

F01
FAO
444

LEB 79/013

NOT YET RELEASED
BY GOVERNMENT CONCERNED

AG:DP/LEB/73/005
Termination Report

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

ANIMAL PRODUCTION, DEVELOPMENT AND TRAINING

LEBANON

TERMINATION REPORT



UNITED NATIONS DEVELOPMENT PROGRAMME



FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS ROME, 1976

MEMO 72.1

1001
240
444

AG:DP/LEB/73/005
Termination Report



ANIMAL PRODUCTION, DEVELOPMENT AND TRAINING

LEBANON

TERMINATION REPORT

Report prepared for
the Government of Lebanon
by
the Food and Agriculture Organization of the United Nations
acting as executing agency for
the United Nations Development Programme

UNITED NATIONS DEVELOPMENT PROGRAMME
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1976

The Food and Agriculture Organization is greatly indebted to all those who assisted in the implementation of the project by providing information, advice and facilities.

TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
1.1 Origin of project	1
1.2 Project background	1
1.3 Outline of official arrangements	4
1.4 Objectives of the project	5
1.4.1 Long-range objectives	5
1.4.2 Immediate objectives	5
2. PROJECT RESULTS AND CONCLUSIONS	7
2.1 Animal production development	7
2.1.1 Feeding practices	7
2.1.2 Fodder conservation	9
2.1.3 Agroindustrial byproducts and feed-mixing plants	10
2.1.4 Animal health services	10
2.2 Forage and pasture development	10
2.2.1 Fodder production	11
2.2.2 Forage seed production and rangeland improvement trials	15
2.3 Economics and investment potential	15
2.3.1 Economics of animal production (milk and meat)	15
2.3.2 Investment potential	16
2.4 Training	16
2.4.1 Fellowships	16
2.4.2 In-service training	16
2.4.3 Study tours	16
3. RECOMMENDATIONS	17
3.1 Animal production development	17
3.1.1 Animal health services	17
3.2 Forage and pasture development	18
3.3 Economics	18
3.4 Training	19

	<u>Page</u>
<u>Appendix 1</u> PROJECT STAFF	21
<u>Appendix 2</u> FELLOWSHIPS	22
<u>Appendix 3</u> LIST OF EQUIPMENT	23
<u>Appendix 4</u> FEEDING STANDARDS AND FEEDING SCHEDULE	24
<u>Appendix 5</u> FORMULAS FOR CONCENTRATE MIXTURES USED IN CATTLE FEEDING	28
<u>Appendix 6</u> COMPARATIVE FEEDING COSTS PER KILOGRAMME OF MILK	29
<u>Appendix 7</u> SILOS INTENDED TO BE CONSTRUCTED BY THE FARMERS COOPERATING IN THE PROJECT	30
<u>Appendix 8</u> FARM ECONOMICS QUESTIONNAIRE - LIVESTOCK PRODUCTION/ CROP PRODUCTION	31

LIST OF TABLES

1. Livestock population of Lebanon	2
2. Times of seeding, seeding rates and chemical fertilizers provided	12
3. Total area under fodder production, autumn 1974 to September 1975	13
4. Total quantities of forage seeds and fertilizers distributed	13
5. Green yields of forage crops	14

1. INTRODUCTION

1.1. ORIGIN OF PROJECT

In June 1970 the Government of Lebanon requested UNDP/FAO assistance in implementing a project for the development of animal production through demonstration of improved methods and techniques to selected farmers. The proposals were subsequently reviewed by a UNDP/FAO technical mission in March/April 1971 to investigate the further strengthening of the project. As a result, a Preparatory Assistance Programme was suggested and approved with the intent to prepare a full-scale project incorporating the items considered essential for the economic development of the animal industry. The full-scale project, 'Animal Production, Development and Training', described in this report, was an outcome of the Preparatory Assistance Programme.

1.2. PROJECT BACKGROUND

Agriculture still plays a significant role in the national economy of Lebanon. About 20% of the active population are employed in agriculture and about 10% of the gross domestic product come from the agricultural sector. A relative abundance of spring water enables an unusually wide range of crops, fruits and vegetables to be grown at successive levels; exports consist mainly of fresh fruits, vegetables and poultry products for which excellent markets have developed in the Arabian and Persian Gulf region. The most recent figure available for the total value of export of agricultural products was LL 176 million in 1971 ^{1/}.

Agricultural production in general has, however, failed to keep pace with the increased demand. With the import of ever-increasing quantities of agricultural commodities, the trade deficit in these commodities was maximum in the livestock sector. The total value of imported livestock and its products was LL 123 million in 1971.

Because of the heavy burden on the economy which the imports of livestock and livestock products represent, it is desirable to make the maximum use of the livestock resources of the country, which would not only provide additional remunerative employment for the rural population but would also ensure an efficient agricultural industry. It was, therefore, of considerable importance that the livestock sector

^{1/} US\$ 1.00 = LL 2.35 (as at 1 November 1975); 100 piastre (P) = LL 1.00.

should be developed and expanded as rapidly as possible. A number of factors currently hinder the development of the industry including the low productivity of the local livestock, poor management, lack of adequate health, breeding and feeding facilities, low productivity of the range resulting from decades of overgrazing, insufficient processing and marketing facilities, lack of incentive to the farmers, inadequate credit and insufficient support given to the organizations responsible for the production, processing and marketing aspects of the livestock sector. The large-scale importation of milk powder and meat, which are often sold at prices well below the cost of production, is another serious problem facing the livestock industry.

During recent years, there has been a marked decline in the country's cattle population while sheep and goats have maintained their numbers (Table 1).

Table 1
LIVESTOCK POPULATION OF LEBANON

Livestock	1969	1972
Cattle	85 700 (45 800 milking cows)	67 131 (50 468 milking cows)
Goats	348 000 (285 000 females)	354 548 (304 426 females)
Sheep	213 000 (172 000 females)	238 756 (205 041 females)

There have been considerable differences between the rates of development of the various sectors of the livestock industry. Some sectors have stagnated and even declined but others, such as the poultry industry, have shown a phenomenal rate of development, with the country now holding a leading position in the development of this industry for the supply of breeding stock and table birds and eggs in the Near East.

In the period 1954-56, the livestock sector contributed only about 19% to the total agricultural gross production. By 1969-70, the share of the livestock sector had increased to about 25% while in 1971 it had reached 28%, mainly due to the development of the poultry industry.

Although annual local meat production from cattle, sheep and goats increased from some 4 800 t in the 1954/66 period to more than 6 500 t in 1969, imports of red meat from live animals increased from 18 900 t valued at LL 24.4 million in 1956,

to 57 200 t valued at LL 74 million in 1968. In addition, imports of frozen and canned meat have also risen in value from over LL 13 million in 1969 to 20,5 million in 1972.

At present, the demand for red meat is mainly being met through importation. If the rate of increase recorded for the period 1956/66 is maintained, the deficit for meat supply is likely to rise to more than 41 000 t by 1975 and to 61 400 t by 1985. Even at current prices, the importation of such quantities would represent a serious burden on the economy. During the last ten years the dairy industry has declined, and consequently the country has been obliged to import ever-increasing amounts of dairy products, annual imports rising from around 17 500 t (LL 35 million) in 1967 to over 20 000 t (LL 54 million) in 1972.

The number of specialized dairy cattle has been declining in recent years as a result of the low profitability of dairy farming. Poor management, lack of essential support services combined with a very high cost of production due to maintaining the animals mostly on expensive imported feed mixtures together with the competition afforded by imported dairy products are the main factors inhibiting the successful development of the dairy industry.

The limited livestock farming in Lebanon is almost exclusively based on maintaining the animals on expensive imported animal feeds - thereby exorbitantly increasing the cost of production. Some 60 to 70% of the total cost of production is attributed to feed cost. Economic livestock farming can best be achieved when the animals are fed mainly on locally grown forage crops supplemented with a minimum quantity of concentrate mixture depending on the production performance. Development of forage crops at the farmers' level has hitherto received little attention resulting in an acute scarcity of forage crops. The present area under forage crops is about 18 000 ha (including rainfed crops), or only about 2% of the total area of Lebanon. It is estimated that the present high cost of production can be substantially reduced with the successful introduction and development of forage crops amongst the stock-owners coupled with maximum use of local agroindustrial byproducts in the animal feed rations.

Many studies have been carried out both by national and international specialists on the economic feasibility of animal production under the prevailing agro-economic conditions in Lebanon. While these studies have generally indicated a favourable economic possibility of developing animal production - provided the essential inputs are ensured - no systematic attempts have yet been made to develop commercial animal production under actual farming conditions. Economic viability concerning development of animal wealth can only be assessed on results achieved from intensive livestock operations under practical farming conditions using modern methods and techniques.

1.3 OUTLINE OF OFFICIAL ARRANGEMENTS

Although the project had been scheduled to start in January 1974, the Project Manager did not take up his position until March 1974. The Project Document was finally approved by the United Nations Development Programme on 31 December 1974, the period of activities being stipulated as two-and-a-half years, inclusive of one-year preparatory assistance. An extended period was envisaged at that time, depending on progress. The Food and Agriculture Organization of the United Nations was designated executing agency and the Office of Animal Production, Ministry of Agriculture, as government cooperating agency. The total UNDP contribution was US\$ 411 000, subsequently raised to US\$ 595 000, while the government counterpart contribution in kind was LL 1 833 600. A detailed plan of work was prepared and approved by all concerned. During the period that the project was active, the corresponding programme of work was almost fully realized.

A Tripartite Review Meeting held on 31 July 1975 was preceded by a visit to the project area of Baalbek-Hermel to observe project progress and activities under field conditions. The Tripartite Review was chaired by Mr. Dikran De Chadravian, Director-General of the Office of Animal Production, Ministry of Agriculture, and attended by representatives of the Ministries of Planning and of Agriculture, UNDP and FAO project staff. Although project implementation was continuously hampered by disturbances throughout the country, progress was considered satisfactory under these conditions. Attention was drawn to the urgent need for animal health services and for additional finance towards the purchase of agricultural equipment and the construction of trench silos. These and some other items, including the raised UNDP contribution, formed the substance of a project revision (LEB/73/005/D) approved by UNDP in September 1975.

The project, originally scheduled to operate to the end of August 1976, was terminated in February of that year. During the foreshortened period of activities, excellent working relations and collaboration were enjoyed with the local authorities and more particularly with the national staff members attached to the project from the Animal Production Office. During the final meeting for terminating the project, the local authorities expressed their appreciation of the work done by the FAO team members and expressed the hope of eventually reactivating the project.

A list of project staff, both international and counterpart, is given in Appendix 1, while fellowships planned are shown in Appendix 2. Equipment supplied through the project is listed in Appendix 3.

1.4 OBJECTIVES OF THE PROJECT

1.4.1 Long-range objectives

The purpose of the project was to assist the Government of Lebanon, through the Animal Production Office, in its endeavour to develop the milk and meat industry at the national level by providing improved services and assistance to the individual stock-owners. To achieve the objectives, the project was required to assist in planning, developing and implementing animal production programmes of economic relevance in collaboration with the farmers, as well as to assist in the organization of the infrastructure considered essential for the successful development of the industry.

1.4.2 Immediate objectives

The project was planned as a pilot demonstration programme to encourage dairy and meat production amongst the small farmers in two selected areas, South Lebanon and Baalbek-Hermel region. The programme, in particular, consisted of activities in animal production development, forage and pasture development, and economics and investment potential as well as in training. Specific objectives were:

(a) Animal production development:

- to organize, through the Animal Production Office, essential support services for the development of the animal industry at farm level and also demonstrate to the stock-owners improved methods of husbandry, feeding, management, production, marketing and processing of milk and meat.

(b) Forage and pasture development:

- to continue the work on the development of high-yielding forage crops and demonstrate improved agronomic methods of forage production amongst the stock-owners including methods of fodder conservation and storage;
- to participate in the production of suitable forage seeds;
- to demonstrate improved methods of range development and management in selected areas;
- to encourage the stock-owners to initiate beef production as a subsidiary to milk production by adopting improved methods of fattening. Simultaneously, to carry out fattening trials on cattle and sheep with commercial stock-owners;
- to establish and implement, through the Animal Production Office, a feed distribution programme to encourage economic production of milk and meat in conjunction with the expansion of milk collecting centres for organized collection, processing and marketing of milk;

- to encourage optimum utilization of locally available agroindustrial byproducts and other cheap feedstuff in the ration for animals in order to reduce the cost of production;
- to encourage cooperative utilization of available services and resources including marketing and processing of products.

(c) Economics and investment potential:

- to evaluate, and demonstrate to the farmers the economics of milk and meat production under the present agroeconomic conditions. Also to compare the relative economic advantages of milk and meat production between cattle and sheep;
- to assess the investment potential for both the small farmers and public or private finance.

(d) Training and study tours:

- to provide fellowships and in-service training to the counterpart staff as well as study tours for both national staff and progressive farmers actively engaged in project activities.

2. PROJECT RESULTS AND CONCLUSIONS

The two areas - South Lebanon and the Baalbek-Hermel region - where project activities took place, were chosen because of the availability of irrigation facilities essential for forage production, and because of the higher concentration of dairy farmers. Farmers were selected on the basis of interest shown on personal contacts as well as on information collected on inputs such as availability of irrigated land for fodder production, type of stock and marketing facilities. In all 126 farmers participated in project activities, 80 from the Baalbek-Hermel region and the rest from South Lebanon.

A second survey was made to ascertain the management practices adopted by the farmers, and in particular to assess the feeding practices vis-à-vis the economics of milk production and the raising of young stock to enable the introduction of improved and economic feeding practices.

2.1 ANIMAL PRODUCTION DEVELOPMENT

2.1.1 Feeding practices

The survey on feeding practices, which covered about 70 farmers, showed that the ration used for dairy cattle consisted mainly of concentrates and straw with occasional feeding of natural grasses during the rainy season only. The daily amount of concentrate fed per cow producing about 10 kg milk was 10 to 12 kg, with an additional 7 to 10 kg of straw. Due to the high price of both components of the ration, the cost of production of milk was estimated at about 60 P/kg. Similarly, the young stock and bulls were maintained on a high level of concentrate and straw feeding - resulting in a high feeding cost. The farmers were, in general, ignorant of the importance of introducing advanced management practices of any type. Nor were the methods used for rearing and raising suckling and young calves considered satisfactory. It was, therefore, not surprising to observe high mortality and low growth rates in young animals.

Since the main objectives of the project were to introduce improved and economic feeding practices, the participating farmers were contacted individually to create confidence in them for gradual introduction of improved feeding rations based mainly on green forage with supplementary feeding of a limited quantity of balanced concentrate mixture. A few progressive and cooperative farmers were selected to

demonstrate the advantage of feeding cheap and balanced rations. Even with the rather limited introduction of alfalfa and early corn (maize) ^{1/} the farmers became convinced of the utility of producing and feeding green forage. Though practised only for a short period, such feeding of green forage with reduced quantity of concentrate feeding resulted in higher production at a reduced cost. Given the time to introduce full rotation of forage production as envisaged in the project to enable the practice of optimum feeding of green forage, animal production activities with progressive farmers could gain the desired momentum. To assist the farmers in adopting improved feeding practices, feeding charts incorporating both forage and concentrate mixture were prepared for different classes of stock with the intention of handing over such charts to individual participating farmers after translation into Arabic. Although the translated version was submitted for printing, it could not be distributed to farmers because of disturbed conditions in Beirut. A pro forma copy of the Feeding Standards and Feeding Schedule based on limited and optimum forage feeding is given in Appendix 4.

2.1.1.1 Different composition of feed mixture

Along with the introduction of improved feeding standards and feeding schedules, the project also prepared different formulas of feed mixtures for use by different groups of stock in order to reduce the cost without sacrificing the nutritive values. The mixtures proposed were based on the availability of the components in local markets. Each feed mixture indicated the nutritive values as well as its cost/kg. Appendix 5 gives the composition of such feed mixtures. Similar feeding standards had been planned for beef and mutton production.

2.1.1.2 Comparative feeding costs of dairy cows

Feeding costs of dairy cows and young stock were observed to be very high and uneconomical. With the introduction of green fodder into the daily rations on limited or optimum levels, the feeding costs per 1 kg milk produced by a cow giving on an average 10 kg of milk/day, could be decreased from 60 P under traditional rations without green fodder to 29 P when green fodder was used in limited quantity, and 23 P when green fodder was used in optimum quantities (see Appendix 6). If green fodder is available in sufficient quantity, the genetical potential in milk production of the individual dairy cows could also be fully utilized, in order to obtain more production at a lower cost. Thus the rations based on green fodder are more economical as regards feeding cost in comparison with rations based mainly on concentrates. It has also been observed that the health conditions of newly-born calves as well as growth rate of young stock are much better when green fodder is included in the rations. Appendix 6 shows the comparative feeding costs of different levels of milk production up to 35 kg of milk/day.

^{1/} The term 'corn' is adopted throughout this report to follow usage common in Lebanon.

2.1.1.3 Milk recording and mastitis control

To encourage the farmers to adopt hygienic practices and to maintain records of performance, a systematic mastitis control and milk recording programme was initiated in February-March 1975, and the farmers showed considerable interest in cooperating. Difficulties in maintaining contact with the farmers prevented subsequent analysis of the data recorded, and restricted efforts to encourage additional farmers to join the programme.

2.1.1.4 Milk collection and marketing

Since sound marketing facilities are essential for providing an economic stimulus towards animal production development, efforts were made to intensify and further expand the activities of the existing milk collection centres and to establish new collection centres. Soon after the project started, a new milk collection centre was put into operation in Laboua village near Baalbek to provide the necessary marketing support to the cooperating farmers. To assist in the milk collection and milk recording programme, two Dodge vans were purchased with project funds. The milk collection centre at Laboua greatly encouraged the farmers to participate in project activities.

2.1.2 Fodder conservation

As the use of conserved fodder in the daily rations of animals, particularly in a period of scarcity, would do much to improve feeding practices and bring down the cost of production, participating farmers were persuaded to take an interest in silage and hay making. To overcome the farmers' problem of lack of ready cash for the construction of silos, an additional US\$ 40 000 was approved by the UNDP in September 1975 for this purpose. However, due to the civil disturbances in Lebanon soon after, no further action could be taken to provide the necessary financial assistance in silo construction. Similarly, all plans for the hay making programme were stopped, although a number of demonstrations were given to the farmers regarding hay making from alfalfa. Special care was taken to demonstrate methods for making high-quality hay as well as to reduce losses to the minimum. During the short duration of the project, many participating farmers showed keen interest in utilization of silage and hay in the daily animal rations and some of the farmers actually started construction of silos in anticipation of financial assistance through the project.

The programme for the construction of trench/pit silos was designed to provide a minimum of 5 t of corn silage for each producing dairy cow owned by the individual farmers. This would have ensured a minimum of about 25-30 kg of silage per animal/day for a period of about 150 to 200 days, particularly during the dry period and



winter months. On the basis of the number of animals owned by the individual farmers, projections were made with regard to the type and capacity of the silos as well as the construction material required by participating farmers, in the form given in Appendix 7.

2.1.3 Agroindustrial byproducts and feed-mixing plants

Utilization of agroindustrial byproducts such as citrus and carob pulps, poultry litters and droppings, etc. as a cheap source of animal feed was considered but due to the premature closure of the project, no further action could be taken. A large number of farmers were also persuaded to construct trench silos for ensiling citrus pulp mixed with wheat-straw. To introduce citrus and poultry litters in the rations, the project had planned to establish a drying plant to enable using such dry by-products as components of feed mixture.

Similarly, in aiming at the production of balanced and cheap concentrate mixtures, two feed-mixing plants (approximate cost US\$ 18 000) with a capacity of 3 t/h were ordered, but had not been delivered or installed at the time of the project's termination.

2.1.4 Animal health services

Sound health services are essential to an animal development programme. Health service facilities throughout the country are almost non-existent, so that stock-owners can derive little or no assistance from the few veterinarians in the country - even at times of emergencies. Those fortunate in obtaining such health services do so only on payment of exorbitant fees, generally beyond the means of most stock-owners. During project activities it became apparent that the absence of support from adequate and timely field health services was a major inhibiting factor in the intensive development of the industry. Participating farmers expressed their strong dissatisfaction regarding this lack to the Tripartite Review Meeting, which resulted in the inclusion of a Health Expert in the team at the time of the project revision, but this appointment could not be made before the closure of the project.

2.2 FORAGE AND PASTURE DEVELOPMENT

The fodder production and range development activities were aimed at:

- assisting the selected farmers in growing high-yielding forage varieties on both irrigated and rainfed lands;
- encouraging and assisting silage and hay making (see also Section 2.1.2);
- conducting seed forage production trials;
- demonstrating improved methods of developing and improving the deteriorated rangelands.

2.2.1 Fodder production

Selected farmers were encouraged to grow high-yielding forage varieties on their land to produce enough green fodder to feed their cows at a very low cost. Assistance included the provision of forage seeds and chemical fertilizers free of charge and the utilization of the project's agricultural machinery whenever needed for seeding, harvesting, baling and corn chopping for silage making.

In an attempt at fodder crop rotation, it was planned that each selected farmer would allocate 2 donum ^{1/} of irrigated land for each of his milking cows to produce the quantity of green fodder needed for feeding each cow during the whole year. Accordingly, full forage rotation based mainly on forage crops was followed on each participating farm unit. Alfalfa was grown on about 40-50% of the land; on the remainder forage crops were rotated starting in spring 1975 with the early-maturing corn, followed in summer by a medium-maturing hybrid corn. After harvesting the corn, it was planned to sow in autumn 1975 a mixture of vetch and barley, or berseem, or fodder peas, on the same land, but this stage could not be implemented.

Several high-yielding forage varieties were used in the project:

Alfalfa	:	El Unico
Early corn	:	Bekaa No. 1
Medium-maturing hybrid corn	:	Pioneer 368A, Jacquona, Acacia
Vetches	:	Woolypod, Common
Fodder peas	:	Black-eyed Susan
Berseem	:	Multicut

The time of seeding for each forage crop fell within a certain limited period according to the location and preparation of the land. Seeding rates, as indicated in Table 2, were strictly observed. Full quantities of the chemical fertilizers, triple superphosphate and ammonium sulphate, were provided and applied at seeding, but ammonium nitrate could not be supplied as required due to lack of adequate funds.

^{1/} 1 donum = 1 000 m².

Table 2

TIMES OF SEEDING, SEEDING RATES AND CHEMICAL FERTILIZERS PROVIDED

Forage	Time of seeding (1975)	Seeding rate (kg/donum)	Quantity of fertilizer (kg/donum)		
			at seeding	at growing stages	
			Triple superphosphate P ₂ O ₅ 46%	Ammonium sulphate N 21%	Ammonium nitrate N 26%
Alfalfa	March and September	3	20	20	20 when needed after cutting
Early corn	April to June	5	20	20	provided by farmers
Hybrid corn	July to August	3-4	30	20	40
Vetch and barley	November	8+4	20	-	-
Fodder peas	November	10	20	-	-
Berseem	October/ November	4	20	20	provided by farmers

The complete three-forage crop rotation described above for the irrigated land started with the growing of alfalfa in March 1975. The other forage crops were rotated accordingly. Efforts were made by the project team to put as much area of land under fodder production as possible even under the disturbed conditions in the country which started in South Lebanon in late February 1975. Table 3 shows the total area under fodder production on irrigated and rainfed lands both in South Lebanon and in Hermel-Baalbek until September 1975 as well as the number of farmers participating in the project. The total area sown reached about 1 246 donum; 820 in South Lebanon and 426 in the Hermel-Baalbek region.

Table 3

TOTAL AREA UNDER FODDER PRODUCTION,
AUTUMN 1974 TO SEPTEMBER 1975

Area	No. of farmers	No. of villages	Area sown (donum)				Total
			Rainfed	Irrigated forage			
			Vetch and barley	Early corn	Hybrid corn	Alfalfa	
South Lebanon	67	21	200	255	196	168	819
Baalbeck-Hermel	67	9		105	209	112	426
Total	134	30	200	360	405	280	1 245

Seeds of vetch, barley and early corn (Bekaa No. 1) were purchased from the local market while seeds of the other forages were imported. Table 4 indicates the total quantities of seeds and fertilizers used for the above-mentioned areas.

Table 4

TOTAL QUANTITIES OF FORAGE SEEDS AND FERTILIZERS DISTRIBUTED

Forages	Seeds (t)	Fertilizers (t)		
		Triple superphosphate P ₂ O ₅ 46%	Ammonium sulphate N 21%	Ammonium nitrate N 26%
Vetch and barley	1.6 0.8	4.0	nil	nil
Early corn	1.8	7.5	7.5	provided by farmers
Hybrid corn	1.6	12.0	8.0	16.0
Alfalfa	0.9	5.6	5.6	2.0
Total	6.7	29.1	21.1	provided in some cases 18.0

Samples of forage yields at harvesting times were taken by means of a metal quadrat 1 x 1 m, at the following stages of growth:

- corn: at the milk stage by when corn plants were ready to be harvested for silage making.
- alfalfa and berseem: when 10% of the plants in the stand were in the flowering stage.
- vetch and barley mixture: at the flowering stage of the vetch, and before seed formation, is considered suitable for hay making.

From the samples obtained, approximate green yields per donum for each harvest or cut for the forage crops were estimated. Forages in a few fields failed to grow, or exhibited weak growth, due to lack of sufficient irrigation water or to some other agronomic negligence. Also some fields in South Lebanon, particularly in the Rashidieh area, were either completely or partly damaged by frequent air raids. Fair to excellent forage yields were obtained from the other fields (Table 5).

Table 5

GREEN YIELDS OF FORAGE CROPS
(kg/donum)

Forage crop	Green yield	
	Lowest	Highest
Vetch and barley mixture	1.6	2.8
Early corn (Bekaa No.1)	3.2	4.9
Alfalfa ^{1/}	0.5/cut	1.9/cut
Hybrid corn	samples could not be taken	

^{1/} Only 3-4 cuts could be sampled from the alfalfa fields. No sampling was possible after September 1975.

To enlist more efficient cooperation and collaboration, a full set of agricultural equipment considered essential for production and conservation of forage was purchased to assist the farmers in South Lebanon in soil cultivation, seeding, harvesting, chopping, baling and other practices. It was noticed that the farmers greatly appreciated such assistance and also encouraged other farmers to join project activities. The purchase of a second set of equipment was approved for use in the Laboua area in September 1975 but had not been delivered before the termination of the project.

2.2.2 Forage seed production and rangeland improvement trials

Two areas were selected for forage seed production, an irrigated area in South Lebanon and a rainfed area in the Baalbek-Hermel region. In South Lebanon, the necessary approval to get 150 donum of irrigated land belonging to the Ministry of Defence was obtained. However, formal transfer of the land from the Ministry of Defence was hindered due to the situation prevailing in the country. Similarly, considerable progress had been made to take over a rainfed area in the Baalbek-Hermel region for seed production trials during 1976/77 and also a piece of rangeland for the demonstration of range improvement trials. No further action could be taken to pursue the programme.

A trial carried out in the season 1975/76 on 150 donum of rainfed land in Hermel to produce forage seeds of vetch and barley was unsuccessful due to a severe drought which hit all rainfed crops not only in Lebanon but also in the neighbouring countries. Accordingly it was planned that in selecting a rainfed area for seed production, a source of irrigation water should be near the plot for use in emergency cases.

2.3 ECONOMICS AND INVESTMENT POTENTIAL

2.3.1 Economics of animal production (milk and meat)

From a total of some 20 livestock-holders with irrigated land in the Lebaa area in South Lebanon, six farmers were selected to participate in project activities. Basic information on existing livestock and crop production was collected on these farms.

A detailed farm economics survey with particular reference to livestock production was made on 45 holdings - 30 in South Lebanon (24 in Tyre and six in Lebaa), and 15 in the Baalbek-Hermel region. A questionnaire was prepared to collect precise and detailed information on the actual farm family income deriving mainly from livestock and crop production and also from off-farm employment. The survey, carried out between February and April 1975, was designed to assess the economic situation of the farmers at the beginning of the project before the introduction of fodder-crops and modern feeding systems. A second survey, intended to show the economic impact of the project activities on farm family income, could not be implemented.

A plan for a daily recording system was designed and distributed to the farmers for test. The system required the farmer (or livestock-holder) to note every day certain information and would enable him, at the end of each month, to make an account for his farm family expense and income. It is important that the farmer gets accustomed to noting all revenue and expenses for his farm and his family. From the analysis of the monthly account each farmer could be shown where he is losing money and how to use his money profitably under actual conditions. Details of the daily recording system and examples of these accounts are given in Appendix 8.

2.3.2 Investment potential

Although the Project Document called for an assessment of investment potential for both the small farmers and public (or private) finance, and allocated funds for consultancies, no such consultancies could be used during the project's shortened life. However, it may be observed that given the proper and adequate service support, development of the animal industry could lead to profitable investment possibilities.

2.4 TRAINING

One of the main obstacles in developing the livestock industry is the acute shortage of trained technical personnel at all levels. The few trained personnel available are almost exclusively engaged in routine administrative work and little or no assistance is given to the stock-owners in pursuing productive farming practices. Nor are there any organized extension services or infrastructure to provide essential support services for the economic development of the industry. The Project Document referred to training by fellowships, in-service training and study tours.

2.4.1 Fellowships

Provisions were made for 7 fellowships for the local counterpart staff, of which formalities for 4 fellowships had been completed by September 1975 (Appendix 2).

2.4.2 In-service training

Project activities had not progressed sufficiently for formal in-service training to begin, but advantage was taken of all contacts with farmers to instruct and advise at an informal level.

2.4.3 Study tours

The aim of the proposed study tour was to enable some progressive participating farmers and field technicians to exchange views and experiences with farmers in technically advanced countries in Europe. Accordingly contacts were made with responsible officers of the British, Danish and French Embassies in Beirut to assist in finalizing arrangements. These preliminary proposals could not be followed up during the project's life.

3. RECOMMENDATIONS

Due to the sudden and premature closure of project activities no definite recommendations can be made at this stage because of lack of sufficient observational results. However, based on the experience gained during the limited life of the project and also considering the interest shown by the stock-owners as well as by the government cooperating agency, the following suggestions are made for the possible continuation of the animal production developmental programme in Lebanon. The Government is recommended to seek international assistance in the implementation of these suggestions and in the provision of the necessary technical support as and when the situation permits.

3.1 ANIMAL PRODUCTION DEVELOPMENT

To develop milk and meat production as a commercial proposition the basic approach would require a fundamental change from the present traditional management practices to more advanced and economic production practices.

The present practice of maintaining animals, based on unbalanced and costly concentrates and straw rations, not only affects the cost of production but also decreases the production possibility and health conditions. Cost of production can conveniently be reduced to a very great extent when green forages are fed at an optimum level, and the balanced concentrate mixtures fed at the necessary level only as a supplementary feed depending on the production level.

More attention and care should be given to rearing and raising of young stock, with particular consideration to the feeding of suckling and weaned calves. Young stock must also be ensured an optimum supply of green forage. Similarly, beef and sheep production practices could be more developed and improved with inclusion of a desired quantity of green forage and liberal utilization of locally available agro-industrial byproducts. The prerequisite would be to ensure optimum availability of quality green forage in the daily feeding rations with consequent reduction in the amount of concentrates commonly fed to the animals.

3.1.1 Animal health services

The highly unsatisfactory position regarding the availability of animal health services needs urgent action. No major livestock developmental programme can be envisaged without adequate veterinary support services.

Since the present situation results largely from an acute shortage of trained personnel, the Government should take all possible steps to get an adequate number of people trained in veterinary science both at graduate and technical levels.

3.2 FORAGE AND PASTURE DEVELOPMENT

To make dairy production an economic proposition, it is estimated that approximately 50 kg of green fodder should be ensured per animal per day. Taking into consideration the forage production possibility under local conditions on irrigated land, at least 0.2 ha of land should be earmarked for forage production per dairy cow. About 40% of the allocated land should be under alfalfa and the remaining 60% under a three-crop forage rotation. This would ensure about 18 to 19 t of green fodder (fresh, ensiled or hay) equivalent per year.

To enable a rational forage feeding programme to be followed throughout the year, provision of silage and hay in the feeding schedule is essential. Proper methods of ensiling and hay making should be developed to suit the local conditions.

To maintain balanced and economic production practices throughout the year, stock-owners must be encouraged to introduce intensive forage crop rotation programmes ensuring availability of sufficient green forage, hay and silage in the feed ration considered essential for optimum production performance.

In addition to introducing optimum forage supply, maximum use must be made of locally available agroindustrial byproducts (e.g. citrus and carob pulps, urea, molasses, poultry litters and droppings) as a component of feed rations for both dairy and meat animals.

3.3 ECONOMICS

The present feeding cost of a litre of milk produced under the traditional feeding practice exceeds the marketing price of the milk. To make milk production a profitable venture, forage production and conservation must be developed along with utilization of agroindustrial byproducts; this could cut the feeding cost by more than 50%.

To ensure a steady marketing support, milk collection, processing and marketing organizations should be intensified and expanded. Such marketing support would encourage the farmers in their animal production activities.

The Animal Production Office should organize and develop the infrastructure and extension services considered essential for assisting the farmers in adopting improved and efficient production practices. They should also provide the stock-owners with technical know-how regarding cultivation, fodder production and conservation feeding standards, preparation of balanced and cheap feeding rations and other practices.

3.4 TRAINING

So that livestock developmental programmes can be pursued in a more profitable manner, the prerequisite would be to train a large number of personnel in the different disciplines of animal science - including marketing, extension services and cooperatives. The American University, Beirut, is in a position to provide such educational and training facilities and the Government should encourage more people to join such courses by providing financial support if necessary. The possibilities of establishing additional training centres with the assistance of external help should be explored. The Government should also take the maximum advantage of bilateral and multilateral assistance, and should keep more liberal provision for the training of national staff under the assistance obtained through international organizations.



[Faint, illegible text, likely bleed-through from the reverse side of the page.]

Appendix 1

PROJECT STAFF

<u>Name</u>	<u>Function</u>	<u>Dates of Service</u>	
		<u>Starting Date</u>	<u>Finishing Date</u>
<u>FAO Staff</u>			
S. Bhattacharya	Project Manager (Animal Production Specialist)	March 1974	February 1976
A.W. Mourzi	Forage and Rangeland Specialist	January 1974	February 1976
U. Grieb	Animal Production Economist	October 1974	February 1976
F. Horszczaruk	Animal Production Officer (Nutrition)	July 1975	February 1976
<u>National Counterpart Staff</u>			
I. Accaoui	Project Co-Manager	March 1974	February 1976
N. Sultan	Dairy Production Specialist	March 1974	February 1976
G. Akl	Forage Specialist	January 1974	February 1976
S. Nemr	Animal Production Economist	October 1974	February 1976
A.H. El Mohammed	Animal Production Officer (Nutrition)	July 1975	February 1976

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام

Appendix 2

FELLOWSHIPS

A. Already proposed

<u>Name</u>	<u>Subject</u>	<u>Location</u>	<u>Duration</u>
I. Accaoui	Intensive meat production and feedlot management	U.S.A. and Argentina	4 months
N. Sultan	Intensive milk production and processing	U.K. and Bulgaria	4 months
G. Akl	Pasture and fodder development and conservation	U.K. and Italy	4 months
S. Nemr	Animal production economics and marketing	U.K. and Czechoslovakia	4 months

B. Not yet proposed

Animal nutrition and feed analysis	U.K.	4 months
Animal health	France	4 months
Farm accountancy and farm book-keeping	France	3 months

Appendix 3

LIST OF EQUIPMENT

	<u>Item</u>	<u>Quantity</u>	<u>Price</u> <u>(US\$)</u>
A.	<u>Agricultural Equipment</u>		
	Massey-Ferguson 165 agricultural tractor	1	8 730
	Massey-Ferguson corn planter with fertilizer attachment. Type MF 40-11	1	1 890
	Massey-Ferguson seed drill. Type MF 34-7	1	2 875
	Howard rotavator. Type E 50	1	1 838
	Massey-Ferguson 32-7 rear mounted mower	1	1 109
	Massey-Ferguson baler. Type MF 15-8	1	6 439
	Maize chopper. Type FM 2H	1	3 980
	Howard rotavator. Type E 50	1	1 550
B.	<u>Laboratory Equipment</u>		
	Laboratory glass washing machine with spare parts	1	3 905
	Calculator Facit CAI-13 110/50	1	162
	Calculator Olivetti D-26 60 cycles	1	450
C.	<u>Office Equipment</u>		
	Olivetti typewriter 35 cm, French	1	160
	Olivetti electric 110/220-50 46 cm/FAO	1	370
D.	<u>Vehicles</u>		
	Dodge van, Model B/200 (1975)	2	12 129
	Peugeot 404 commercial type	1	3 468
	Peugeot 504 family	1	3 468
	Peugeot 504	1	

Appendix 4

FEEDING STANDARDS AND FEEDING SCHEDULE

A4.1 Feeding standards for rearing calves up to 6 months of age

Age		Average body weight (kg)	Average daily gain (kg)	DM (kg)	DP (g)	SFU	Ca (g)	P (g)
(days)	(weeks)							
0 - 4		35	0.5					
5 - 14	1 - 2	40	0.4	0.7	165	1.12	15	12
15 - 28	3 - 4	50	0.4	0.9	190	1.12	15	12
29 - 42	5 - 6	60	0.4	1.1	205	1.16	15	12
43 - 56	7 - 8	65	0.4	1.6	225	1.56	15	12
57 - 70	9 - 10	75	0.5	2.4	280	2.30	16	13
71 - 84	11 - 12	80	0.6	2.8	330	2.68	16	13
85 - 98	13 - 14	90	0.6	3.1	315	2.70	16	14
4 - 5 months old		100	0.7	3.7	390	3.20	16	14
5 - 6 months old		120	0.7	4.1	420	3.40	16	14

A4.2 Feeding standards for growing and adult productive cattle

Type of animal	Average production	DM (kg)	DP (g)	SFU	Ca (g)	P (g)
Dairy cows	5 - 7 kg of milk	10-14	580	6.28	31	19
	- 10 kg of milk	11-15	730	7.44	38	27
	- 15 kg of milk	12-16	1 030	9.76	51	38
	- 20 kg of milk	13-17	1 330	12.08	64	48
	- 25 kg of milk	14-18	1 550	13.80	75	53
	- 30 kg of milk	14-19	1 715	15.00	82	58
	- 35 kg of milk	14-20	2 015	17.30	90	63
Dry cows		11-15	737	7.44	38	27
Pregnant heifers:	0 - 6 months	10-12	800	7.70	30	25
	7 - 9 months	11-14	900	8.60	30	25
Young stock:	7 - 9 months	7- 7	560	4.70	16	15
	10 - 12 months	6- 8	620	5.60	16	15
Breeding bulls		10-12	800	6.90	56	40

A4.3 Proposed feeding schedule based on limited forage (production and feeding)

Type of animal	Feed	Amount fed (kg)	DM (kg)	DP (g)	SFU	Ca (g)	P (g)
Dairy cows (15 l of milk)	Green forage	30	7.2	720	5.4	69.0	15.0
	Concentrates	4	3.6	535	3.7	4.3	36.0
	Tibben 1/	3	2.7	9	0.9	4.5	1.9
			13.5	1 264	10.0	81.8	52.9
Dry cows	Green forage	30	7.2	720	5.4	69.0	15.0
	Concentrates	2	1.8	268	1.8	2.1	18.0
	Tibben 1/	3	2.7	9	0.9	4.5	1.9
			11.7	997	8.1	75.6	34.9
Pregnant heifers	Green forage	30	7.2	720	5.4	69.0	15.0
	Concentrates	2	1.8	268	1.8	2.1	18.0
	Tibben 1/	3	2.7	9	0.9	4.5	1.9
			11.7	997	8.1	75.6	34.9
Young stock	Green forage	15	3.6	360	2.7	34.5	7.5
	Concentrates	2	1.8	268	1.8	2.1	18.0
	Tibben 1/	1	0.9	3	0.3	1.5	0.7
			6.3	631	4.8	38.1	26.2
Bulls	Green forage	30	7.2	720	5.4	69.0	15.0
	Concentrates	2	1.8	268	1.8	2.1	18.0
	Tibben 1/	2	1.8	6	0.6	3.0	1.4
			10.8	994	7.8	74.1	34.4

1/ Chopped straw.

A4.4 Recommended feeding schedule on the basis of optimum forage production and feedingA4.4.1 Cows and bulls

Cow/bull	Feed	Amount fed (kg)	DW (kg)	DP (g)	SFU	Ca (g)	P (g)
Dairy cows (5 - 8 l of milk)	Alfalfa, green 1/	10	2.4	350	1.7	40.0	6.0
	Corn, green or silage	20	4.8	240	3.8	14.0	10.0
	Concentrates	-	-	-	-	-	-
	Straw or barley hay	2	1.8	98	0.9	2.1	1.9
			9.0	688	6.4	66.1	17.9
Dairy cows (10-12 l of milk)	Alfalfa, green 1/	15	3.6	535	2.6	60.0	9.0
	Corn, green or silage	20	4.8	240	3.8	14.0	10.0
	Concentrates	1.5	1.4	175	1.4	1.6	13.5
	Straw or barley hay	2	1.8	98	0.9	4.2	3.8
			11.6	1 048	8.7	79.8	36.3
Dairy cows (15-16 l of milk)	Alfalfa, green 1/	20	4.8	700	3.4	80.0	12.0
	Corn, green or silage	25	6.0	300	4.7	17.5	15.0
	Concentrates	2	1.8	232	1.9	2.9	12.8
	Barley hay	2	1.8	98	0.9	4.2	3.8
			14.4	1 330	10.9	104.6	43.6
Dairy cows (20 l of milk)	Alfalfa, green 1/	20	4.8	700	3.4	80.0	12.0
	Corn, green or silage	25	6.0	300	4.7	17.5	15.0
	Concentrates	3	2.7	350	2.8	3.2	27.0
	Barley hay	3	2.7	147	1.2	6.3	5.7
			16.2	1 497	12.1	107.0	51.7
Dairy cows (25 l of milk)	Alfalfa, green 1/	25	6.0	870	4.3	100.0	15.0
	Corn, green or silage	25	6.0	300	4.7	17.5	15.0
	Concentrates	3	2.7	350	2.8	3.2	27.0
	Barley hay	3	2.7	147	1.2	6.3	5.7
			17.4	1 667	13.0	127.0	62.7
Dairy cows (30 l of milk)	Alfalfa, green 1/	30	7.2	1 050	5.1	120.0	18.0
	Corn, green or silage	25	6.0	300	4.7	17.5	15.0
	Concentrates	4	3.6	464	3.8	5.8	25.6
	Barley hay	3	2.7	147	1.2	6.3	5.7
			19.5	1 961	14.8	149.6	64.3
Dairy cows (35 l of milk)	Alfalfa, green 1/	35	8.4	1 235	6.0	140.0	21.0
	Corn, green or silage	30	7.2	360	5.7	21.0	18.0
	Concentrates	5	4.5	582	4.7	6.1	49.0
	Barley hay	3	2.7	147	1.2	6.3	5.7
			23.3	2 324	17.6	173.4	93.7
Pregnant dry cows	The same feeding rations as dairy cows giving 10 - 12 l of milk						
Breeding bulls	Alfalfa, green 1/	10	2.4	350	1.7	40.0	6.0
	Corn, green or silage	10	2.4	120	1.9	7.0	5.0
	Concentrates	3	2.7	350	2.8	3.2	27.0
	Straw or barley hay	2	1.8	98	0.9	4.2	3.8
			9.3	918	7.3	54.4	41.8

1/ or hay equivalent.

A4.4.2 Heifers

Age/condition of heifer	Feed	Amount fed (kg)	DM (kg)	DP (g)	SFU	Ca (g)	P (g)
6 to 7 months (average 10 kg body weight)	Alfalfa, green 1/	10	2.4	350	1.7	40.0	6.0
	Corn, green or silage	5	1.2	60	0.9	3.5	2.5
	Concentrates	1	0.9	116	0.9	1.4	6.4
	Straw or barley hay	1	0.9	49	0.4	2.1	1.9
				5.4	575	3.9	47.0
8 to 9 months (average 200 kg body weight)	Alfalfa, green 1/	10	2.4	350	1.7	40.0	6.0
	Corn, green or silage	10	2.4	120	1.9	7.0	5.0
	Concentrates	1	0.9	116	0.9	1.4	6.4
	Straw or barley hay	1	0.9	49	0.4	2.1	1.9
				6.6	635	4.9	50.5
10 to 12 months (average 250 kg body weight)	Alfalfa, green 1/	10	2.4	350	1.7	40.0	6.0
	Corn, green or silage	15	3.6	180	2.7	10.5	7.5
	Concentrates	1	0.9	116	0.9	1.4	6.4
	Straw or barley hay	1	0.9	49	0.4	2.1	1.9
				7.8	695	5.8	54.0
13 to 15 months (average 300 kg body weight)	Alfalfa, green 1/	10	2.4	350	1.7	40.0	6.0
	Corn, green or silage	20	4.8	240	3.8	14.0	10.0
	Concentrates	1	0.9	116	0.9	1.4	6.4
	Straw or barley hay	1	0.9	49	0.4	2.1	1.9
				9.0	755	6.8	57.5
First 6 months of pregnancy	Alfalfa, green 1/	15	3.6	535	2.6	60.0	9.0
	Corn, green or silage	20	4.8	240	3.8	14.0	10.0
	Concentrates	1	0.9	116	0.9	1.4	6.4
	Straw or barley hay	2	1.8	98	0.9	4.2	3.8
				11.1	989	8.2	79.6
Last 3 months of pregnancy	Alfalfa, green 1/	15	3.6	535	2.6	60.0	9.0
	Corn, green or silage	20	4.8	240	3.8	14.0	10.0
	Concentrates	2	1.8	232	1.9	2.9	12.8
	Straw or barley hay	2	1.8	98	0.9	4.2	3.8
				12.0	1 103	9.2	81.1

1/ or hay equivalent.

A4.4.3 Calf rearing

Age of calf (days) (weeks)		Feed	Amount fed (kg)	DM (kg)	DP (g)	SFU	Ca (g)	P (g)
0 - 4		Colostrum 3 x 1.5	4.5	-	-	-	-	-
5 -14	1 - 2	Whole milk	5	0.65	160	1.1	6.0	4.5
15 -28	1 - 4	Whole milk	6	9.78	192	1.3	7.2	5.4
29 -42	5 - 6	Whole milk	4	0.52	128	0.88	4.8	3.6
		Skim milk	3	0.27	102	0.33	3.3	2.7
		Concentrates and hay free access		+	+	+	+	+
				0.79	230	1.21	8.1	6.3
43 -56	7 - 8	Whole milk	2	0.26	64	0.44	2.4	1.8
		Skim milk	5	0.45	170	0.55	5.5	4.5
		Concentrates	0.5	0.45	75	0.45	5.2	3.0
		Alfalfa green wilted 1/	1.0	0.24	35	4.17	4.0	0.6
				1.40	344	1.61	17.1	9.9
57 -70	9 -10	Skim milk	5	0.45	170	0.55	5.5	4.5
		Concentrates	0.75	0.67	110	0.67	7.9	4.5
		Alfalfa green 1/	5	1.20	175	0.85	20.0	3.0
				2.32	455	2.07	33.4	12.0
71 -98	11 -14	Concentrates	1	0.90	150	0.90	10.5	6.0
		Alfalfa, green 1/	5	1.20	175	0.85	20.0	3.0
		Corn green or silage	5	1.20	60	0.95	3.5	2.5
				3.30	385	2.70	34.0	11.5
4 months		Alfalfa green 1/	5	1.20	175	0.85	20.0	3.0
		Corn, green or silage	5	1.20	60	0.95	3.5	2.5
		Concentrates	1	0.90	150	0.90	10.5	6.0
		Straw or barley hay	1	0.90	49	0.40	2.1	1.9
				4.20	434	3.10	36.1	11.4
5 months		Alfalfa green 1/	5	1.20	175	0.85	20.0	3.0
		Corn, green or silage	10	2.40	120	1.90	7.0	5.0
		Concentrates	1	0.90	150	0.90	10.5	6.0
				4.50	445	3.65	37.5	14.0

1/ or hay equivalent.

Appendix 5

FORMULAS FOR CONCENTRATE MIXTURES USED IN CATTLE FEEDING

A5.1 Concentrate mixtures for dairy cows, dry cows, pregnant heifers and breeding bulls

Ingredients	Quantity in kg/100 kg of the mixture or in %				
	Mixture No.1-A	Mixture No.1-B	Mixture No.1-C	Mixture No.1-D	Mixture No.1-E
Barley, ground	35	20	15	15	10
Corn, ground	15	10	10	-	10
Wheat, ground	-	10	15	15	10
Wheat, bran	40	50	50	60	50
Cottonseed cake ground or meal	10	10	10	10	10
Dry sugar-beet pulp	-	-	-	-	10
Cost P/kg of mixture	31.5	29.00	28.75	26.75	27.20

Add 0.5 kg salt and 1.5 kg limestone (well ground) per 10 kg of the mixtures.

A5.2 Concentrate mixtures for growing heifers (4 to 18 months of age) and young bulls

Ingredients	Quantity in kg/100 kg of the mixture or in %				
	Mixture No.2-A	Mixture No.2-B	Mixture No.2-C	Mixture No.2-D	Mixture No.2-E
Barley, ground	25	20	25	25	25
Corn, ground	10	15	-	-	10
Wheat, ground	-	15	15	20	-
Wheat bran	50	40	50	45	40
Cottonseed cake or meal	10	10	10	10	15
Groundnut meal	5	-	-	-	-
Sugar-beet pulp	-	-	-	-	10
Cost in P/kg of mixture	30.50	30.75	26.75	27.50	27.40

Add 1 kg salt and 1 kg limestone per 100 kg of the mixtures.

A5.3 Concentrate mixtures for rearing calves (3 weeks to 3 months of age)

Ingredients	Quantity in kg/100 kg of the mixture or in %			
	Mixture No.3-A	Mixture No.3-B	Mixture No.3-C	Mixture No.3-D
Barley, ground	30	25	20	20
Corn, ground	20	10	10	-
Wheat, ground	-	15	15	35
Wheat, bran	35	35	40	30
Linseed oil meal	5	5	5	5
Soybean oil meal	5	5	5	5
Groundnut oil meal	5	5	5	5
Cost in P/kg of mixture	34.0	35.2	34.2	34.3

Add 1 kg salt and 1.5 kg limestone per 100 kg of the mixtures.

Appendix 6

COMPARATIVE FEEDING COSTS PER KILOGRAMME OF MILK

Type of animal	Average daily milk production	Ration components	Average amount fed (kg)	Price (P/kg)	Cost of the ration (P)	Average cost of milk (P/kg)
(a) TRADITIONAL RATIONS						
Dairy cows (ration used by the farmers)	10	Concentrates	11	35	385	
		Green (hashish)	10	3	30	
		Straw	9	20	180	
		Total			595	59.5
(b) LIMITED GREEN FORAGE FEEDING						
Dairy cows (ration proposed)	10	Alfalfa green	10	4	40	
		Corn green or silage	10	4	40	
		Concentrates	4	32	128	
		Straw	4	20	80	
		Total			288	28.8
(c) UNDER OPTIMUM GREEN FORAGE FEEDING (RATIONS RECOMMENDED)						
Dairy cows	10	Alfalfa, green (or hay equivalent)	15	4	60	
		Corn green or silage	20	4	80	
		Concentrates	1.5	32	48	
		Barley hay	2	20	40	
		Total			228	22.8
Dairy cows	15	Alfalfa, green (or hay equivalent)	20	4	80	
		Corn green or silage	25	4	100	
		Concentrates	2	32	64	
		Barley hay	2	20	40	
		Total			284	18.9
Dairy cows	20	Alfalfa, green (or hay equivalent)	20	4	80	
		Corn green or silage	25	4	100	
		Concentrates	3	32	96	
		Barley hay	3	20	60	
		Total			336	16.8
Dairy cows	25	Alfalfa, green (or hay equivalent)	25	4	100	
		Corn green or silage	25	4	100	
		Concentrates	3	32	96	
		Barley hay	3	20	60	
		Total			356	14.2
Dairy cows	30	Alfalfa, green (or hay equivalent)	30	4	120	
		Corn green or silage	25	4	100	
		Concentrates	4	32	128	
		Barley hay	3	20	60	
		Total			408	13.6
Dairy cows	35	Alfalfa, green (or hay equivalent)	35	4	140	
		Corn green or silage	30	4	120	
		Concentrates	5	32	160	
		Barley hay	3	20	60	
		Total			480	13.7

Appendix 7

SILOS INTENDED TO BE CONSTRUCTED BY
THE FARMERS COOPERATING IN THE PROJECT

Type of silo	Dimension of silo (m)	Average silo capacity (t)	Silos required (number)
Chamber	1.8 x 1.5 x 6.0	10	28
Trench	2.5 x 2.0 x 8.0	35	26
Trench	3.0 x 2.0 x 15.0	75	10
Trench	3.0 x 2.0 x 20.0	100	3
Trench	5.0 x 2.0 x 20.0	200	7
Total number of silos required:			74

Construction materials required:

Total silo capacity (tons of silage)	3 370 t
Total volume of concrete for silo construction	1 800 m ³
Total amount of cement	600 t
Total amount of sand	900 m ³
Total amount of gravel	1 260 m ³
Boards (25 mm thickness) for construction forms	2.5 m ³
Beams (70 x 70 mm)	0.5 m ³

Appendix 8

FARM ECONOMICS QUESTIONNAIRE - LIVESTOCK PRODUCTION/CROP PRODUCTION

A. ITEMS TO BE RECORDED DAILY

<u>INCOME</u>	<u>Animal Production</u>	<u>EXPENDITURE</u>
<u>Sales and consumption</u>		<u>Expenses</u>
Milk and milk products		Fodder - straw
Eggs		- green
Slaughter animals		Concentrates
Changes in livestock		Veterinary costs
Animals - born/sold/died		Labour costs
Use of draught animals		Purchase costs
- hired (taken)		
- rented (given)		
	<u>Crop Production</u>	
<u>Sales and consumption</u>		<u>Expenses</u>
Fruit		Seeds and plants
Wheat		Fertilizer
Barley		Manure
Vegetables		Pesticides
Legumes		Tractor costs
Other		Machinery costs
		Transport
		Processing
		Irrigation
		Hired labour
		Family labour (hours)
	<u>Family labour and expenses</u>	
<u>Revenue from off-farm employment</u>		<u>Expenses</u>
		Food
		Housing
		Education
		Health
		Clothing
		Leisure
		Rent of land
		Interest on credit

B. EXAMPLES OF COMPLETED QUESTIONNAIRES

Example I

ACCOUNTS FOR ONE YEAR

SMALL FAMILY FARM NEAR TYRE, SOUTH LEBANON (0.40 ha IRRIGATED)

INCOME (LL)		EXPENDITURE (LL)	
1. <u>Animal Production (sales only)</u>		1. <u>Animal Production</u>	
Milk (6 300 kg x LL 0.534)	3 340	Concentrate	1 190
Manure (50 sacks x LL 1.50)	75	Straw (60 sacks x LL 15.00)	900
Slaughter animals (1 calf = 50 kg)	300	Veterinary costs	40
		Housing	200
Total	3 715	Total	2 330
2. <u>Crop Production (sales only)</u>		2. <u>Crop Production (excluding family labour)</u>	
Cucumber (9 800 kg x LL 0.30)	2 940	Seeds (1.5 kg x LL 35.00)	52
		Fertilizer (500 kg x LL 0.50)	250
		Pesticides (2 kg x LL 30.00)	60
		Animal traction	30
		Harvesting, processing, transport	150
Total	2 940	Total	542
3. <u>Revenue from Off-farm Employment</u>		3. <u>Family Expenses</u>	
Salary for 200 days	4 000	Food, clothes, etc.	6 840
Total	4 000	Total	6 840
		4. <u>Rent of Land</u>	
		Rent	400
		Total	400
TOTAL INCOME/YEAR	10 655	TOTAL EXPENSES/YEAR	10 112
	=====		=====
Total revenue (income)	10 655		
Total expenses	10 112		
Difference income/expenses		543	
Autoconsumption (estimated):			
Milk	550		
Vegetables	200		
Manure	75		
Total autoconsumption		825	

Note: The remuneration for family labour and management is included in the total farm family income.

SUMMARY

Total income comprises:

%	from
34.9	animal production
27.6	crop production
37.5	off-farm employment
100.0	

Total expenses comprise:

%	for
23.0	animal production
5.4	crop production
67.6	family expenses
4.0	rent of land
100.0	

Example II
 ACCOUNTS FOR ONE YEAR
 FAMILY FARM AT LABOUA (HERMEL) (TOTAL 8 ha/5 ha IRRIGATED)

<u>INCOME (LL)</u>		<u>EXPENSES (LL)</u>	
<u>1. Animal Production (sales only)</u>		<u>1. Animal Production</u>	
Milk (5 000 kg x LL 0.45)	2 250	Concentrate (1 800 kg x LL 0.40)	720
Honey (40 kg x LL 8.00)	320	Straw	600
Slaughter animals (2 calves x LL 600)	1 200		
Total	3 770	Total	1 320
<u>2. Crop Production (sales only)</u>		<u>2. Crop Production (family labour not included)</u>	
Apricots (20 000 kg x LL 0.50)	10 000	Apricots	3 865
Tomatoes (5 000 kg x LL 0.40)	2 000	Tomatoes	1 975
Green peas (5 000 kg x LL 1.25)	6 250	Green peas	2 770
Vegetable marrow (5 000 kg x LL 0.25)	1 250	Vegetable marrow	965
Eggplants (1 500 kg x LL 0.15)	225	Eggplants	130
Total	19 725	Total	9 705
<u>3. Revenue from Off-farm Employment</u>		<u>3. Family Expenses</u>	
Salary (LL 200/month)	2 400	Food	5 475
		Housing	600
		Education	3 200
		Health	1 000
		Clothing	2 500
		Travel, etc.	1 500
Total	2 400	Total	14 275
TOTAL INCOME/YEAR	25 895	TOTAL EXPENSES/YEAR	25 300
Total revenue (income)	25 895		
Total expenses	25 300		
Difference income/expenses		595	
Autoconsumption (estimated):			
Milk (2 500 kg x LL 0.45)	1 125		
Vegetables (200 kg x LL 0.40)	80		
Fruit (100 kg x LL 0.50)	50		
Total autoconsumption	1 255		

Note: The remuneration for family labour and management is included in the total farm family income.

S U M M A R Y

Total income comprises:

%	from
14.5	animal production
76.2	crop production
9.3	off-farm employment
100.0	

Total expenses comprise:

%	for
5.2	animal production
38.4	crop production
56.4	family expenses
100.0	

Example III

ACCOUNTS FOR ONE YEAR

FARM, LEBAA, SAIDA AREA (5.2 ha IRRIGATED LAND)

INCOME (LL)		EXPENSES (LL)	
1. <u>Animal Production</u> (sales only)		1. <u>Animal Production</u>	
Milk (25 200 kg x LL 0.60)	15 120	Concentrate (1 500 kg/month x LL 0.40 = = LL 600 p.m.); (600 x 12)	7 200
Slaughter animals (7 calves x LL 350)	2 450	Straw	2 500
		Green fodder	1 000
		Hired labour	2 400
		Housing costs	350
		Veterinary costs	200
Total	17 570	Total	13 650
2. <u>Crop Production</u> (sales only)		2. <u>Crop Production</u>	
Vegetables (2.6 ha)	9 500	Seeds	230
		Plants	535
		Tractor costs	540
		Irrigation costs	200
		Hired labour	1 500
Total	9 500	Total	3 005
3. <u>Revenue from Off-farm Employment</u>		3. <u>Family Expenses</u>	
Salary	5 000	Food	7 500
		Housing	420
		Health	100
		Clothing	2 500
		Other	1 200
Total	5 000	Total	11 720
		4. <u>Interest on Credit</u>	
		9% yearly on LL 10 000	900
		Total	900
TOTAL INCOME/YEAR	32 070	TOTAL EXPENSES/YEAR	29 275
	=====		=====
Total revenue (income)	32 070		
Total expenses	29 275		
Difference income/expenses	2 795		
Autoconsumption (estimated):			
Milk (1 800 kg x LL 0.60)	1 080		
Eggs (9 000 eggs x LL 0.25)	2 250		
Vegetables (400 kg x LL 0.40)	160		
Total autoconsumption	3 490		

Note: The remuneration for family labour and management is included in the total farm family income.

S U M M A R Y

Total income comprises:

%	from
54.8	animal production
29.6	crop production
15.6	off-farm employment
100.0	

Total expenses comprise:

%	for
46.6	animal production
10.3	crop production
40.0	family expenses
3.1	payment of interest
100.0	

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع العام