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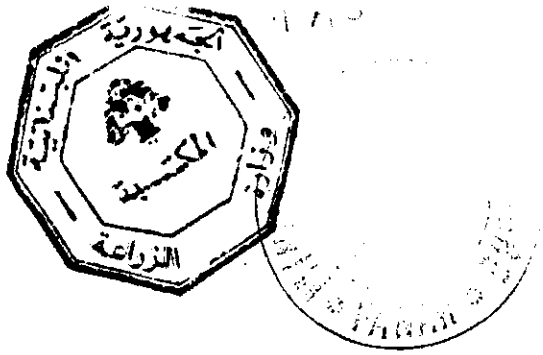

FORAGE PRODUCTION IN LEBANON AND POSSIBLE SOLUTIONS FOR ITS DEVELOPMENT

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September 1970

CHAPTER I.

INTRODUCTION

Lebanon is greatly dependent on import of animal products to feed its population. The scarcity of pastures and the limited availability of good forage during the whole year, constitute the major factors which limit the expansion of milk and meat industry in Lebanon.

As a result, one of the major policies of the Government is the development of forage production in order to increase milk and meat supply in the country.

The purpose of this report is to reveal in detail the current situation and problems of forage production in Lebanon and to suggest the possible solutions for its development.

CHAPTER II.

THE CURRENT SITUATION

1 - AREA OF GRAZING LANDS

Lebanon has an area of about 1,015,000 hectares with a population estimated in 1968 at some 2.8 millions.

The grazing area used for the feeding of animals has been estimated at about 885,500 hectares divided as follows:

54 % Natural ranges, forests, woodlands, undeveloped open land and barrens.
16 % Abandoned agricultural land.
2 % Cultivated with forage crops.
6 % Fallow lands.

2 - RANGE CONDITION

Most ranges of Lebanon are in poor condition and are characterized by unstable and eroding soils deficient in organic matter and fertility. Their vegetation consists of inferior species, mostly annuals. The expert noticed in his field trips that the spiny weed Poterium spinosum is dominating large areas of the ranges in South and North Lebanon.

The deterioration of such ranges is proceeding at an accelerated rate due to the following principal causes:

A- Improper stocking rate.
B- Improper season of grazing.

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3 - CULTIVATED FORAGE CROPS AND PASTURES.

According to the Agricultural statistics (1969), the area cultivated with forage crops in Lebanon in 1968, was estimated at about 17439 hectares (Table 1).

Table 1 : Area of forage crops in Lebanon
(Area in hectares)

Crop	North Lebanon	Mount Lebanon	South Lebanon	Bekaa	Total Lebanon
Legumes					
Chickpeas	500	110	424	1915	2949
Vetches	945	73	2198	2388	5604
Alfalfa	30	8	22	170	230
Other legumes	522	59	929	2956	4466
Cereals					
Maize	850	8	793	1375	3026
Sorghum	960	1	203	-	1164
Total area	3807	259	4569	8804	17439

It is clear from Table 1 that forage crops are cultivated on a very limited scale due to the belief that these crops are not competitive to other crops. Their production is insufficient to meet the requirements of the animals existing in the country.

Chick peas and vetches grown on non-irrigated lands, constitute about half of the area under forage cultivation. The production of these two forages is very low.

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Alfalfa occupied a diminutive area of about 230 hectares scattered in the four provinces mentioned in Table 1.

Improved pastures are non-existant in Lebanon. The only green forage crops given to animals are corn and vetches.

CONCLUSION

1 - Most ranges of Lebanon are in poor condition due to overgrazing and agricultural mismanagement.

2 - Forage crops are cultivated on a very limited scale.

3 - Alfalfa, as an important forage crop, is grown on 230 hectares only.

4 - Improved pastures are non-existant in Lebanon.

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CHAPTER III.

EFFECT OF SHORTAGE IN FORAGE PRODUCTION ON DAIRY AND MEAT INDUSTRY IN LEBANON

1 - EFFECT ON ANIMAL FEED

Reda (1970) stated that alfalfa is grown competitively with other crops on irrigated land in the Bekaa valley. The 230 hec. grown with this important forage crop yield 14,000 tons of green forage. This production is sold to owners of race horses at 4.5 Lebanese Piasters per kilogram; farm gate price. The dairy people can not afford to pay this price.

Owing to the shortage in forage production from ranges and lands cultivated with forage crops, the country has been obliged to import most of her animal feeds from different countries. The main feed imports are concentrates. Agricultural statistics(1966) revealed that the consumption of corn reached about 60,000 tons of which 58,000 were imported.

The value of feed import has been estimated at about 48,000,000 L.L. for 1968.

2 - EFFECT ON MILK AND MEAT PRODUCTION

The shortage in green forage production and the importation of most of the feed requirements at high prices have resulted in rising feeding costs. Helou (1970) found that the cost of imported feed represented an average of between 43 to 87 % of the total cost of feed per cow.

As a consequence, a number of milk producers were not able to face the profit squeeze and were forced out of business (Reda 1970).

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Because of this situation, the number of milk cows has steadily been decreasing. The number in 1964 was estimated at 38,000 animals while in 1968 it reached less than 30,000 animals.

The meat industry was also affected. There has hardly been any increase in animal meat production in recent years.

Saad (1970) stated that the total meat production from cattle sheep and goats increased only from an average of 4,800 tons to 5,300 tons between 1954 - 56 and 1964 - 66. This slight increase has been due to the increase in sheep and goat meat production.

3 - EFFECT ON MILK AND MEAT PRODUCTS IMPORTED IN LEBANON

A - Imported milk products : As the number of dairy cows is declining, ever-increasing amounts of dairy products are imported in the country to meet the local need of the population. Between 1956 and 1967 the country increased its imports of dairy products from about 70,000 tons to more than 173,000 tons.

The total import bill for dairy products increased from 15 to about 35 millions of Lebanese Pounds. These products are sold in the country at dumping prices.

Table 2 shows the quantity imported in the years 1956, 1966 and 1967.

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Table 2 : Imported dairy products in Lebanon
(in tons)

Dairy products	1956	1966	1967
Dried milk	3,430	51,960	53,574
Butter	13,980	42,540	57,096
Ghee	32,830	19,800	21,587
Cheese	18,680	37,120	41,025

B - Imported meat products : At the present time, the country is importing roughly four fifths of the local demand for red meat. Between 1956 and 1966 the total imports of red meat from live animals increased in quantity from 18,900 tons in 1956 to 29,300 tons in 1966, the total value increased from 24.4 to 94.7 millions of Lebanese Lires for the two years respectively (Saad 1970).

According to the United Nations estimates, the world prices of red meat are expected to rise even to higher levels by 1975 as the world shortage in meat production is expected to continue for at least the next ten years. It is estimated that in 1975 the demand deficit for meat in Lebanon would rise to about 40,000 tons.

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CONCLUSION

One of the main difficulties facing the development of milk and meat production in Lebanon is the low productivity of natural ranges and scarcity of land under forage production.

At the present time, most of the animal feed is imported at high prices. The ever increasing cost of feeding has created a profit squeeze for dairy and meat producers, forcing many of them out of business.

As a result, the country is greatly dependent on the import of animal products to feed its population.

The only solution to this problem is to increase the forage production in the country at considerably lower prices.

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CHAPTER IV.

POSSIBLE SOLUTIONS FOR THE INCREASE OF FORAGE AND FEED PRODUCTION IN LEBANON

The main solutions for the increase of forage and feed in the country consist of the following topics :

1 - Increase yields from lands now under forage cultivation.
2 - Expansion of forage cultivation on irrigated and rain-fed agricultural lands.
3 - Range improvement.
4 - The use of agricultural residue and by-products of agricultural industries as feeds.
5 - Forage conservation.

1 - INCREASE YIELDS FROM LANDS NOW UNDER FORAGE CULTIVATION.

In most countries, green forage is the cheapest source of animal feed. In Lebanon, the price of forage crops sold in the markets makes them uneconomical for dairy farmers. As indicated before, alfalfa is grown for sale to owners of race horses who can afford to pay 4.5 L.P./kilogram. The dairy people cannot afford to pay this price. At this price the gross revenue from alfalfa cultivation amounts to about 270 L.L. per donum which compares favourably with other crops ; 201 and 246 Lebanese Lires for vegetable and fruit respectively (Reda 1970).

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Reda (1970) stated that to secure the market of the dairy people, forage crops would have to be sold at substantially lower prices which can be achieved by doubling the present forage crop yields per hectare.

At present, agricultural statistics in Lebanon indicate that forage crops produce extremely low yields per hectare in comparison with other countries and the world average.

Raising yield per hectare for forage crops can be reached by:

A- Introduction of high yielding varieties of alfalfa, corn and other commonly cultivated forage crops.

B- Introduction of new forage crops not previously cultivated in the country such as red clover, Ladino clover, cocksfoot and ryegrasses.

C- Proper agricultural management of fertilizing, weed control and other agronomical practices.

D- Cultivation of mixed pastures of grasses and legumes.

In this connection, the expert would like to state that the result of experiments carried out with a mixture of Tetraploid Italian ryegrass and red clover proved to be successful. This mixture yielded nearly twice as much of that produced by alfalfa (El Moursi, 1969 B).

Trials to increase the production of alfalfa by its combination with orchard grass (Dactylis glomerata) and Tetraploid perennial ryegrass (Lolium perenne), and the introduction of new forage crops such as millets and sorghums are now being carried out by the expert in South Lebanon, North Lebanon and the Bekaa Province.

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2 - EXPANSION OF FORAGE CULTIVATION ON IRRIGATED AND RAIN-FED AREAS

Classes of agricultural lands which can be used for the expansion of forage cultivation are:

A - First rate agricultural land under irrigation: Intensive forage production as a cash crop on this type of land may prove to be more economical than other crops due to the lower initial investment and labour cost.

B - Cultivated land in tree crop production: Most of the land under fruit trees is usually left bare. This land can be cultivated with legumenous forage crops which, on the one hand benefit the trees with their nitrogen fixing bacteria, and on the other hand, produce an ample amount of livestock feed.

According to agricultural statistics (1969) the average area under citrus, olive and apple was estimated at about 11,500, 16,000 and 11,000 donums respectively.

C - Cultivated land now used for production of soil depleting crops:

The introduction of crop rotation with soil building forage grasses and legumes will be very beneficial in in areas cultivated with depleting crops, such as tobacco in South Lebanon and sugar beet in the Bekaa Province. At present, crop rotation is not usually practiced in Lebanon.

D - Areas irrigated recently with the Litani Dam Project in South Lebanon: The Litani Dam Project is now irrigating 2000 hectares. In the future, this project will cover 25,000 hectares.

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Most of the land benefiting by this project is characterized by a high percentage of calcium carbonate. Preliminary results obtained from experiments carried out by the expert in this area proved that the cultivation of certain varieties of forage crops is very successful.

E - Rain-fed area cultivated with unprofitable cereal crops: Wheat production in Lebanon in rain-fed areas is unprofitable. A high percentage of the estimated 68,051 hectares cultivated with wheat could be best used for forage production either as hay or permanent pasture.

F - Abandoned agricultural land in rain-fed areas: The abandoned agricultural land in Lebanon has been estimated at about 175,000 hectares. This land has the capability of producing considerable forage of grass and legumes.

3 - RANGE IMPROVEMENT

The principal causes of the deterioration of most of the ranges of Lebanon are overgrazing and improper season of grazing. To improve such ranges the following solutions are suggested:

A - Proper stocking rate: Sears (1965) stated that a reduction in grazing use of approximately 60 - 70% will be necessary to reverse the downward trend and affect substantial range improvement.

B - Proper season of use: Most grasses are considered especially susceptible to heavy use early in the spring. Protection from too much grazing at this time is essential in renewing the vigour of depleted ranges.

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C - Deferred grazing: Excluding livestock from part of the ranges during the grazing season is extremely beneficial to the vegetation of the deteriorated ranges.

D - Range fertilization: Usually moisture, not lack of fertility, is a limiting factor in range production. However, fertilizer can be added when initial soil fertility is very low.

E - Chemical control of undesirable plants: This method can be applied when grazing control has been achieved and a sufficient cover of grass species are present in the land to generate and fill the bare spaces left by the undesirable plants killed.

F - Range reseeding: Ranges which are very badly depleted must be reseeded artificially. Reseeding should be applicable where the chance of success is good. Success depends on knowing what to seed, when to seed, and how to seed economically.

4 - THE USE OF AGRICULTURAL RESIDUE AND BY-PRODUCTS OF AGRICULTURAL INDUSTRIES AS FEEDS.

There are large quantities of agricultural residue and by-products of agricultural industries in Lebanon which are wasted. Such wastage can be used as feed for animals and can replace a big part of the highly priced imported concentrates. A report forwarded by the expert to the Lebanese Government (El Moursi 1968), indicated quantities and suggestions for their use as animal feeds.

A - Agricultural residues :

a - The green tops of sugar beet grown in the Bekaa Province reaches about 30,000 tons per year.

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b - The green tops of ground nuts which are grown in North Lebanon on an area of about 2825 hectares.

c - Spoiled vegetables, fruit and other crops.

These agricultural residues can be prepared as feed for animals by drying or fermenting as silage.

B - By-products of agricultural industries

			Tons/year
a -	Flour mills:	Broken wheat grains	2,700
		Bran	47,000
b -	Oil mills:	Oil cakes	35,000
c -	Food canning factories :	Wasted vegetables and fruits.	1,000
d -	Breweries:	Malt	700
e -	Sugar beet factory:	Dry beet bulb	4,000
		Molases	3,000
f -	Slaughterhouse:	Blood	1,640
		Wasted meat	500
		Offals	1,000

5 - FORAGE CONSERVATION

The herbage surplus to the needs of the grazing animal can be conserved as hay or as silage. Conservation and grazing are integrated to the mutual benefit of summer and winter feeding.

Sears (1965) stated that the lack of experience in forage production in Lebanon is accompanied by lack of knowledge in proper methods of preservation. Techniques in both must be developed together, through demonstration and extension services, but production must be initiated first.

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In Lebanon, conservation must have an important part in any future forage livestock program.

A- Hay making is of limited value as an aid to pasture management for it is very much dependent on dry weather. Drying in early summer creates a peak in labour requirements.

To insure quick drying, herbage is usually cut at an advanced stage of growth which results in delayed recovery of the sward and a deterioration in the denseness and palatability of the sward for grazing purposes. The effect of haying on the botanical composition of the sward may be critical and careful management is required to remedy its effects.

B- Artificial drying can play a very useful part in grassland management, in that any surplus herbage can be conserved at an early stage. However, dryers have not become popular because of the relatively high cost of the product.

C- Ensilage is the best means of conservation; grass silage is less dependent than hay on prolonged dry weather and can be made at any time in the grazing season. As a result, ensilage can be practiced and spread over the season more easily than with hay.

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CONCLUSION

The development of both meat and milk production in Lebanon is dependent on the availability of cheap feed.

Increasing the forage supply at low prices can be achieved by improving yields of the present cultivated forage crops and by the expansion of forage cultivation on irrigated and rain-fed agricultural lands.

Range improvement by proper stocking and management would safely accomodate approximately the same grazing load as at present, plus the benefits of a higher animal nutrition level and effective soil conservation of the range land.

Forage conservation must have an important role in any future forage livestock program. Ensilage is the best means of coservation recommended for Lebanon.

The substantial quantities of agricultural residues and by-products of agricultural industries and slaughterhouses in the country can be used as animal feeds.

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CHAPTER V.

SUMMARY AND CONCLUSION

The present report indicates that the shortage in green forage production in Lebanon, due to low productivity of natural ranges and scarcity of land under forage production, has forced the country to import animal feed at high prices.

The ever increasing cost of feeding has created a profit squeeze for dairy and meat producers forcing many of them out of business.

The declining number of milk cows and the stagnation in animal meat production has made Lebanon greatly dependent on the import of milk and meat products.

Building up the milk and meat industry in the country rests essentially on the production of cheaper forage to substitute for high priced imported concentrates.

The report pointed out the possible solutions for the development of forage production in Lebanon.

The introduction of high yielding varieties of forage crops , locally grown or not previously cultivated in the country, is very essential to increase the forage supply.

The expansion of forage cultivation in first rate agricultural land under irrigation may prove to be economical over other crops due to the lower initial investment and labour cost. Land left bare under trees can be cultivated with legumes, which help soils with their nitrogen fixing bacteria living on their roots.

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CHAPTER VI.

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The inclusion of forage crops, particularly legumes, as a part of crop rotation with depleting crops such as tobacco in South Lebanon and North Lebanon and sugar beet in the Bekaa Province, will be very beneficial in building up the depleted soils.

Irrigation projects newly established in Lebanon, can help considerably in the expansion of forage cultivation. The Government is much concerned in expanding forage cultivation in the area benefiting from the Litani Dam Project in South Lebanon.

Abandoned agricultural land and land under unprofitable wheat production in rain-fed areas could be best used for forage production either as hay or permanent pasture.

The report also lays stress on range improvement. Proper stocking rate, proper seasonal use, and other recommended agricultural management, will be necessary to reverse the downward trend of the deteriorated ranges of Lebanon.

Forage conservation must have an important role in any future forage livestock program. Ensilage is the best means of conservation recommended for the country. Proper methods of preservation must be developed through demonstration and extension services.

The report revealed the importance of the agricultural residue and by-products of agricultural industries and slaughterhouses as feed for animals. Their considerable amounts will constitute an excellent substitute for part of the high priced imported concentrates and will help, together with the development of forage production, in the revitalization of the milk and meat industries in the country.