cycle as M.E.U. It will import 25800 day old chick every 27 weeks. At this farm a switch to the 20 week cycle can be done during the third year since a processing plant will be in

operation for the broiler production unit. Every imported batch will be brood in the 4 brooding houses (the old two houses will each carry 4300 chicks and the two new houses will each brood 8600 chicks). After brooding this first batch it will fill the first laying house as the following table :-

TABLE (4.30) Alternative Rearing and Laying Cycle at Hargeisa Complex

Week	Batch	Rearing houses 1,2,3,4 in-out		Laying Houses 1,2,3 In - Out		4,5,6 In - Out		7,8,9 In - Out	
1	A	1	6	1	76	-			
27	B	27	33			34	103		
54	C	54	60					61	130
81	D	81	87	88	157				

In a managing the layers and brooder houses one should take good care of chicken and keep an eye on every little detail. Some reasonable suggestions about rearing poultry on floor will be mentioned in rearing parent stock and broiler, and it will be redundant to repeat the same suggestions here.

b) Parent Stock

The flow of chicks to the parent stock houses will be each 18 weeks. The number of chicks delivered each time will be 3900 chicks including males. Time before chicks arrival

houses should be placed in separate area to be given extra T.L.C. They should not be enterminglid with females until after 8th week of age. Males and females should be watched carefully to attain recommended body weight after the 3-4th week. House litter should be with some moisture to build good immunity, not too dry not too wet. Chick guard should be expanded step by step and chicks should start learning to use the chain feeder as early in life as possible.

The chicks should be debeaked by a precision debeaker at the age of 6-9 days. Immunity against disease should be monitored regularly by testing. No practice of restricted feeding should be followed during the first production years. All managements should have a period of experience before any such procedure can be followed.

The parent stock houses will be used to brood, grow and lay for 41 weeks production. The chicks flow in and out of the 4 houses can be as follows :-

TABLE (4.31) Chicks Flow For Parent Stock Houses

Week	Batch	One In - out	Two In- Out	Three In- Out	Four In- Out
1	A				
18	B		18 85		
36	C			36 103	
54	D				54 121
72	E	72 139			

The equipments of brooding should be hanged to the ceiling after the brooding time. The baby chicks equipment should also be hanged on lumber wood across the entrance room in one corner.

The cycle will be complete when the fifth batch E replaces batch A after 41 weeks of lay or at age of 67 week since project starts.

The parent stock farm will provide the hatchery with all hatching eggs required. The proposed hatchery is a part of this whole integrated project receiving the eggs from the farm and delivering the baby chicks to the broiler production unit. The connection between the hatchery and the parent stock farm should be only in providing eggs to the former. Any labour help from one unit to the others should be prohibited. If under any circumstances any extra help is needed in the hatchery from labourers on the parent stock farm, they should change clothes and clean up before working in the hatchery building.

The eggs received by the hatchery building should be fumigated immediately with a (3X) concentration of formaldehyde fumigation. The eggs then will have to be cooled in the cooler until the time of setting. The setting time is determined by the time when the chick truck is to leave the hatchery to the B.P.U. Chicks should be at the B.P.U. and fed between 12 to 17 hours after the hatch is " Pulled". Eggs should be trayed as close to setting as possible. One should not fumigate eggs in the incubator at all. The eggs are moved and transfered using the egg lift. Hatching eggs should be delivered to hatchery building daily. Eggs should not be kept over night on the parent stock farm. They also have to be collected 5-6 times daily

from the nests. Eggs will be held in the working room of the laying house on the egg table until delivered to the hatchery.

The hatchery capacity can be doubled by importing 75 - 80 thousand capacity setter and using the same hatcher twice a week instead of weekly. This can be taken into account for any future planning for expansion.

4.5.2.2 Broiler Production Units

The rearing programmes for broiler should be detailed about what has to be done and when. It has to indicate if chicks are to be debeaked and at what time. A calender in each house should be posted marked with the dates for debeaking and vaccination, the type of feed, quantity and when to be changed. Most broiler are fed two types of rations : starter and finisher. The type of ration when to be used for each brood must be marked on a calender.

The management system to be used on the broiler farm will not be exactly " all in all out system". The reason for not using this system is that we have to raise all baby chicks hatched. When a demand on some extra baby chick appear by private farms the " all in all out system " can be used. It is for this same reason that the 20 houses described in the chapter of project description should be divided each to house 5000 - 6000 broilers. This division is to avoid waste of space and energy when 15 or even 17 thousand chicks are hatched. The divided houses will serve as complementary compartments to the 10,000 ones. The divided houses can have even the same feed chain in all houses. When time come to market some baby chicks to private farms exact number can be used in each house. At that time a cycle of two batches of size 6000 chicks

a year with 35 weeks in between would be easier to handle and would give almost the same number of broiler chicks. The down period between brooding in the broiler houses is about 4 - 5 weeks, see Table, (4.33). This will give approximately the 5 broods per year for each house. Each house will use 10 gas brooder. The space provided for broilers trough feeders will be 7.5 cm. The water supplied by automatic waterer for each 100 chicks. Each brooder house will use a chicks guard to confine the chicks to a heated area. The amount of light for a growing broiler is only that amount necessary to enable the birds to move about and to see to eat and drink.

One should notice that continuous light is required for the first 48 hours. It is recommended that chicks, should arrive at the farm early in the day rather than late afternoon or night. The hatching time should be organized so that chicks can hatch early in the morning. The broiler farm should be prepared to receive the chickens with clean and disinfected equipment as well as new clean litter. The houses should be at an adequate temperature before the chicks arrive. Their should also be an attraction light placed near the hoover to attract chicks to the heater for the first few days.

The processing plant at the broiler production unit will be mainly processing broiler as well as spent hens of layers and parent stock. The 1 million broiler will require about 250 days work of the plant of 500 bird/hr. The spent layers from table egg and parent stock will not require more than 5-10 days processing. This would indicate that a plant with capacity of 500 bird/hr will be adequate to reach the project goal. If more birds are available for processing a second shift can always be worked out. The following table gives the total tonnage of

poultry meat produced at the plant.

TABLE (4.32) Tonnage of Poultry Meat Produced From Birds Processed At the Plant

Year Project	Broiler Prod. Unit (Ton)	Layers at Hargeisa (Ton)	Present Stock at Hargeisa (Ton)	Total
2	365.8	-	-	365.8
3	1,114.7	30.4	24.9	1,170.0
4	1,110.1	15.2	16.4	1,141.7

Table (4.33) gives the total number of baby chicks produced weekly till the end of the project 2nd production year.

TABLE (4.33) Projected Day Old Chicks Produced Till The Project 2nd Year Production

Production Week	Total Baby Chicks in 1000	Production Week	Total baby chicks in 1000	Production week	Total baby chicks in 1000
30	1.4	57	18.0	84	19.8
31	5.4	58	17.7	85	22.2
32	8.6	59	17.2	86	23.3
33	9.9	60	16.9	87	23.3
34	10.6	61	16.5	88	19.0
35	10.9	62	16.3	84	19.0
36	11.1	63	15.9	90	18.9
37	11.1	64	15.3	91	18.8
38	11.1	65	16.0	92	18.3
39	11.0	66	19.9	93	17.7
40	10.7	67	22.7	94	17.6
41	10.7	68	23.3	95	17.1
42	10.3	69	23.6	96	16.6
43	10.1	70	23.5	97	16.4
44	10.0	71	19.0	98	16.2
45	9.9	72	18.9	99	15.5
46	9.6	73	18.8	100	14.8
47	10.8	74	18.3	101	16.0
48	14.6	75	17.7	102	19.8
49	17.7	76	17.6	103	22.2
50	17.7	77	17.1	104	23.3
51	19.2	78	16.6		
52	19.1	79	16.4		
53	19.2	80	16.2		
54	19.0	81	15.5		
55	18.9	82	14.8		
56	18.7	83	16.0		

4.6 Project Costs

4.6.1 Mogadishu Egg Unit

Total costs of the Unit during the project development period (PY1 - PY2) are estimated at about So. Sh. 9.2 million. The foreign exchange component is estimated at So. Sh. 6.7 millions or 73% of the total cost. Physical contingencies of 8% and price contingencies of 10% are provided on capital cost items only during the project development period. These contingency allowances are allocated between local currency and foreign exchange according to the ratio of each in total base cost. Overall contingencies amount to about So. Sh. 1.2 million or about 12.5% of total project cost.

Project costs do not include duties and taxes on imports as it is assumed that the project will be exempted from customs on imports of capital goods. The Somali Government Generally approves the exemption of development projects from such taxes. A detailed break-down of project costs is presented in Tables 2-4, Annex III and the total cost summary is represented in Table (4.34).

4.6.2. Hargeisa Poultry Complex

Total cost of the complex during the project development period (PY1 - PY2), are estimated at about So. Sh. 47 million. The foreign exchange component is estimated at about So. Sh. 25 million, or about 53% of the total cost. Physical contingencies of 8% and price contingencies of 10% are provided on capital cost items only during the project development period. They are also allocated between local and foreign currencies

according to the ratio of each in total base cost. Overall contingencies amount to about So. Sh. 6.5 million or about 14% of total project costs.

Project costs do not include duties and taxes on imports on the same assumption as (4.6.1). A detailed breakdown of project costs is presented in Tables 5.9, Annex III, and the total cost summary is represented in Table (4.35).

TABLE (4.34) Summary of Total Cost of Mogadishu Egg Unit

(So. Sh. 000)

	PY 1	PY 2	Total	Local Currency	Foreign Exchange
1. Capital costs	6,399	-	6,399	1,137	5,262
2. Operating Costs	-	1,678	6,678	1,160	518
Total base cost	6,399	1,678	8,077	2,297	5,780
Foreign exchange	5,262	518	-	-	5,780
3. Contingencies					
- Physical	512	-	512	95	417
- Prices	640	-	640	110	530
Total contingencies	1,152	-	1,152	205	947
Foreign exchange	947	-	-	-	957
Total costs	7,551	1,678	9,229	2,502	6,727
% of total costs	82%	18%	100%	27%	73%
Foreign exchange	6,209	518	-	-	6,727

TABLE (4.35) Summary of Total Costs of Hargeisa Poultry Complex

(So. Sh. 000)

	PY1	PY2	Total	Total Currency	Foreign Exchange
1. Capital costs	29,665	4,264	33,929	14,756	19,173
2. Operating costs	-	6,454	6,454	4,297	2,157
Total base cost	29,665	10,718	40,383	19,053	21,330
Foreign exchange	14,933	6,397	-	-	21,330
3. Contingencies					
- Physical	2,373	341	2,714	1,180	1,534
- Prices	2,966	895	3,861	1,679	2,182
Total contingencies	5,339	1,236	6,575	2,859	3,716
Foreign exchange	2,669	1,047	-	-	3,716
Total costs	35,004	11,954	46,958	21,912	25,046
% of total costs	75%	25%	100%	37%	53%
Foreign exchange	17,602	7,444	-	-	25,046

5. ORGANIZATION AND MANAGEMENT

5. ORGANIZATION AND MANAGEMENT

5.1 Organization and Relationship Between Units

The P.D.P. will produce two different types of poultry products, which are eggs and meat. Each product is actually a chain of several events. These events must be syncronized to maximize efficiency in production. The chain for M.E.U. will include a continuous supply of commercial baby chicks, a strict vaccination program, a continuous supply of well balanced and adequate diet, and the collection and grading and packing eggs.

At the H.P.C. the chain to produce table eggs will be the same like that at the M.E.U. But, the production chain to produce poultry meat is a lot more difficult and complicated than producing table eggs. This chain would include, production of hatching eggs, hatching baby chicks, rearing broiler chicks, vaccinating and feeding the broiler birds, and then processing broiler for a ready to cook carcass.

To facilitate organizing all their production units at P.D.P. and other projects, the Ministry of Livestock has to create a new agency responsible for the poultry industry. The above recommended agency should be headed by director of poultry production. The director will have different services department headed by assistant directors for administration and finance, planning and research, technical services, marketing and supplies.

The managers at each project should report directly to the poultry production director and the director in turn should have the ability to act swiftly on any problems with the power of

D. G. invested in him.

The managerial practices at each of the production units is very important in determining the project profit or loss. One should always remember that good management is the result of pinpointing inefficiencies and correcting them. In fact there are many factors involved in poultry management. The idea of management is not just to know these factors, but there must be a system to bring them to the attention of the manager on a regular basis. It follows from there that the appraising of the reports and having the ability to make corrections or adjustments when necessary is considered the prime function of capable manager.

5.2 Management of the L.P.U.

The hatchery management and operation would need as aprime target a constant and continuous supply of quality hatching eggs. This supply of hatching eggs must be adequate to produce all the chicks that can be brood or sold, there must not be an excess that would have to be sold at a salvage price. The hatchery at the P.D.P. is a part of integrated project. The number of chicks needed each week is determined well in advance. In fact the number of chicks brood depend on the number of broiler to be processed. The project goal is to process 1 million broiler annually. The management should also consider the cost of producing a chick. Cost management will depend on the managerial analysis of the hatchery operation costs. It must have a constant watch on the items that affect the cost of producing a chick.

The important items of these are : labour efficiency which

can be measured as number of chicks hatched per hatchery employee, wage rate and managerial efficiency, utilization of incubator capacity all year around, the percent hatching and operations he will cover, decrease in cost per chick with larger operation. Also old fashioned operations are apt to be less sanitary and chick quality may be impaired.

It should be known that hatchery management decisions cannot wait until the month end or year end. Inefficiency cannot continue day after day, hatch after hatch. They must be handled and corrected as fast as they occur. So, the manager of the hatchery should keep certain records after each hatch, each week, and at the end of each month. The essence of a proper job is to deliver these records to the manager in the proper time to do the required job. These reports should be as clear and informative as possible. One should not confuse the manager with too many reports. He should be only provided with those reports necessary to make major decision, but minor decisions should be the result of discussions with his employees. For hatchry operation one important report is the Manager's Hatch Report. This report should be initiated immediately after each hatch and it must be current to be effective. The other report of the hatchery is the Manager's Monthly Report which should include three segmints a) hatchability data, b) cost analysis c) all other data available.

The hatchability data should include monthly, egg setting capacity, number of eggs actually set, percent hatching egg, egg capacity utilized, total chick hatched for month, standard hatchels, life for month, percent total chick, hatched for month, percent chicks culled, percent extra chicks, total salable chicks hatched, percent salable chicks, hatched.

The cost analysis should include egg cost per salable chicks hatched, total cost to hatch one salable chick, the other required information as total hatchy employee, total delivery employee, chick hatched per hatchy employee, and number of hatches per the month are also important.

5.3 Managerial Practices at the B.P.U.

The brooder houses should be fenced and must be cleaned thoroughly before placing a new group of chick in the brooder house or houses. It should be noted that immediately after the fenced brooding is depopulated of birds, the house or houses should be cleaned, disinfected, and brooded for another group of chicks. Immediate preparation is necessary so that the buildings may be empty for one or two weeks prior to placing new chicks in the m. Disinfection and fumigation will kill most of any disease producing organisms, an empty house will break the life cycle of most of those remaining.

It should be noticed that cleaning process must include, removing all old litter away from the premises, then clean and screb the house and take all loose debris from the building. All equipment must be scraped, washed and disinfected. Also, treat dirt floor with an oil-and-disinfectant mixture.

A few days before the chicks are due to arrive at the farm the caretaker must begin to ready the poultry brooder house. He should cover the floor with about 5 cm. of litter material. Litter should be clean, dry and free of any mold. Litter should be slightly slightly moist the first three weeks of the chick's life, after that it should contain about 25% moisture. Also stove should heat start until the day before chicks arrive. The

chicks should be delivered by a clean, fumigated truck. The plastic chick boxes should be cleaned and disinfected. The time of chick arrival should be early in the morning so they will have the entire day to learn to drink and eat and be under close observation. One should " dump" the chicks near the brooden heat. One should also remember to dispose all empty vaccine vials after vaccination is completed. When debeaking the chicks one should notice that the idea is to create as little stress as possible in the meantime when beat is cut should not grow back to normal length again. Debeaking chicks at 6 - 9 day, by precision debeaker is usually very efficent way to do the job.

The day-to-day management of the laying flock takes all the ability of most poultry men. Maximum egg production is essential. The condition for keeping laying hen atcomfort state is to bring all circumstances in the poultry houses at optimum. The stimulation of egg prodcution can be accomplished by the supply of light either natural day light or artificial light or by both. The type of cage system used here is " Triple-deck". This system mainly used to conserve house space. To prevent the droppings boards are installed below the top two cages , causing the manure to fall into one area. The egg collection on the M.E.U. farm will be autimatic gathering while at H.P.C. will be manual gathering. One should notice that it is not difficult for an efficient operator to pick up the eggs by hand from 30,000 layers and still have time for other chores. To facilitate the procedure, carts are moved through the aisles and the eggs placed in flats on the carts. But the automatic egg-gathering devices one being designed so eggs will roll from the slopping floor of the cage on to a movable belt, which delivers them to a service room at the end of the building where they are packed in flats.

6. PRODUCTION, PRICES AND MARKETING

6. PRODUCTION, PRICES AND MARKETING

A. MOGADISHU EGG UNIT

6.1 General

This unit will produce table eggs and poultry meat (spent birds as a by-product of egg production). Despite the substantial increase in the supply of these products, no serious problem is anticipated in the marketing and distribution of commodities produced by the unit.

6.2 Unit Outputs

The unit will have table eggs and spent birds as the final products of the layers farm. The layers farm includes rearing houses for about 25,000 DOC and a layer farm that will raise 64,500 laying hens. This layer farm will give 10 million table eggs when full capacity is reached at PY3. Spent birds will be sold live until the erection of the processing plant component of the broiler complex to be established at Afgoi - Balad during the present three year Plan 1979 - 1981.

At full development, PY3, the annual production generated by the project is estimated as follows :-

TABLE (6.1) Annual Production of Mogadishu Egg Unit

1. Table eggs	9.587	(million)
2. Spent birds meat	30.2	(ton) ; on odd years only
	15.1	(ton) ; on even years only

The value of this annual production would be worth an estimated So. Sh. 6.054 million in odd years, and So. Sh. 5.903 million in even years, all in 1979 prices. The basis for these estimates is given in chapter 4 which analysis the expected production and cost estimates.

6.3 Marketing And Prices

The structure of the market for each product depends mainly upon the growth of the product market, competition, and barriers to entery. These elements of market structure as well as their effect on the project's future performance will be emphasized in the analysis of the marketing and prices of the project's products.

6.3.1 Table Egg Marketing

The paucity of data concerning table egg production and consumption in Somalia as well as the development of national income per capita is a major limitation to the required analysis of market structure. The shortage of egg production relative to consumption in the Mogadishu area can in any case be discerned from the movements in egg prices. In 1977 the price was So. Sh. 0.5/ egg. This price jumped in 1978 to So.Sh. 0.8/ egg. Present day prices (December 1979 - January 1980) paid by consumers are between So. Sh. 1 to 1.2/egg.

There is already one new project under implementation, the Poultry Industry Project at Km. 15, to which this new project is going to be annexed. This other project is going to produce around 10 million eggs annually. The completion of these two projects will pose no problem in marketing, since this will

mean a daily supply of 55,000 eggs in the Mogadishu area, which is not a considerable amount.

On the other hand, demand for eggs is expected to increase in the future as a result of the expected increase in income per capita due to the Government development efforts. In addition the increase in urbanization and population as well as the change in tastes towards more consumption of eggs will be additional factors to increase the demand for eggs. Ths increase in urganization will also lead to a reduction of the backyard poultry production and thus will add to the already felt shortages of egg production relative to demand.

At full production, PY3, the project is expected to produce table eggs for domestic consumption. The expected producer price is So. Sh. 0.6/ eggs. While this is a bit higher than the Government determined price, which has been determined at So. Sh. 0.4/ egg since 1975, it is much lower than current prices for eggs in the Mogadishu markets, and will be even lower than market prices at the start of operation if prices keep their upward trend.

This relatively low price for eggs, an addition to the provision of some marketing services such as grading, processing and packaging into more convenient forms, storing and moving them through wholesale and retail channels should eliminate any problem in the marketing of the project's egg production.

6.3.2 Spent Hens Marketing

Starting PY3, the project will dispose of 37,000 hens annually in odd years and 18,500 in even years when full production is reached. These hens will be considered as a by product of the

egg production unit, and they are expected to pose no real problem in marketing.

The amount of spent hens offered for sale is a small amount in lieu of the fact that there is no commercial production of broilers in Mogadishu up to the present time. In addition demand for poultry meat is expected to increase a result of the expected increase in income per capita, the increase in urbanization and the expected increase in beef and mutton prices due to the expected increase in exports of these products. This latter factor will lead to the substitution of the cheaper poultry meat for the increasingly expensive beef and mutton meat.

With regard to the prices of spent hens, this will be assumed to be So. Sh. 10/bird. This appears to be a very reasonable price in lieu of the existing cost structure and supply shortages.

B. Hargeisa Poultry Complex

6.4. General

The complex will produce poultry meat (broilers and spent hens), and table eggs. No serious problem is anticipated in the marketing and distribution of these products as there is no commercial production of these products up to now in Hargeisa, and because of the limited and insufficient backyard poultry production compared to the demand for such products.

6.5 The Outputs of the Complex

The Hargeisa poultry complex will have broilers, spent birds, and table eggs as its final products. These will be

the products of the broiler farm component that includes 20 broiler houses, poultry processing plant and the feed mill. The layer and parent stock component includes brooding and laying houses, parent stock, houses, hatchery and the PMU.

At full development PY3, the annual production generated by the complex is estimated as follows :-

TABLE (6.2) Annual Production of Hargeisa Poultry Complex

1. Broilers Meat	1,110 (ton)
2. Spent birds meat	46.6 (ton) in odd years
	26 (ton) in even years
3. Table eggs	9.647 (million)

The value of this annual production would be worth an estimated So. Sh. 26.952 million in odd years and So. Sh. 26.645 million in even years, all in 1979 prices. The basis for these estimates is given in chapter 4 which analyse the expected output and cost estimates.

6.6. Marketing & Prices

6.6.1. Marketing Poultry Meat

Poultry meat that will be produced by the project consists of broilers and spent birds. These two types differ in quality and acceptability to consumer according to the tenderness, juiciness, and flavour of the meat when cooked. Broilers meat is very tender with a soft, pliaable, and smooth textured skin. The meat of spent birds (matured hens of more than ten months) is, on the other hand less tender.

The price each type can command in the market will, thus vary according to the difference in quality. This product differentiation will provide the project with some marketing strength because it will increase the number of probable consumers of its products.

6.6.2 Poultry Markets

Due to the lack of data, it is extremely difficult to estimate accurately poultry consumption in Hargeisa and the neighbouring cities. All the consumed birds are produced in the backyard, and there is no meaningful way to estimate annual production as there has been no census for backyard poultry, as well as the lack of knowledge concerning its productivity, which is thought to be low because of low genetic potential, and disease.

The supply of eggs and poultry meat in Hargeisa seems to be, however, much less than the demand, and this is reflected in the high prices of poultry products in Hargeisa's markets, even when compared to the prices of poultry products in Mogadishu, current day (1979) prices are So. Sh. 40/birds for spent hens.

Future demand for poultry meat in Hargeisa will depend on such factors as the growth of the level of income, the rate of growth of population and particularly the rate of growth of the urban population, and on the prices of poultry meat as well as those of other substitutes such as table fish beef and mutton meat.

Date about the level of income is not available, even though there is presently a booming situation in the Hargeisa

area. The income levels in this area is expected to increase more than the national average as Hargeisa is the major trading centre for livestock exports, in addition to the considerable, export potential of Somali livestock in the Arab markets.

The population census of 1975 estimates the population of the North west Region (including Hargeisa, Berbera, Gabile, Borama, Zaila, and Lughaya) at 440,000 person. If the growth rate of population is 2.7 which is expected to remain as it is over the medium term, then the population of the region is around 500,000 persons at present. This size of population with its future growth, represents a considerable market for the poultry meat produced by the project, even though the estimates of the popjlation census is thought to be downward baised as a result of the nomadic nature of the majority of the population.

As regard to prices of poultry meat, the price of spent birds per unit in the Hargeisa markets increased from So. Sh. 20 in 1977, to So. Sh. 25 in 1978 to So. Sh. 28 at present (1979). This upward movement in prices is expected to continue as long as the supply conditions remain as they are.

At the same time the prices of beef and mutton meat have been increasing in the past few years in the Hargeisa market, due to the increase in export prices of livestock. Prices per kg have increased from So. Sh. 10-14 in 1977 to So. Sh. 14- 18 in 1978, to So. Sh. 20-30 at the present time. This increase in the prices of beef and mutton will in itself lead to an increase in the demand for poultry meat.

On the basis of the preceeding analysis, it can be safely concluded that while the current trends in demand for poultry,

meat are expected to remain at what they are, the reduction in price of poultry meat as a result of an integrated project like the present one, will lead to a fast growth in the demand for poultry meat.

While the marketing and distribution of poultry products in Hargeisa is characterized by the lack of marketing organization of any form, the project will sell both fresh and frozen carcass of poultry and will arrange for their delivery for both wholesalers and retailers. The project will also use modern packaging materials and will have modern refrigerated trucks to facilitate hygienic handling of the products.

With regard to the prices of the project's outputs, these are assumed to be So. Sh. 12 and 10/kg, for the meat from broilers and spent birds respectively. These appear to be very reasonable prices in lieu of the existing cost structure and supply and demand conditions.

6.6.3 Table Egg Marketing

The situation regarding the paucity of data concerning egg production and consumption is similar in Hargeisa to that in Mogadishu. The shortage of egg production relative to consumption in the Hargeisa area can be discerned, however, from the movements in egg prices. Price per egg was So. Sh. 1 in 1978, and it rose to between So. Sh. 2.5 to 3 during 1979, and sometimes even higher.

Demand for eggs is expected to increase in the future as a result of the expected increase in income per capita, and the growth in population and organization. Since Hargeisa can be

considered nowadays as one of the growth poles in Somalia, due to its role in livestock trade, these factors are going to be more pronounced in Hargeisa. Changes in tastes towards more consumption of eggs per capita are also expected as a result of the improvement in education and communication.

At full development, PY3, the project is expected to produce 9.6 million table eggs annually for domestic consumption in Hargeisa and other cities in the North West Region. The expected producer price is So. Sh. 0.6/egg. This is much lower than current prices in the area, and will even be much lower than market prices at the start of the project if prices keep their upward trend.

This, relatively low price for eggs, in addition to the provision of some marketing services such as grading, prodessing and packaging into more convenient forms, storing and and moving them through wholesale and retail channels should eliminate any problem in the marketing of the project's egg production.

7. FINANCIAL AND ECONOMIC ANALYSIS

7. FINANCIAL AND ECONOMIC ANALYSIS

A. Mogadishu Egg Unit

7.1 The Financial Rate of Return

The financial rate of return (FRR) of the unit is 26% over 20 years. In the calculation of the rate of return , details of which are in Annex IV, the following assumptions and parameters have been employed :-

a) Total costs during the two years project development period are those described in chapter 4 and Annex III and are valued at their expected prices C.I.F. Mogadishu. These costs include the allowances made for physical and price contingencies. During the the remaining 18 years of the project's life, full provisions is made for both replacement and operating costs.

b) It was assumed that the capital goods imported for the project will be exempted from customs duties. This exemption is generally given to development projects.

c) No residual value is accounted for the project buildings, other installations, and the flock at the end of the project's 20 years' life.

d) Estimates of total costs and revenues used for the calculation of the FRR are expressed in 1979 constant prices.

e) Finally it was assumed that the project will benefit, free of charge, from the infrastructure facilities such as roads, water supply, labour and management housing facilities and offices, storage area and egg shell plant of the original km 15 project. This is one of the factors responsible for the relatively high value of the FRR, even though the prices determined for the output of the project are lower than present prices.

7.2 Sensitivity Analysis

The FRR has been made to determine the impact of changes in total costs and total revenues. The results are summarized in Table (7.1) below and show that the project could withstand circumstances more adverse than those reasonably expected, yet remain financially sound.

TABLE (7.1) The Financial Rate of Return : Mogadishu Egg Unit

Total benefits decrease by :		0 %	20 %
Total costs increase by :			
	0%	26	13
	20%	15	-

Undoubtedly the project will impose a tremendous problem of absorption on the Ministry of Livestock, Forestry and Range, and in particular will involve logistical, administrative and

management problems. The project will also require certain degree of coordination with the km. 15 project especially in their operation and marketing activities. But with the careful choice of the project's management personnel, and with the close supervision during the implementation and the early stages of operation, it seems possible that any incipient weakness in organization and management will be identified early enough and dealt with in the proper way.

7.3 The Economic Rate of Return

An attempt has been made to estimate the economic rate of return (ERR) of the project and it is estimated to be 22% over 20 years. In the calculation of the ERR, details of which are in Annex IV, Tables 12 and 13, the following parameters and assumptions have been utilized :-

a) The economic prices for the outputs (all which are tradeable commodities) and imported inputs of the project are missions's estimates of 1979 world prices for these products, c.i.f. Mogadishu. These prices in U. S. $ were multiplied by the shadow exchange rate (see below) to determine economic prices in Somali shelling. These world prices were obtained by personal contacts with various international poultry companies and thought to be representative of present day cost levels.

b) The shadow exchange rate (SER) utilized to express world prices of the tradeable products of the project and the foreign exchange component of total costs in terms of local currency during the estimated life of

the project was estimated at U.S. $ 1 = So.Sh. 11.8. This is a rough estimate and is based on data concerning the development of Somali merchandise exports and imports over the past few years. It was necessary to resort to this exercise because of the apparent over-valuation of the Somali currency ; even though there is no official estimate of the SER or for that matter for any of the national parameters, by the Ministry of Planning in Somalia.

B. Hargeisa Poultry Complex

7.4. The Financial Rate of Return

The estimated FRR for this project is 27% over 20 years. In the calculation of the rate of return details of which are in Annex IV, the same assumptions and parameters, 7.1 (a) - (d) as in Mogadishu egg unit, were utilized.

The project will utilize the existing installations of the poultry farm, planned to be established in Hargeisa since 1975, but never completed. The costs of these installations were considered as sunk costs, and thus were not considered in the above mentioned estimate of the FRR. An attempt was made, however to estimate the net revenue of this farm, had it been completed. This estimate represents the difference between revenues from operating the farm at its planned capacity and the incremental costs required to put the farm into operation. This stream of net revenue which is termed without the project case, is deducted from the stream of net revenue emanating from the project, to estimate the incremental benefits with the project. The FRR is estimated at 25% in this case and the details are shown in Tables (10) - (11), Annex IV.

7.5 Sensitivity Analysis

The FRR has been made to determine the impact of the changes in total costs and total revenues. The results are summerized in Table (7.2) below and show that the project could withstand circumstances more adverse than those reasonably expected, yet remain financially justified. These results are subject to the same reservations as in (7.2).

TABLE (7.2) The Financial Rate of Return : Hargeisa Poultry Complex

Total Benefits Decrease by :		0 %	20%
Total costs increase by :	0 %	27	16
	20%	10	-

7.6 The Economic Rate of Return

An attempt has been made to estimate the ERR of the project, and it is estimated at 22% over 20 years. In the calculation of the ERR, details of which are in Annex IV, Tables 14 and 15, the same parameters and assumptions as those in (7.3) were utilized.

ANNEXES

ANNEX 1

CLIMATIC CONDITIONS OF SOMALIA

ANNEX I

TABLE (1) Mean Sunshine Hours and Windspeed at Afgoi Station

Station	Mean Sunshine Hr/Day	Ave. Windspeed (km/Hr)
Jan.	8.2	11.2
Feb.	9.1	14.4
Mar.	8.6	12.3
Apr.	7.2	9.4
May	6.6	8.6
June	6.9	11.1
July	5.9	13.5
Aug.	8.0	12.7
Sept.	8.9	13.0
Oct.	6.8	10.3
Nov.	4.5	6.0
Dec.	6.5	8.5

ANNEX I

TABLE (2) Average Rainfall at Selected Stations

(mm)

M/Station	Mogadishu	Afgoi	Hargeisa	Berbera
Jan.	0.0	0.0	0.8	2.5
Feb.	0.0	10.1	6.3	7.6
March	5.8	6.3	44.3	17.7
April	39.1	76.0	43.7	12.7
May	72.3	102.5	49.5	10.1
June	77.8	69.7	32.5	0.0
July	74.5	52.8	54.5	2.5
Aug.	31.1	18.6	56.4	2.5
Sept.	17.2	6.4	54.0	0.0
Oct.	52.3	73.1	27.6	2.5
Nov.	48.2	124.5	12.4	0.0
Dec.	3.8	25.7	1.3	2.5
Average	422.1	565.7	383.3	60.6

TABLE (3) Mean Monthly Temperature & Relative Humidity at Selected Stations (C°)

Station / Month	Mogadishu		Afgoi		Hargeisa		Berbera	
	Temp.	R.H	Temp.	R.H	Temp.	R.H	Temp.	R.H
January	27.5	71	27.3	66	18.0	61	24.4	77
February	27.6	71	27.6	63	18.9	62	25.1	74
March	28.3	72	28.6	63	22.2	50	28.2	34
April	29.4	71	28.6	67	23.1	46	29.6	81
May	27.7	73	27.1	72	24.2	49	31.8	69
June	26.4	74	25.9	71	23.9	51	35.2	52
July	25.8	75	24.9	74	23.6	51	36.3	49
August	25.8	75	25.5	74	23.6	53	36.6	36
September	26.3	74	26.0	72	23.9	50	33.7	40
October	27.2	74	26.6	70	22.2	48	30.0	58
November	27.5	73	27.6	71	18.9	60	27.0	72
December	27.3	72	27.4	72	18.3	71	24.8	61

ANNEX 11

PROJECT IDENTIFICATION : PRODUCTION STANDARDS

ANNEX II

TABLE(1) Production Standards for Egg-Type Commercial Leghorns

Week of Egg Production	% Hen-day Egg Production	% Hen-housed Egg Production	Cummulative Egg Production Per Hen Housed
1	5	5	0.3
2	18	16	1.5
3	34	32	4
4	54	50	7
5	71	68	12
6	89	83	18
7	92	90	24
8	91	89	30
9	90	88	36
10	89	87	42
11	88	86	48
12	88	85	54
13	87	84	60
14	86	83	66
15	85	83	72
16	85	82	78
17	84	81	83
18	83	80	89
19	82	79	94
20	82	78	100
21	81	77	105
22	80	76	111
23	79	75	116
24	78	74	121
25	78	73	126
26	77	72	131
27	76	71	136
28	75	70	141
29	75	70	146
30	74	69	151
31	73	68	155
32	72	67	160
33	72	66	165
34	71	65	169
35	70	64	174
36	69	63	178
37	69	62	183

ANNEX II

TABLE (1) Continued

Week of Egg Production	% Hen-Day Egg Production	% Hen-housed Egg Production	Cumulative Egg Production per Hen Housed
38	68	61	187
39	67	60	191
40	66	59	195
41	66	59	199
42	65	58	203
43	64	57	207
44	63	56	211
45	63	55	215
46	62	54	219
47	61	53	223
48	60	52	226
49	60	51	230
50	59	50	233
51	58	49	237
52	57	48	240

TABLE (2) Poultry Project Feed Consumption ANNEX II

A. Mogadishu Layer Farm :

Calculations were made on the basis of 85% of baby chicks imported were housed for laying season. The mortality rate during the production year is calculated on the basis of 1.25% mortality per month. The H. H. egg production is assumed to be 240 eggs for the commercial egg type leghorn laying hens.

First Year

Batch A for Growing	=	231.75 ton
" " " 28 weeks egg production	=	424.49
" B Brooding	=	2.25
Sub-Total tonage of feed for rearing	=	234.0
" " " " " " production	=	424.49
Total 1st Year	=	658.49

Second Year

Batch A for last 24 weeks production	=	326.46
" B for rearing	=	229.50
" B for first 51 week production	=	738.47
" C for rearing	=	231.75
" C for first 26 week production	=	395.58
Sub- Total tonage of feed for rearing	=	461.25
" " " " " " production	=	1460.51
Total 2nd Year	=	1921.76

Third Year

Batch C last 26 weeks production	= 355.37
" D for rearing	= 231.75
" D for first 51 weeks production	= 738.47
" E for rearing	= 231.75
" E for the first 24 weeks production	= 366.68
Sub-total tonage of feed for rearing	= 463.50
" " " " " " production	= 1460.52
Total 3rd Year	= 1924.02

B. Hargeisa Broiler & Parent Stock Farm

1. Parent Stock Unit

Calculation on the basis of approximately 90% houses. The meat-type breeder pullet will require about 14.29 kg feed till the 24th week of age.

First Year

Batch A for rearing	= 46.44 ton
" A first 26 weeks production	= 91.73
" B rearing	= 46.44
" B for first 8 weeks production	= 29.91
" C for 16 weeks of rearing	= 23.72
Sub-Total feed for rearing	= 116.60
" " " for production	= 121.64
Total 1st Year	= 238.24

TABLE (2) Continued 2

Second Year

Batch A for last 15 weeks production	= 45.66
" B " " 33 " "	= 107.48
" C " rearing	= 22.72
" C " first 41 weeks	= 137.39
" D for rearing	= 46.44
" D for 24 weeks production	= 85.29
" E for rearing	= 46.44
" E for first 6 weeks production	= 22.25
" F for rearing	= 19.79
Sub-Total feed for rearing	= 135.39
" " " " production	= 398.07
Total 2nd Year	= 533.46

Third Year

Batch D for last 17 weeks production	= 52.10
" E " " 35 " "	= 115.14
" F " rearing	= 26.65
" F first 40 weeks production	= 134.53
" G for rearing	= 46.44
" G " first 22 weeks production	= 78.66
" H " rearing	= 46.44
" H " first 4 weeks production	= 14.59
" I " for rearing	= 0.877
Sub Total feed consumed for rearing	= 120.41
" " " " " production	= 395.02
Total 3rd Year	= 515.43

ANNEX II

TABLE (2) Continued 3

2. Broiler Farm

A) First Year

The project will raise 337,558 commercial straight run broiler chicks. At end of 8 weeks of age the live body weight will be about 1.8 kg. The feed required to attain the above age is about 3.76 kg per bird at conversion rate of 2.1. The feed needed to raise 377,558 broilers to the end of the 8 weeks, at a conversion rate of 2.4, is about 4,29 kg per bird. The total feed required for the first year is 1338 ton. (Broiler starter and finisher).

B) The project will raise 1,028,569 broiler in the second year and the feed required will be 4,412 ton.

C) The third year. The project will raise 1,024,381 broilers, and the feed required will be 4,394 ton.

ANNEX II

TABLE (3) Egg Production Standard of Leghorn Egg-Type Commercial Layers (for 21500 Pullets Houses)

Production week	Egg Production H. H.Basis	Cumulative Egg H.H.	Production week	Eggs Production H.H. Basis	Cumulative Egg H.H.
1	7.7	7.7	27	106.8	1.899.7
2	26.3	34.0	28	105.3	3.005.0
3	46.5	80.5	29	105.3	3.110.3
4	72.8	153.3	30	103.7	3.214.0
5	97.5	250.8	31	102.2	3.316.2
6	123.9	374.7	32	100.6	3.416.8
7	133.2	507.9	33	99.1	3.515.9
8	131.6	639.5	34	97.5	3.613.4
9	131.6	771.1	35	96.0	3.709.4
10	130.1	901.2	36	94.4	3.803.8
11	128.6	1029.8	37	92.9	3.896.7
12	127.0	1156.8	38	92.9	3.989.6
13	125.4	1282.2	39	91.3	4.080.9
14	123.9	1406.1	40	89.8	4.170.7
15	122.3	1528.4	41	88.2	4.258.9
16	120.8	1649.2	42	86.7	4.345.6
17	120.8	1770.0	43	85.1	4.430.7
18	119.2	1889.2	44	85.1	4.515.8
19	117.7	2006.4	45	83.6	4.599.4
20	116.2	2122.6	46	82.0	4.681.4
21	114.5	2237.1	47	80.5	4.761.9
22	113.0	2350.1	48	78.9	4.840.8
23	113.0	2463.1	49	77.4	4.918.2
24	111.5	2574.6	50	75.8	4.994.0
25	109.9	2684.5	51	75.8	5.069.8
26	108.4	2792.2	52	74.4	5.144.2

$\bar{X}$ = 240 Egg/Bird.

ANNEX II

TABLE (4) **Approximate Composition and Metabolishable Energy of Some Feeds in Somalia**

Ingredien	DH.	CP.	EE.	CF.	ASH.	Ca.	P.	ME(Kcal/kg)
Maize	88.0	8.9	3.5	2.9	1.5	0.01	0.25	3366
Sorghum	88.8	11.0	2.8	2.0	1.7	0.04	0.29	3256
Barley	89.0	11.5	1.9	5.0	2.5	0.08	0.42	2620
Wheat grain	88.0	13.5	1.9	3.0	2.0	0.05	0.41	3086
Banana Pulp	88.6	5.4	0.87	1.79	3.33	-	-	3110
Wheat bran	89	14.8	4.0	6.0	10.0	0.14	1.17	1256
Maize germ	90	20.0	1.0	12.0	3.8	0.3	0.5	1694
Soybean meal	89.0	42.0	3.5	6.5	6.0	0.2	0.6	2420
Sesame meal	93.6	42.0	7.0	6.5	12.0	0.2	1.3	2640
Fish & Bone meal	92.0	45.0	8.5	2.5	1.37	11.0	5.9	1716
Fish meal	90.0	62.4	8.4	1.0	20.5	7.5	3.6	2630
Feather meal	93.2	85.0	2.5	1.5	3.9	0.2	0.7	2354

ANNEX II

TABLE (5) Amino Acid Composition of the Feeds, Amino Acids % of the Feeds

Feed	Meth.	Cyst.	Lys.	Trypt.	Threon.	Isolev.	Hist.	Val.	Len.	Agr.	Ph.	Gl.	Avail.
Maize	0.17	0.13	0.22	0.09	0.37	0.37	0.19	0.42	1.0	0.52	0.44	0.33	93
Sorghum	0.1	0.2	0.27	0.09	0.87	0.6	0.27	0.53	0.4	0.45	0.3	0.45	83
Wheatbran	0.2	0.3	0.6	0.38	0.68	0.6	0.3	0.7	0.9	0.07	0.57	0.0	75
Ricepolish	0.14	0.08	0.24	0.12	0.27	0.33	0.16	0.46	0.5	0.59	0.34	0.59	85
Soybean	0.6	0.62	0.7	0.65	1.7	2.8	1.1	2.2	3.6	3.2	2.1	2.3	98
Bone meal	0.53	0.26	2.2	0.18	1.8	1.7	1.5	2.4	2.9	1.8	2.7	6.5	90
Sesame Meal	1.48	0.6	1.37	0.82	1.71	2.28	1.16	2.53	3.3	5.06	2.3	4.43	95

ANNEX II

TABLE (6) Protein Requirements of Broiler Chickens (0-6 weeks) in Relation to the Energy Content of the Diet

Metabolishable Energy k/Cal/kg. ration	Protein required %
2780	20.8
2890	21.7
3000	22.5
3120	23.3
3260	24.2
3340	25.0
2890	19.0
3000	20.0
3120	20.5
3260	21.2
3340	22.0
3450	22.7

ANNEX II

TABLE (7) Protein Requirements of Replacement Pullets in Relation to Energy Content of the Diet

M. E. K.cal./kg	Starter 0-6 wks %	Grower 6 - 12 wk %	Pullet Developer 12 - 20 wks %
2170	19.0	15.8	12.4
2780	19.7	16.4	12.9
2900	20.5	17.1	13.4
3000	21.3	17.8	13.9
3120	22.0	18.4	14.4

ANNEX II

TABLE (8) Protein Requirements of Laying and Breeder Hens as Related to Energy Content of Diet and Environmental Temp.

Met. E. K. Cal/kg.	Protein Moderate Climate %	Warm Climate %
2670	15.0	17.0
2780	15.7	17.4
2900	16.3	18.3
3000	17.0	18.3
3120	17.7	-

ANNEX II

TABLE (9) Protein Requirements of Broilers Hens in Relation to Energy Content of Diet

M. E. K. Cal/kg.	Protein Moderate Climate %	Hot Climate %
2560	14.5	16.0
2670	15.1	16.7
2780	15.8	17.4
2900	16.3	18.1
3000	17.0	18.8

Ref : Vddexgivv, July 20 (1978) 50 (3) 63 - 64.

ANNEX II

TABLE (10) Vitamin Requirements of Poultry

Nutrient	Starting	Growing	Laying	Breeding
V.A. (IU)	5000	3000	4000	5000
V.D. (IU)	1000	1000	1000	1000
V. D_3 (IU)		4	-	7.5
V. K. (mg/kg)	2.2	2.2	2.2	2.2
Thiamine B_1 (mg/kg)	2.2	2.2	2.2	2.2
Riboflavin B_2 "	4.4	4.4	4.4	4.4
Pantothenic "	15.6	13.4	5.6	16.7
Nicotinic "	33.4	33.4	26.7	33.4
Pyridoxine "	4.4	3.3	3.3	4.4
Biotin "	0.16	0.12	0.12	0.19
Folic "	1.4	0.4	0.4	0.9
Choline "	1330.0	1000	1100	1100
V. B_{12} "	0.01			
Linoleic "	1.5	0.8	1.4	1.4

ANNEX II

TABLE (11) Mineral Requirements of Poultry

	Starting	Growing	Laying	Breeding
Ca (%)	1	0.8	3.7	3.7
P (available %)	0.45	0.4	0.4	0.4
Na %	0.15	0.15	0.15	0.15
K %	0.4	0.4	0.4	0.4
Cl %	0.15	0.15	0.1	0.1
Mn (g/kg)	55.5	55.5	33.4	33.4
Mg (mg/kg)	555	555	555	555
Fe (Mg/kg)	89	55.5	44.5	78
Cu (mg/kg)	11.1	11.1	11.1	11.1
Zn "	44.5	33.4	22.2	22.2
Se "	0.156	0.156	0.156	2.156
I "	0.38	0.38	0.38	0.33

ANNEX II

TABLE (12) Amino Acid Requirements of Chickens

Amino Acid	Starting & Growing % of Dietary Prot.	Laying & Breeding G/ hen/ day
Arginine	5.0	0.85
Histidine	2.0	0.34
Isoleucine	4.0	0.85
Leucine	7.0	1.28
Lysine	5.0	0.72
Methionine	2.0	0.34
Cystine	1.0	0.27
Phenyl alanine	3.5	0.78
Tyrosine	3.5	0.63
Tryptophan	1.0	0.17
Valine	4.3	0.73
Glycineeserine	5.0	-

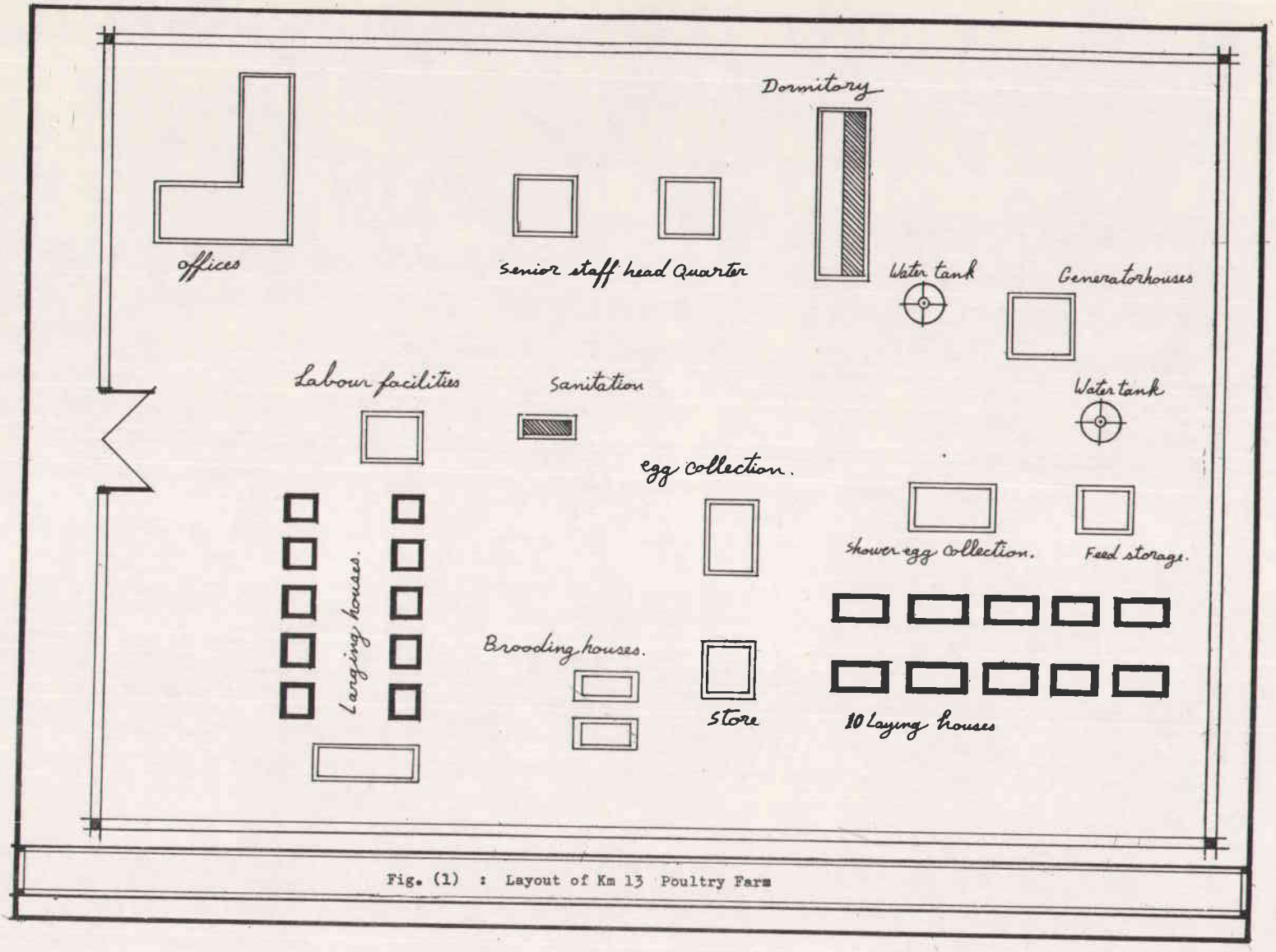

Fig. (1) : Layout of Km 13 Poultry Farm

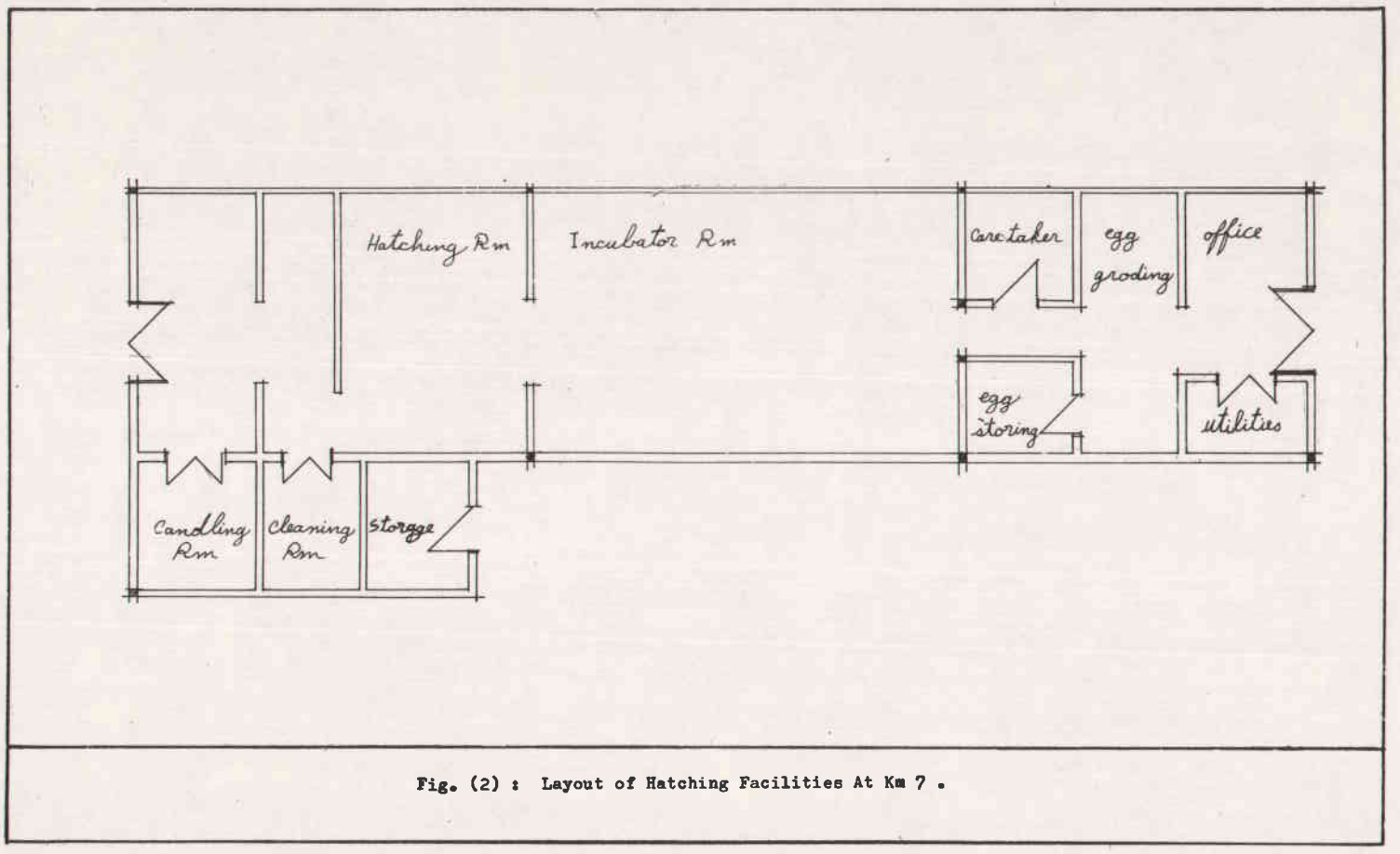

Fig. (2) : Layout of Hatching Facilities At Km 7 .

ANNEX II

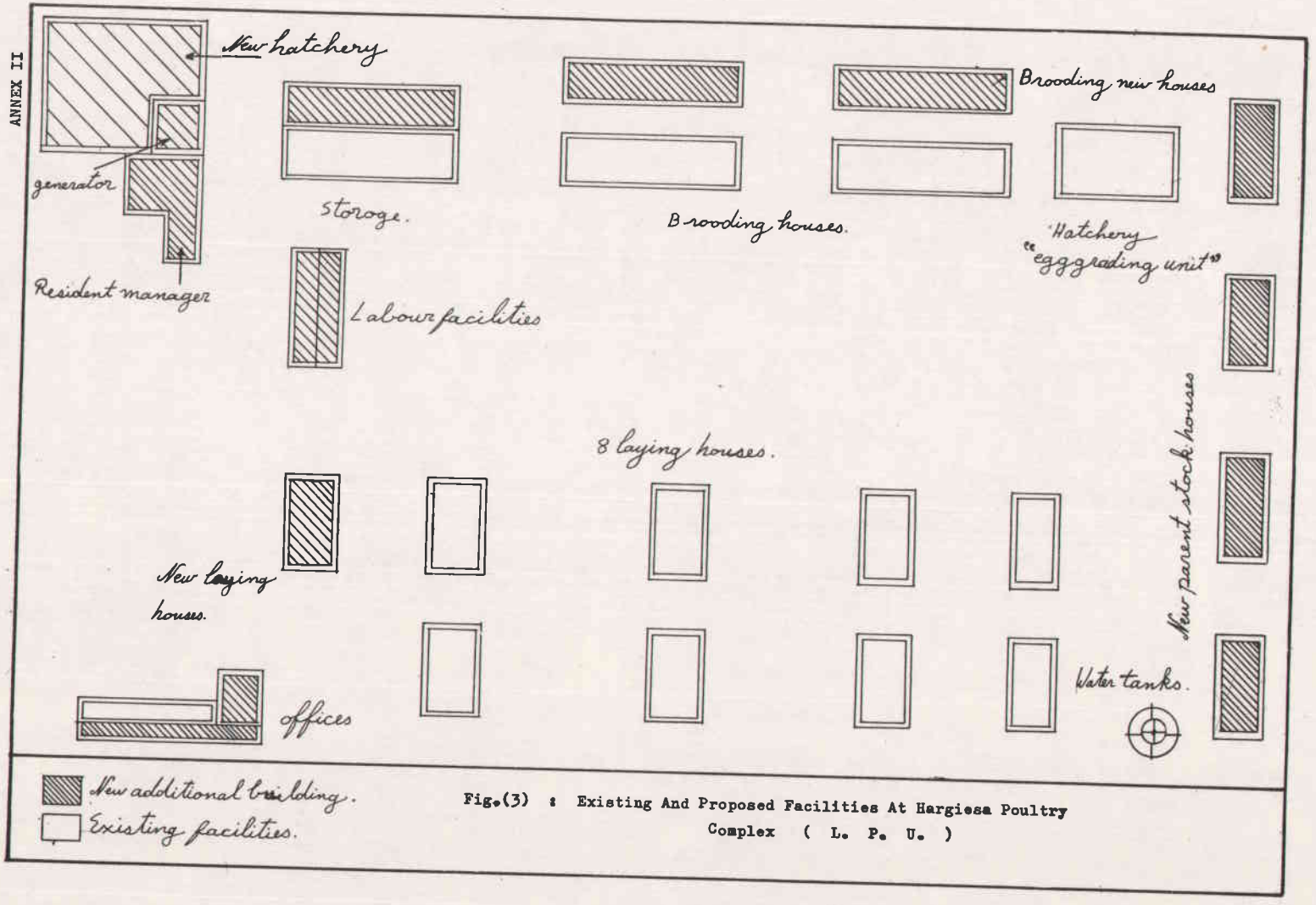

Fig.(3) : Existing And Proposed Facilities At Hargiesa Poultry Complex (L. P. U.)

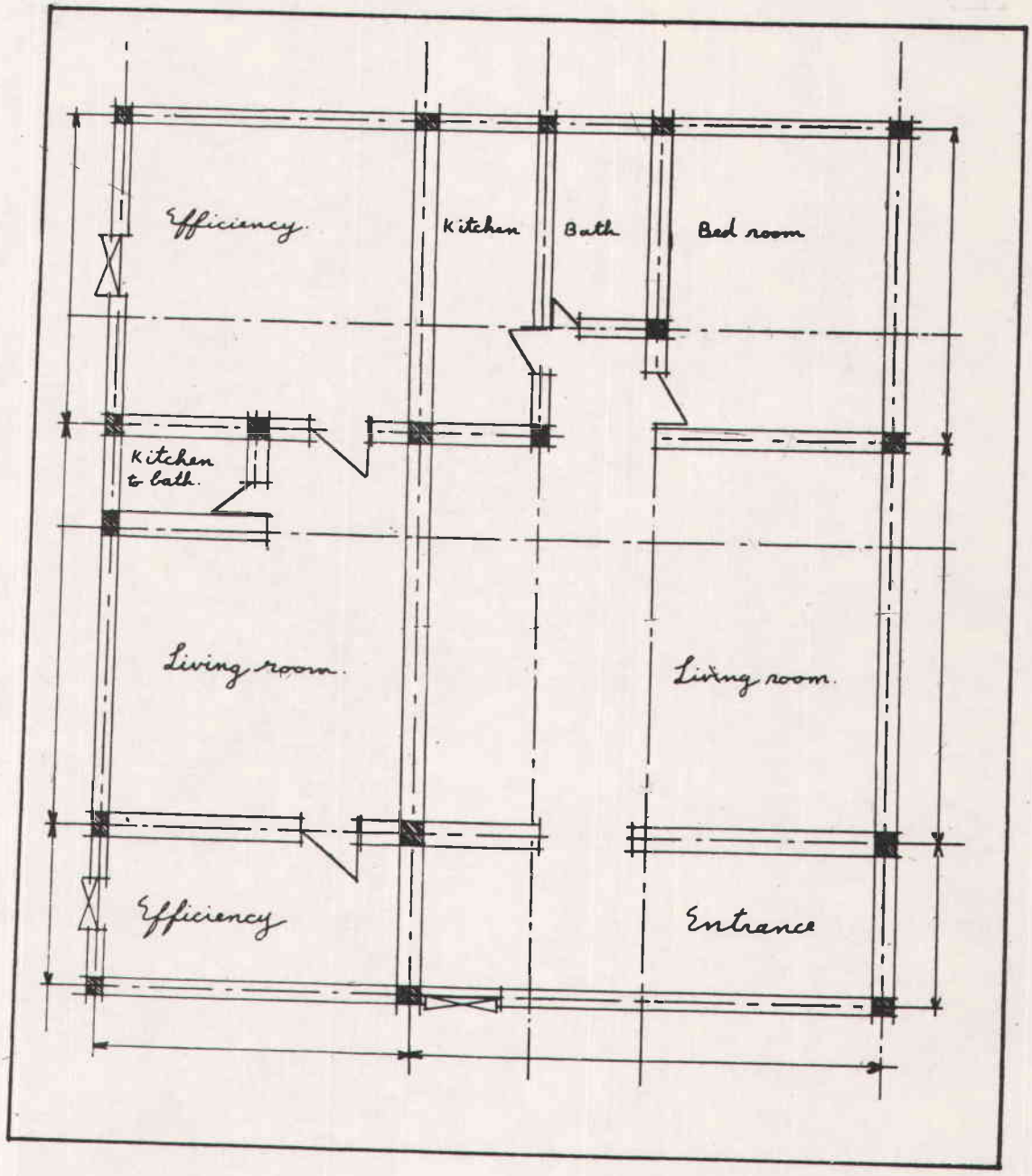

Fig. (4) : Layout Of Resident Manager Building

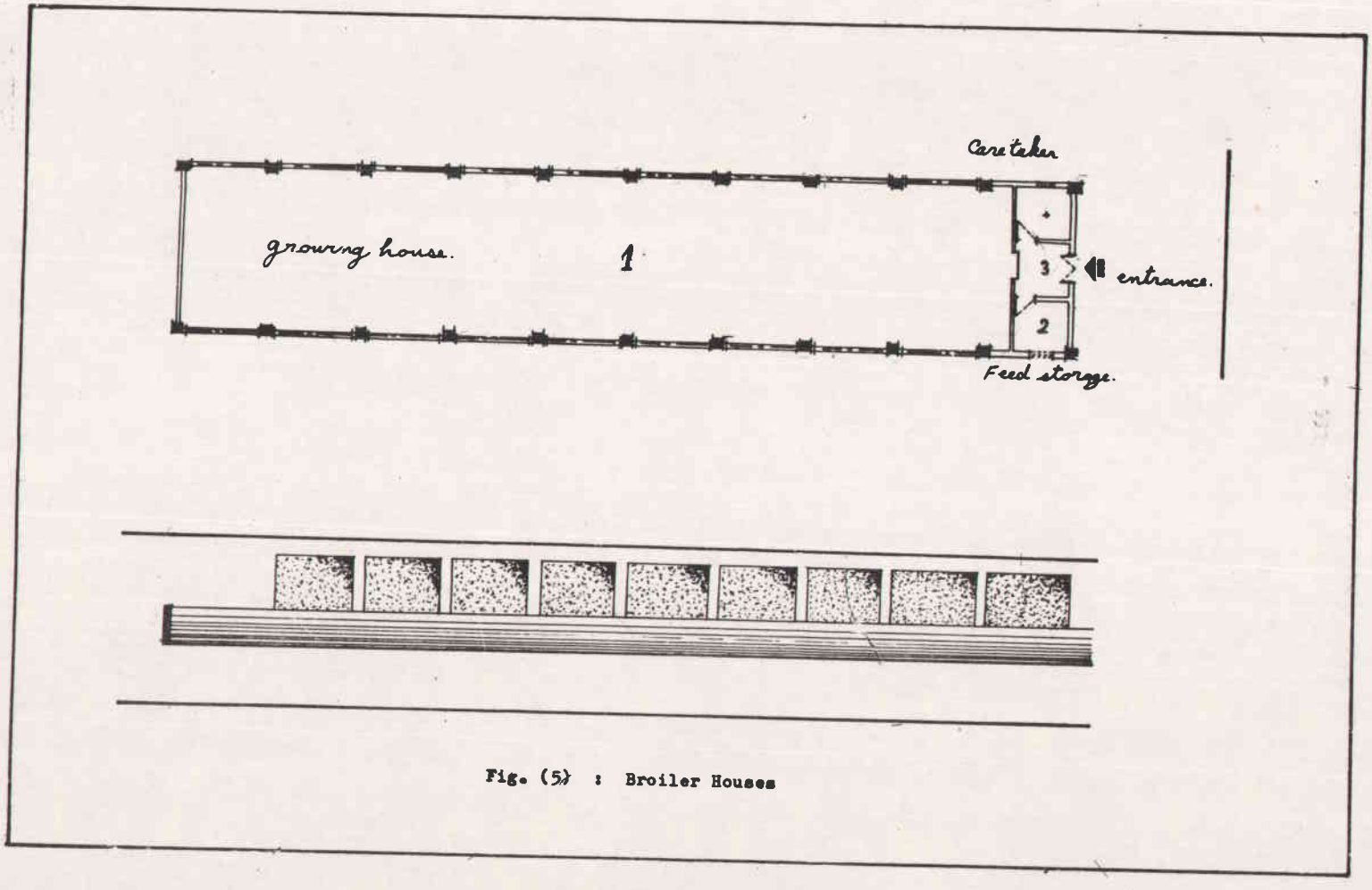

Fig. (5) : Broiler Houses

ANNEX II

FIG. (6) Feed Mill and Storage

1. Raw material storage room
2. Mixed feed storage room
3. Bath room
4. Office
5. Laboratory
6. Microingredient Storage Room
7. Repair shop and spare parts
8. Microingredient premix and storage room
9. Hammer mill and feed mixing room
10. Entrance

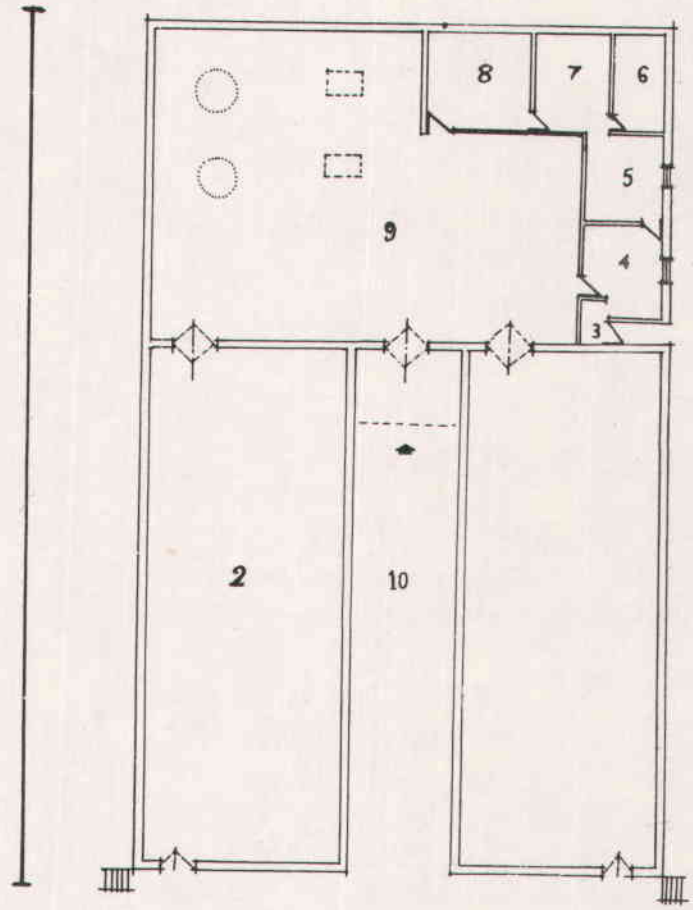

Fig. (6) Feed Mill and Storage

ANNEX II

FIG. (7) Hatchery Building

1. Egg receiving room
2. Cold room
3. Fumigation room
4. Incubator room
5. Candling and transfer room
6. Hatcher room
7. Chick handling room
8. Chick holding room
9. Dispatch room
10. Wash room
11. Generator
12. Water pumps
13. Storage and disinfecting room
14. Office
15. Passageway
16. Personnel
17. Workshop
18. Employees' Entrance
19. Dressing room
20. Bath room
21. Entrance

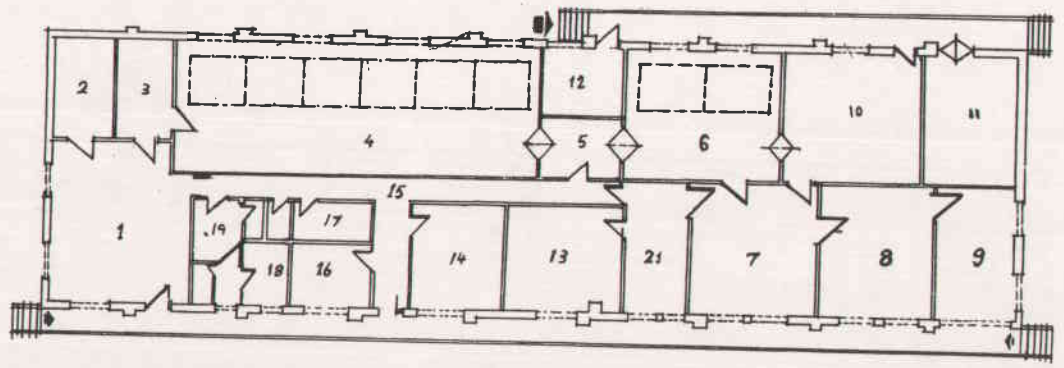

Fig. (7) : Hatchery Building

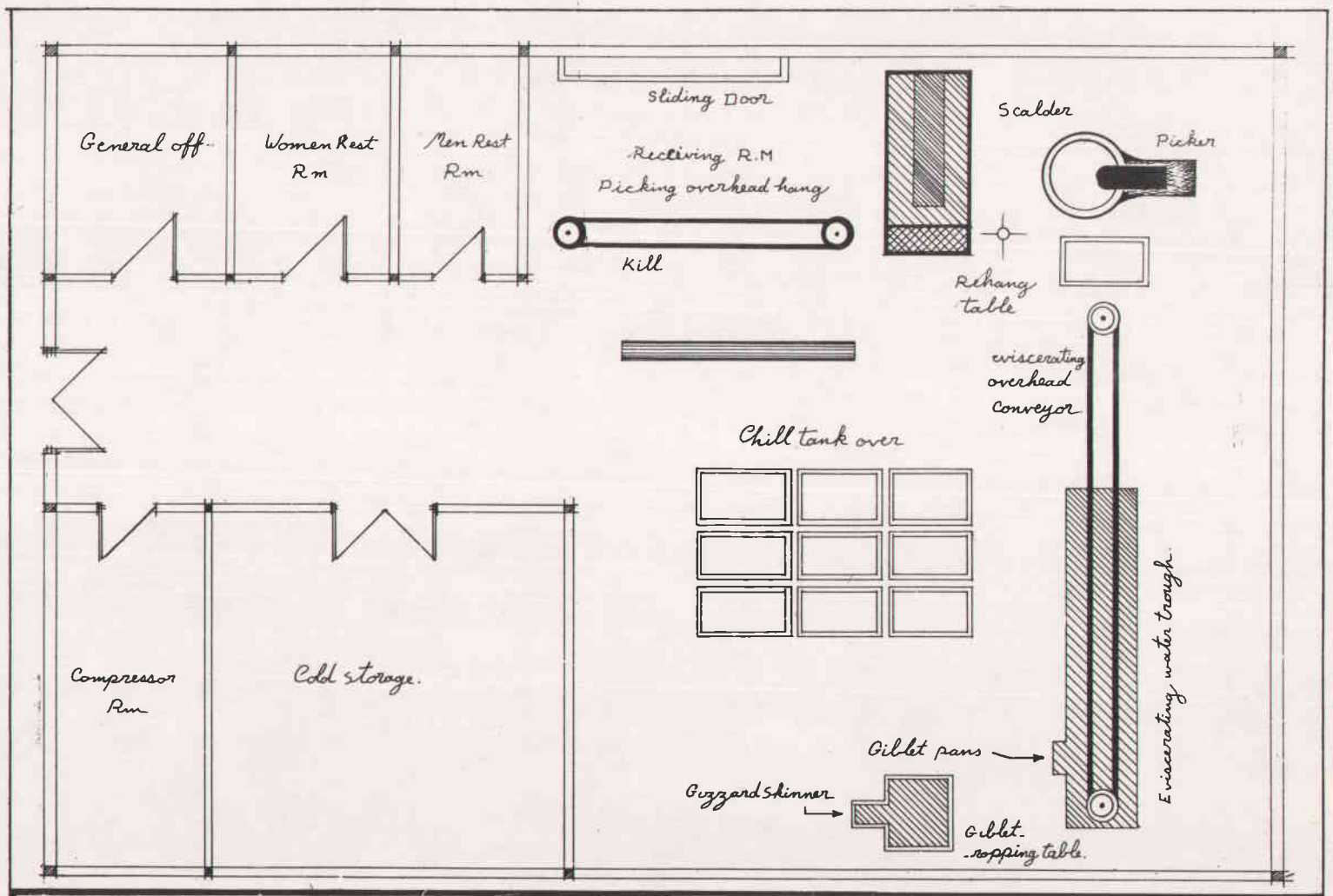

Fig. (8) : Layout of Poultry Processing Plant (500 B.P.H.)

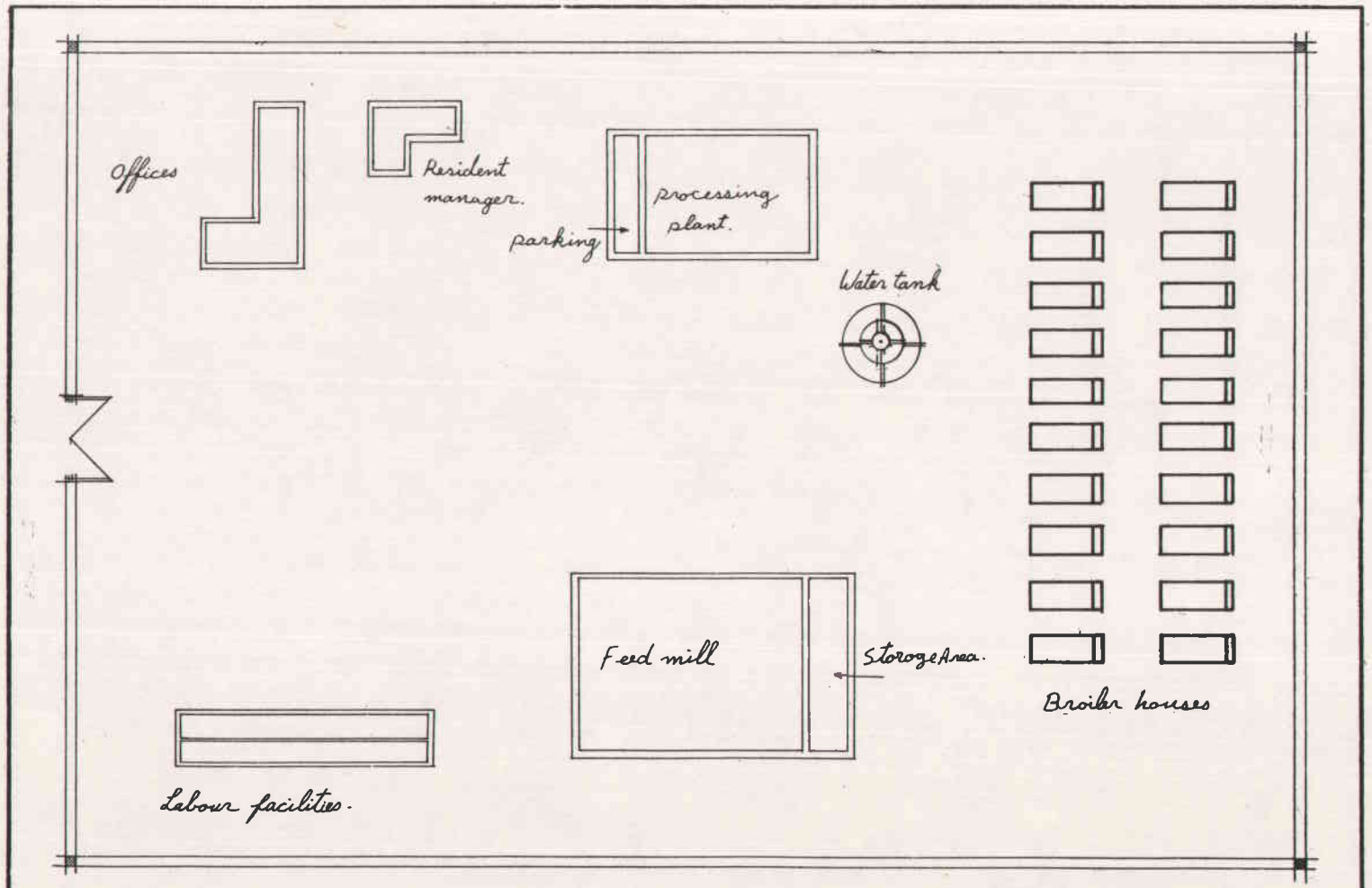

Fig.(9) : New Facilities At Hargiesa Poultry Complex, The Broiler Production Unit (B. P. U.)

ANNEX 111

PROJECT IDENTIFICATION : COST ESTIMATES

ANNEX III

TABLE (1) Poultry Development Project Budget Plan

1. Mogadishu Egg Unit (M.E.U.)	Cost in 1000 So. Sh.		
	Local	F.E.	Total
a) Buildings	1,136,5	1,354,3	2,490,9
b) Equipments			
1. Five years depreciation	6	151,9	151,9
2. Ten years depreciation	-	3,756,2	3,756,2
c) Electricity	176,1	-	176,1
d) Fuel	23,8	4,6	28,4
e) Packing Materials	-	61,4	61,4
f) Chickens (annually)	-	387,5	387,5
g) Wages (annually)	13,9	-	13,9
h) Hygenic cost	-	80,6	80,6
i) Feed costs			
1. First production year	878,3	-	878,3
2. Second production year	2,544,6	-	2,544,6
3. Third production year	2,547,8	-	2,547,8
Sub-total I. (Chicken for 3 year)			13,117,6
II. Hargeisa Poultry Complex			
A. Layers and Parent Stock Unit (L.P.U.)			
1) Buildings Poultry houses for broading laying and parent stock	2,095,4	1,714,4	3,809,8
2) Storage room 10 X 10	104,5	85,5	190,0
3) Office 49 m^2	51,2	41,9	93,1
4) Hygeine lab 66 m^2	76,4	62,4	138,8
5) Labour & management houses	188,2	148,2	329.4

TABLE (1) Continued 1

	Local	F.E.	Total
6) Hatchery building 480m^2	554.6	453.6	1,008.0
7) Water system & Tanks	554.0	445.0	999.0
8) Cold storage 63 m^2	72.8	59.5	132.3
Equipments			
For layers farm water foundation	-	10.0	10.0
Starter trays	-	5.0	5.0
Drinkers	-	30.1	30.1
Feeders	-	43.5	43.5
Gas brooder	-	13.5	13.5
Gas tanks	-	13.0	13.0
Electric & light systems	-	150.0	150.0
Pullet crates	-	107.9	107.9
Automatic motors	-	67.8	67.8
Feed chains	-	380.7	380.7
Community nests	-	216.9	216.9
Egg baskets	-	11.7	11.7
Electric & light & water	-	585.9	585.9
Parent Stock			
Water fountain	-	4.7	4.7
Start trays	-	2.3	2.3
Automatic feed	-	169.2	169.2
Gas brooder	-	9.7	9.7
Gas tank	-	8.3	4.3
Automatic water	-	14.1	14.1
Community nests	-	100.4	100.4
Egg basket	-	2.1	2.1
Egg tables	-	8.1	8.1

TABLE (1) Continued 2

	Local	F.E.	Total
Electric & light & water	-	260.4	260.4
Incenerator	-	10.5	10.5
Precision debeaker	-	2.8	2.8
Regular debeaker	-	1.5	1.5
Egg flats	-	6.2	6.2
Offices furniture & housing & furniture	-	152.6	152.6
Disease control lab equipment	-	74.4	74.4
Hatchery			
Incubators	-	378.2	378.2
Egg cooler	-	13.1	13.1
Fumigation	-	2.4	2.4
Tables	-	2.0	2.0
Chick handling	-	5.7	5.7
Cleaning	-	2.8	2.8
Generator	-	248.0	248.0
Water pressure system	-	12.6	12.6
Candling & transfer	-	16.3	16.3
Plastic egg trays	-	24.2	24.2
Small refrigator	-	9.3	9.3
Workshop	-	7.1	7.1
Egg lift	-	4.7	4.7
Tray washer & chick box washers	-	130.6	130.6
Incenerator	-	10.5	10.5
Chick boxes	-	34.7	34.7
Office furniture	7.5	-	7.5
Egg cases	-	9.6	9.6

TABLE (1) Continued 3 ANNEX III

	Local	F.E.	Total
Egg Grading			
Plastic egg box carrier	-	161.2	161.2
Egg trays	-	49.6	49.6
Plate farm	-	3.5	3.5
Refrigerator	-	9.3	9.3
Cold storage	-	24.5	24.5
Sizing & packing	-	670.8	670.8
Vehicles	-	494.8	484.8
Wages	59.2	-	59.2
Management Head quarters wages	17.8	-	17.8
Electricity and fuel	207.3	-	207.3
Chicken layers (annually)	-	399.9	399.9
Chicken parent stock (annually)	-	151.1	151.1
Packing materials	-	73.6	73.6
Feed cost-first year layers	899.0	-	899.0
Second year layers	2,600.4	-	2,600.4
Third year layers	2,592.1	-	2,592.1
First year parents	321.2	-	321.2
Second year parents	706.9	-	706.9
Third year parents	681.9	-	681.9
Infrastructure	931.1	22.6	953.7
Sub Total A (Including Chickens & feed - for 3 years)			= 21,156.3
B. Broiler Production Unit (B.P.U.)			
a. Buildings broiler houses	8,682.6	7,103.9	15,786.5
Staff & labour housing and office	209.4	171.3	380.5
Water Tank	66.0	54.0	120.0
Feed mill	315.6	258.2	573.8
Processing plant	346.5	283.5	630.0

TABLE (1) Continued 4

	Local	F.E.	Total
b. Equipments broilers			
Water fountain	-	16.7	16.7
Starter trays	-	16.7	16.7
Round drinkers	-	200.9	200.9
Gas brooder	-	96.7	96.7
Floor scale	-	43.4	43.4
Chicken crates	-	26.7	26.7
Chain feeder	-	323.6	323.6
Electricity and light	-	502.2	502.2
Furniture	119.5	-	119.5
c. Processing plant			
Water pump	-	54.2	54.2
Refrigerator & furniture	15.0	9.3	24.3
Repairshop	-	11.3	11.3
Plastic carcass crater	-	173.0	173.0
Line of processing plant with freezer & cool	-	694.4	694.4
d. Feed mill			
Generator	-	124.0	124.0
Complete equipments	-	310.0	310.0
Vehicles	-	539.4	539.0
e. Wages	62.7	-	62.7
f. Electricity & fuel	319.5	-	319.5
g. Packaging materials	102.8	-	102.8
h. Feed cost - First year	2,317.0	-	2,317.0
Second year	7,059.0	-	7,059.0
Third year	7,030.0	-	7,030.0
i. Hygienic cost	-	240.0	240.0
j. Infrastructure	718.4	49.5	737.9

Sub Total B -(Chicken and feed 3 years) = 38,636.9

Sub Total II.(chicken and feed 3 years) = 59,793.2

Project TOTAL Including chickens and feed for the first 3 production on yrs) = 72,910.8

TABLE (2) Summary of Total Costs : Mogadishu Egg Unit
(So. Sh. 000)

Year	Capital Cost	Operating Cost	Total base cost	Contingencies Physical[1] 8%	Contingencies Price[2] 10%	Total Cost
1	6,399	-	6,399	512	640	7,551
2	-	1,678	1,678	-	-	1,678
3	-	3,345	3,345	-	-	3,345
4	-	3,350	3,350	-	-	3,350
5	-	3,350	3,350	-	-	3,350
6	150	3,350	3,502	-	-	3,502
7	-	3,350	3,350	-	-	3,350
8	-	3,350	3,350	-	-	3,350
9	-	3,350	3,350	-	-	3,350
10	-	3,350	3,350	-	-	3,350
11	3,908	3,350	7,258	-	-	7,258
12	-	3,350	3,350	-	-	3,350
13	-	3,350	3,350	-	-	3,350
14	-	3,350	3,350	-	-	3,350
15	-	3,350	3,350	-	-	3,350
16	152	3,350	3,502	-	-	3,502
17	-	3,350	3,350	-	-	3,350
18	-	3,350	3,350	-	-	3,350
19	-	3,350	3,350	-	-	3,350
20	-	3,350	3,350	-	-	3,350

1) Physical contingencies were calculated on capital cost items during the project development period (first two years).

2) Price contingencies were compounded at 10% annually for capital costs during the project development period (first two years).

ANNEX III

TABLE (3) Project Capital Costs : Mogadishu Egg Unit

(So. Sh. 000)

Year	Building	Equipment	Vehicles	Total	Foreign Exchange
1	2,491	3,711	197	6,399	5,262
2	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	79	73	152	152
7	-	-	-	-	-
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	-
11	-	3,711	197	3,908	3,908
12	-	-	-	-	-
13	-	-	-	-	-
14	-	-	-	-	-
15	-	-	-	-	-
16	-	79	73	152	152
17	-	-	-	-	-
18	-	-	-	-	-
19	-	-	-	-	-
20	-	-	-	-	-

ANNEX III

TABLE (4) Project Operation Costs : Mogadishu Egg Unit

(So. Sh. 000)

Year	1	2	3	4-20
Wages & salaries	-	14	14	14
Feeds	-	878	2,545	2,548
Chicks	-	387	387	387
Hygiene cost	-	65	65	65
Fuel	-	28	28	28
Electricity	-	176	176	176
Packing Material	-	61	61	61
Maintenance (1% of equipment cost)	-	37	37	37
Overheads (2)	-	32	32	32
Total	-	1,678	3,345	3,350
Foreign Exchange	-	518	518	518

1) Annual maintenance costs is estimated to be 1% of the value of equipment and vehicles.

2) This is estimated as 10% of the operating expenses, including the costs of feed, chicks , and hygiene care.

ANNEX III

TABLE (5) Summary of Total Costs ; Hargeisa Poultry Complex (So. Sh. 000)

Year	Capital Cost	Operating Cost	Total base cost	Contingencies Physical[1]	Contingencies Price[2] 10%	Total
1	29,665	-	29,665	2,373	2,966	35,004
2	4,264	6,454	10,818	341	895	11,954
3	-	13,318	13,318	-	-	13,318
4	-	13,256	13,256	-	-	13,256
5	-	13,256	13,256	-	-	13,256
6	213	13,256	13,469	-	-	13,469
7	286	13,256	13,542	-	-	13,542
8	972	13,256	14,228	-	-	14,228
9	402	13,256	13,658	-	-	13,658
10	-	13,256	13,256	-	-	13,256
11	3,680	13,256	16,836	-	-	16,936
12	3,863	13,256	17,119	-	-	17,119
13	-	13,256	13,256	-	-	13,256
14	-	13,256	13,256	-	-	13,256
15	972	13,256	14,228	-	-	14,228
16	386	13,256	13,642	-	-	13,642
17	515	13,256	13,771	-	-	13,771
18	-	13,256	13,256	-	-	13,256
19	-	13,256	13,256	-	-	13,256
20	-	13,256	13,256	-	-	13,256

1) Physical contingencies were calculated on capital cost items during the project development period (first two years).

2) Price contingencies were compounded at 10% of annually for capital costs during the project development period (first two years).

ANNEX III.

TABLE (6) Project Capital Costs Summary : Hargeisa Poultry Complex (So. Sh. 000)

Year	Layers and Parent Stock	Broilers Component	Total	Foreign Exchange
1	9,214	20,451	29,665	14,933
2	2,325	1,939	4,264	4,240
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	180	33	213	213
7	201	85	286	286
8	447	525	972	972
9	229	173	402	402
10	-	-	-	-
11	2,012	1,668	3,680	3,407
12	2,097	1,766	3,683	3,841
13	-	-	-	-
14	-	-	-	-
15	447	525	972	972
16	280	180	206	386
17	430	85	515	515
18	-	-	-	-
19	-	-	-	-
20	-	-	-	-

ANNEX III

TABLE (7) Project Capital Cost : Hargeisa Poultry Complex
Layers and Parent Stock (So.Sh.000)

Year	Buildings and Infra-structures	Equipments	Vehicles	Total	Foreign Exchange
1	6,754	2,460	-	9,214	4,940
2	-	1,830	495	2,325	2,316
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	180	-	180	180
7	-	52	149	201	201
8	-	447	-	447	447
9	-	229	-	229	229
10	-	-	-	-	-
11	-	2,012	-	2,012	1,958
12	-	1,602	495	2,097	2,090
13	-	-	-	-	-
14	-	-	-	-	-
15	-	447	-	447	447
16	-	180	-	180	180
17	-	281	149	430	430
18	-	-	-	-	-
19	-	-	-	-	-
20	-	-	-	-	-

ANNEX III

TABLE (8) Project Capital Costs : Hargeisa Poultry Complex (So. Sh. 000)

Year	Buildings & Infra-Structures	Equipments	Vehicles	Total	Foreign Exchange
1	18,259	2,192	-	20,451	9,993
2	-	1,391	539	1,939	1,924
3	-	-	-	-	-
4	-	-	-	-	-
5	-	-	-	-	-
6	-	33	-	33	33
7	-	11	47	85	85
8	-	525	-	525	525
9	-	173	-	173	173
10	-	-	-	-	-
11	1,668	-	-	1,668	1,548
12	1,227	539	1,766	-	1,751
13	-	-	-	-	-
14	-	-	-	-	-
15	-	525	-	525	525
16	-	206	-	206	206
17	-	11	74	85	85
18	-	-	-	-	-
19	-	-	-	-	-
20	-	-	-	-	-

TABLE (9) Project Operating Costs : Hargeisa Poultry Complex (So.Sh. 000)

Year	1	2	3	4-20
Wages & Salaries				
- Layers & Parent stock	-	77	77	77
- Broilers component	-	63	63	63
Feeds				
- Layers & parent stock	-	1,220	3,307	3,274
- broiler	-	2,317	7,059	7,030
Chicks				
- Layers & parent stock	-	1,653	1,653	1,653
- Broilers	-	-	-	-
Hygiene cost				
- Layers & parent stock	-	65	65	65
- Broilers	-	240	240	240
Fuel				
- Layers & parent stock	-	66	66	66
- broiler component	-	69	69	69
Electricity				
- Layers & parent stock	-	123	123	123
- Broiler component	-	250	250	250
Packing materials				
- Layers & parent stock	-	74	74	74
- Broiler component	-	103	103	103
Maintenance				
- Layers & parent stock	-	25	43	43
- Broiler component	-	22	36	36
Overheads[2]				
- Layers & parent stock	-	36	38	38
- Broiler component	-	51	52	52
Total	-	6,454	13,318	13,256
Foreign Exchange	-	2,157	2,189	2,189

1) Annual maintenance cost is estimated to be 1% of the value of equipment and vehicles.

2) This is estimated as 10% of the operating expenses, excluding the costs of feeds chicks and hygiene care.

ANNEX 1V

PROJECT IDENTIFICATION :

FINANCIAL AND ECONOMIC ANALYSIS

ANNEX IV

TABLE (1) Financial and Economic Prices : Hargeisa Poultry Complex

I t e m	Financial	Economics
a) Broilers meat (So. Sh.000/ton)	12	14.7
b) Spent birds meat (So.Sh.000/ton)	10	8.7
c) Total eggs (So.Sh/Unit)	0.6	.8

Shadow exchange rate (SER) = Official Exchange rate (OER) X 1.9

SER : U. S. $ = So. Sh. 11.8.

ANNEX IV

TABLE (2) Total Revenue : Mogadishu Egg Unit

(So. Sh. 000)

Year	Eggs	Spent Hens	Total
1	-	-	-
2	1,723	-	1,723
3	5,752	302	6,054
4	5,752	151	5,903
5	5,752	302	6,054
6	5,752	151	5,903
7	5,752	302	6,054
8	5,752	151	5,903
9	5,752	302	6,054
10	5,752	154	5,903
11	5,752	302	6,054
12	5,752	151	5,903
13	5,752	302	6,054
14	5,752	151	5,903
15	5,752	302	6,054
16	5,752	161	5,903
17	5,752	302	6,054
18	5,752	151	5,903
19	5,752	302	6,054
20	5,752	151	5,903

ANNEX IV

TABLE (3) Total Revenue : Hargeisa Poultry Complex

(So. Sh. 000)

Year	Eggs	Spent	Broilers	Spent	Eggs	Total
1	-	-	-	-	-	-
2	1,709	-	6,752	-	44	8,505
3	5,705	506	20,580	162	84	27,037
4	5,705	253	20,496	168	83	26,645
5	5,705	506	20,496	162	83	26,952
6	5,705	253	20,496	108	83	26,645
7	5,705	506	20,496	162	83	26,952
8	5,705	253	20,496	108	83	26,645
9	5,705	506	20,496	162	83	26,952
10	5,705	253	20,496	108	83	26,645
11	5,705	506	20,496	162	83	26,952
12	5,705	253	20,496	108	83	26,645
13	5,705	506	20,496	162	83	26,952
14	5,705	253	20,496	108	83	26,645
15	5,705	506	20,496	162	83	26,952
16	5,705	253	20,496	108	83	26,645
17	5,705	506	20,496	162	83	26,952
18	5,705	253	20,496	108	83	26,645
19	5,705	506	20,496	162	83	26,952
20	5,705	253	20,496	108	83	26,645

ANNEX IV

TABLE (4) Cash Flow : Financial Analysis : Mogadishu

Egg Unit (So. Sh. 000)

Year	Total Cost	Total Benefit	Balance	Present worth	Present worth
1	7,551	-	(7,551)	(5,807)	(6,041)
2	1,678	1,723	45	27	29
3	3,345	2,054	2,709	1,233	1,387
4	3,350	5,903	2,553	894	1,047
5	3,350	6,054	2,704	727	887
6	3,502	5,903	2,401	497	629
7	3,350	6,054	2,704	430	568
8	3,350	5,903	2,553	314	429
9	3,350	6,054	2,704	254	362
10	3,350	5,903	2,553	186	273
11	7,258	6,054	(1,204)	(45)	(104)
12	3,350	5,903	2,553	110	176
13	3,350	6,054	2,704	89	149
14	3,350	5,903	2,553	64	112
15	3,350	6,054	2,704	54	95
16	3,350	5,903	2,401	36	67
17	3,350	6,054	2,704	32	62
18	3,350	5,903	2,553	23	46
19	3,350	6,054	2,704	19	38
20	3,350	5,903	2,553	13	31
				850	242

$$FRR = 25 + 5 \left(\frac{242}{1092} \right) = 26\ \%$$

ANNEX I.V

TABLE (5) Cash Flow : Financial Analysis - Mogadishu

Unit (So. Sh. 000)

Alternative I : Benefits Decrease by 20

Year	Total Cost	Total benefit	Balance	Present worth 1.0%	Present worth 15 %
1	7,551	-	(7,551)	(6,864)	(6,569)
2	1,678	1,378	300	(248)	(227)
3	3,345	4,843	1,498	1,125	986
4	3,350	4,722	1,372	937	785
5	3,350	4,843	1,493	927	742
6	3,502	4,722	1,220	688	527
7	3,350	4,843	1,493	766	561
8	3,350	4,722	1,372	641	449
9	3,350	4,843	1,493	633	424
10	3,350	4,722	1,372	530	339
11	7,258	4,843	(2,415)	(845)	(519)
12	3,350	4,722	1,372	438	257
13	3,350	4,843	1,493	433	243
14	3,350	4,722	1,372	361	193
15	3,350	4,843	1,493	357	184
16	3,502	4,722	1,220	266	131
17	3,350	4,843	1,493	296	139
18	3,350	4,722	1,372	247	111
19	3,350	4,843	1,493	245	105
20	3,350	4,722	1,372	204	84
				1137	(1,055)

$$FRR = 10 + 5 \left(\frac{1137}{2.192} \right) = 13\ \%$$

ANNEX IV

TABLE (10) Cash Flow:Financial Analysis - With Out Project Costs: Hargeisa Poultry

(So. Sh. 000)

Year	Capital Cost	Operating	Total Cost	Total Revenue	Balance
1	2,388	-	2,388	-	(2,388)
2	-	773	773	1,063	290
3	-	2,740	2,740	1,168	2,428
4	-	2,740	2,740	5,032	2,292
5	-	2,740	2,740	5,032	2,292
6	471	2,740	3,211	5,032	1,821
7	-	2,740	2,740	5,032	2,292
8	275	2,740	3,015	5,032	2,017
9	-	2,740	2,740	5,032	2,292
10	-	2,740	4,324	5,032	2,292
11	1,684	2,740	2,740	5,032	708
12	-	2,740	2,740	5,032	2,292
13	-	2,740	2,740	5,032	2,292
14	-	2,740	2,740	5,032	2,292
15	275	2,740	2,015	5,032	2,017
16	471	2,740	3,211	5,032	1,821
17	-	2,740	2,740	5,032	2,292
18	-	2,740	2,740	5,032	2,292
19	-	2,740	2,740	5,032	2,292
20	-	2,740	2,740	5,032	2,292

ANNEX IV

TABLE (11) Cash Flow - Financial Analysis : with The Project Cost Hargeisa Poultry Complex

(So. Sh. 000)

Year	Incremental net benefit	Present worth 25%
1	(32,616)	26,093
2	(3,739)	2,393
3	11,291	5,781
4	11,097	4,550
5	11,404	3,741
6	11,355	2,975
7	11,118	2,335
8	10,400	1,747
9	11,002	1,474
10	11,097	1,187
11	9,308	800
12	7,234	499
13	11,404	627
14	11,097	488
15	10,707	375
16	11,182	313
17	10,889	250
18	11,097	200
19	11,404	160
20	11,097	133
		(851)

FRR = 25 %

ANNEX IV

TABLE (14) Economic Cost : Hargeisa Poultry Complex

(So. Sh. 000)

Year	Total Cost	Local Component	Foreign Component	Foreign Component value at the SER	Total Economic Cost
1	35,004	20,071	17,602	33,501	53,572
2	11,954	5,557	7,444	14,168	19,725
3	13,318	11,129	2,189	4,159	15,288
4	13,256	11,067	2,189	4,159	15,226
5	13,256	11,067	2,189	4,159	15,226
6	13,649	11,247	2,402	4,564	15,811
7	13,542	11,067	2,475	4,703	15,770
8	14,228	11,067	3,161	6,006	17,073
9	13,658	11,067	2,591	4,923	15,990
10	13,256	11,067	2,189	4,159	15,226
11	16,963	11,367	5,596	10,632	21,999
12	17,119	11,089	6,030	11,457	22,546
13	13,256	11,067	2,189	4,159	15,226
14	13,256	11,067	2,189	4,159	15,226
15	14,228	11,067	3,161	6,006	17,073
16	13,643	11,067	2,575	4,893	15,960
17	13,771	11,067	2,704	5,138	16,205
18	13,256	11,067	2,189	4,159	15,226
19	13,256	11,067	2,189	4,159	15,226
20	12,256	11,067	2,189	4,159	15,226

ANNEX IV

TABLE (15) Cash Flow : Economic Analysis - Hargeisa Poultry Complex (So. Sh. 000)

Year	Total Economic Costs	Total Economic benefits	Balance	Present worth 22%
1	53,572	-	(53,572)	(43,929)
2	19,725	10,609	(9,116)	(6,126)
3	15,288	29,510	14,222	7,836
4	15,226	33,140	17,914	8,079
5	15,226	33,407	18,181	6,727
6	15,811	33,140	17,329	5,251
7	15,770	33,407	17,637	4,392
8	17,073	33,140	16,067	3,278
9	15,990	33,407	17,417	2,909
10	15,226	33,140	17,914	2,454
11	21,999	33,407	11,407	1,278
12	22,546	33,140	10,594	975
13	15,226	33,407	18,181	1,364
14	15,226	33,140	17,914	1,111
15	17,073	33,407	16,334	833
16	15,960	33,140	17,180	721
17	16,205	33,407	17,202	585
18	15,226	33,140	17,914	502
19	15,226	33,407	18,181	418
20	15,226	33,140	17,914	340
			(1,775)	(992)

ERR = 22%

ANNEX V

TEAM OF EXPERTS

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