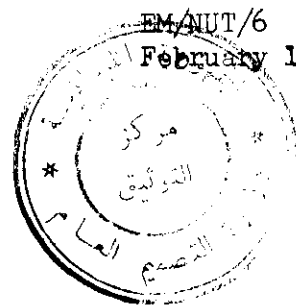


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FOOD HYGIENE AND FOOD CONTROL IN LEBANON
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by

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I. FOOD-BORNE DISEASES IN LEBANON

No statistics are available that will show the incidence of food-borne infections, parasitic diseases or cases of food poisoning. No doubt the incidence is considerable. It seems a safe estimate that 25 per cent of all cases of infectious disease—reported and non-reported are transmitted through the alimentary route. Some figures and information mainly originating from published and unpublished data, furnished by Dr. Emile Rizk, may throw some light upon the present situation.

Parasitic Diseases

1. Trichinosis.— This disease is endemic in Lebanon and of considerable importance to the Christian community comprising about fifty per cent of the total population. The food habits of this group include the eating of pork, mostly in the form of raw sausages which are being manufactured by local butchers. The first outbreak of Trichinosis reported in Lebanon occurred in 1894. The source is said to have been the meat of a wild boar. In about 1920 the French Mandate induced a rise in pig breeding. On the outskirts of Beirut some pig breeding establishments, exploiting garbage feeding, developed, and in 1939 a large outbreak of Trichinosis occurred in Beirut comprising more than 500 cases in humans, (B Saad: Presse Medicale, June 1940). Three thousand pigs from the garbage feeding herds were submitted to microscopical examination, and Trichinella were found in no less than 26 per cent. The parasite was also found in many rats caught at the garbage dump near the slaughterhouse of Beirut. In 1945 another outbreak with 36 cases was reported from a small village, Araya, 10 kms from Beirut, (Turquieh: La Trichinose en 1945, Revue Medicale Francaise du Moyen-Orient 1945), in 1951 a third outbreak was diagnosed in North Lebanon. Except for rats, the incidence of Trichinella in wild animals has not been investigated. The same applies to the incidence in dogs. Serial examination of human diaphragms from post-mortem up till now revealed 2 out of 50 positive.

2. Taeniasis.— A serial examination by means of the tape-slide technique for demonstration of ova of helminths in the perineal region showed the following percentages of positives in patients from policlinics. (Unpublished data by Dr. Rizk)

| | |
|----------------|------------|
| Taenia species | 19 percent |
| Ascaris | 18 " |
| Enterobius | 60 " |
| Trichiuris | 1.9 " |

Because ova of Cestodes only with difficulty can be differentiated microscopically, the reported Taenia species include T. saginata, H. nana and Dipylidium caninum, which are the three species of tapeworms usually found in humans in Lebanon. Taenia solium and Diphyllobothrium latum have not been found. Taenia saginata, the beef tapeworm, is by far the most common species which means that a large majority of the 19 per cent human tapeworm carriers actually are cases of Taenia saginata. The high incidence of Taenia saginata indicated by these findings corresponds to the fact that Cysticercus bovis is found in a high percentage of cattle slaughtered in Lebanon. In the slaughterhouse of Beirut with monthly

killings of about 1000-2000 heads of cattle an average of 10-15 heavily infested carcasses is said to be found each month. The writer, however, by inspecting at random 25 carcasses slaughtered in the Beirut slaughterhouse, found five with live *Cysticercus bovis* in the heart. This of course indicates that the incidence of *Cysticercus bovis* is and from all experience necessarily must be much higher than generally recognized.

3. Echinococcosis. - *Echinococcus* cysts are extremely common in lungs and liver of cattle and sheep slaughtered in Lebanon. Often the parasites are present in very large numbers, and it seems that the present practices of meat inspection and disposal of condemned materials by no means are suitable to prevent material containing fertile cysts from being removed from the slaughterhouse. Pipkin, Rizk & Balikion (*Echinococcosis in the Near East and its Incidence in Animal Hosts, Transactions of the Royal Society of Tropical Medicine and Hygiene, Vol 45, 1951*) report the incidence of *Echinococcus* cysts in slaughterhouse material from Beirut in 1949 as follows:

| | | |
|--------|------|------------------------|
| Cattle | 47 | percent cyst positives |
| Sheep | 6-11 | " " " |
| Camels | 67 | " " " |

Of the cysts found in cattle 37 per cent were fertile, whereas about 54-62 per cent of the cysts found in camels and sheep were fertile. Of 237 dogs examined 32.9 per cent harboured the corresponding tapeworm, *Echinococcus granulosus*. Human cases of *Echinococcosis* receiving surgical treatment in hospitals amounted to about 250 during a 15-year period. The actual incidence of the disease in humans is unknown but must be considerably higher than is indicated by the hospital records. The authors quoted remark "that the occurrence in certain areas such as Lebanon of a periodically heavy rate of canine infection - as high as 33 per cent - presents a reservoir of infection for man which is comparable with that seen in countries notorious for the disease (New Zealand, formerly Iceland). This suggests that human infection is possibly greater than previously supposed".

4. Distomatosis. - It may be interesting to note that ova of the common liver flukes, *Fasciola hepatica* and *Dicrocoelium lanceatum* are seen not too seldom in routine examination of stools from humans not harbouring the parasites. Obviously this is due to consumption of vegetable foods that have been exposed to faecal pollution from animals carriers. In slaughterhouses liver flukes are found in 10-20 per cent of cattle, goats and sheep.

Digestion of infective cercaria, especially from salads containing wild herbs, have resulted in a small number of *Distomatosis* cases in humans, giving rise to severe and protracted illness.

5. Amoebic Dysentery. - This disease is endemic in the country and a constant threat to people eating raw vegetables and fruits. Dr. Rizk gives the figure 21 per cent of faeces samples positive with *Entamoeba histolytica*.

Bacterial Diseases

1. Shigella-Dysentery, Typhoid and Paratyphoid are prevalent in the country and certainly underreported. Epidemic outbreaks of typhoid and paratyphoid mainly have been traced to unhygienic water supplies in the

rural areas, but as there is no or little control of carriers, there is an ever-lasting possibility of scattered cases spread through unhygienic conditions of handling of foods.

2. Acute Gastro-enteritis caused by Salmonella types from Animal Sources are common, the most common types being Salmonella typhi murium, Salmonella enteritidis and Salmonella cholerae suis. The present practices of meat inspection - not including bacteriological examination - offers little or no protection against transmission of Salmonellosis through meat products. Recently an isolated outbreak of Salmonella cholerae suis, occurring from consumption of swine liver, has been observed, causing one death and some severe cases. Repeated outbreaks of what is considered hog cholera and Salmonellosis in pigs have been noticed.

3. Streptococcal infections.- In the last days of July an outbreak of food-borne septic sore throat occurred among the students of the American University. More than 70 cases were reported during 28 and 29 July 1953, apparently all originating from the University milk bar. Epidemiological investigations pointed strongly towards ice cream as the vector of disease. The milk bar makes its own ice cream utilizing raw milk which reportedly is being boiled prior to use. It was not possible to determine how the ice cream had become contaminated with Streptococcus pyogenes humanus. Efforts to trace carriers among the personnel of the milk bar were being made. However, the massive outbreak of the epidemic points to a heavy infection which normally results not from secondary contamination from human sources but directly from a case of mastitis in a cow, produced by Streptococcus pyogenes humanus. It is quite possible that boiling of the milk in total or in part had been omitted. Bacteriological investigations of milk were started too late and, due to lack of a milk control system, it was not possible to trace the source of milk supply back to any specific herd or group of herds. Therefore nothing could be done in an attempt to trace the possibly infected milking cow.

The case illustrates very well the dangers involved in an uncontrolled and unsupervised city milk supply system where the consumer's only line of defence is to boil the milk himself prior to consumption. It is not known - but it seems likely - that the epidemic also involved cases outside the university campus.

4. Brucellosis.- Cultural examination of milk samples collected from about 1600 cows and goats in various parts of Lebanon and Syria picked a total of 14 strains of Brucella, of which 10 were from Lebanon (4 Brucella abortus from cow milk and 6 Brucella melitensis from goats milk). Whey-agglutination tests performed with the same material gave 17-18 per cent positive cows and goats together, indicating that 17-18 per cent of the animals tested carried Brucellosis. (A Survey and Bacteriological Study of Brucellosis in Selected Parts of Lebanon and Syria - by L. Azoury, Thesis 1948). It is no place here for a critical evaluation of this work but this proves beyond doubt that Brucellosis, both Brucella abortus and Brucella melitensis, is present within the country, and that the bacteria may be found in milk of goats and cows. Whether the results of the whey-agglutination tests are a true indication of the incidence of the disease in Lebanese live stock is open to comments. With an overall rate of infection of 17-18

percent there ought to have been more positive cultures. It seems that about 50 percent of the positive whey-agglutination tests showed only low titres (not exceeding 1 - 10). The Veterinary Service has no information on the disease, only states that Brucella has been demonstrated in an aborted foetus of a cow, belonging to a herd near Sidon. Milk from this herd is being delivered to Beirut. Following this finding, Strain 19 vaccination was applied to all adult animals of that herd. Milk from this particular herd gave throughout strong positive reactions when tested by means of the Brucella abortus Milk Ring Test. Moreover the writer, thanks to the kind cooperation of the Lebanese Veterinary Service and of Dr. Beechwood of Point Four Administration, had an opportunity to perform ring tests on milk samples from Angar village, covering about 300 milking cows. Danish hematoxylin stained antigen was used for these tests. The results were all negative, indicating that the herds of the Armenian village of Angar, from where milk is being sent to Beirut, are free from Brucellosis.

5. Bovine tuberculosis.-- Very little is known about the occurrence of tuberculosis in live stock in Lebanon. Dr. Asmar, Chief of Veterinary Service, however, about a year ago, performed tuberculin tests on about 300 cows in the above-mentioned Armenian village of Angar and found 49 percent reactors. Some cases were confirmed by slaughtering at a nearby slaughterhouse. This is a frighteningly high incidence. Most of the cattle slaughtered in the slaughterhouses are not dairy cows from Lebanon itself, but range cattle and bulls imported from Syria and Turkey, and in this material tuberculosis is but rarely found. The writer did not observe any case himself and finds the information available insufficient to judge the importance to public health of this disease. If the figures from Angar are representative of Lebanese dairy cattle, the importance would be considerable.

6. Leptospirosis.-- Leptospira icterohaemorrhagiae and Leptospira canicola have been identified, and there is reason to believe Leptospirosis to be quite widespread among dogs. Very likely, the disease will occur among other animals (goats).

7. Bacterial food poisoning.-- The enterotoxic type of food poisoning, caused by staphylococci and probably other bacteria as well, is a serious problem and cases are numerous. The sources may be any type of prepared food, but source number one seems to be fresh white cheese prepared from goat milk and probably also from sheep milk. In a paper by A. Berberion: L'Empoisonnement par le fromage en Syrie et au Liban, (Revue Médicale Française du Moyen-Orient, 1945) cheese poisoning is described as by far the most common type of food poisoning in Syria and in Lebanon. In two cases submitted for bacteriological examination, staphylococci were found in both in amounts of some hundred millions per gram of cheese. Dr. T.M. Sarah, Municipal Medical Officer of Batroun, confirmed that cheese poisoning is a well known and rather frequent disease that may cause very severe symptoms including collapse. Formerly it has been suggested that the cause of this cheese poisoning was a metallic poisoning originating from utilization of copper vats for holding the milk during processing, or the ingestion by the goats of some poisonous plant growing in the mountain fields during spring and summer months. In fact this latter theory has led to an official ban on production and sale of fresh goat milk cheese during spring and summer months. This

regulation, however, cannot be enforced, and people are still eating cheese and suffering from food poisoning. Locally the cheese is known by the name of "Djubni Khadra", and in fact the production of cheese is the only way in which milk from flocks of goats high in the mountains can be preserved and put to use for human consumption. The primitive conditions and lack of transportation facilities prevent the delivery of fresh milk, so the herdsmen living with the flocks of goats turn their surplus of milk into cheese as a matter of routine. The process of production is described as follows: the milk is heated to a lukewarm temperature and dried stomach mucosa of a young goat (natural rennet) is added to the milk wrapped in a piece of cloth. After 4 - 5 hours the milk has clotted, and the coagulum is pressed into balls of cheese that are eaten either fresh or after preservation in salt water, dry salt or oil. This procedure of course involves ample opportunities for the development of staphylococcus enterotoxin. The staphylococci may be added to milk either through contamination from human carriers of staphylococci, or they may originate from cases of staphylococcal mastitis in the goats. As is well known from other countries staphylococci are the usual cause of mastitis in goats and cases of staphylococcal food poisoning have repeatedly been traced back to that source. It should also be noted that staphylococci tolerate high concentrations of salt and will grow even in media containing 6 per cent salt.

II. COMMENTS UPON THE PRESENT SYSTEM OF INSPECTION AND CONTROL OF FOOD IN LEBANON

Government Activities

According to the system inherited from the French Mandatory Government, food inspection and food control activities have been divided between three different ministries: the Ministry of Health, the Ministry of National Economy and the Ministry of Agriculture. Until recently, however, no attempt had been made to define clearly by law the authority and responsibility of each ministry within this field. In principle, the Ministry of Health is supposed to be responsible for sanitary inspection of food establishments and for hygienic standards of all foods and milk. The Ministry of Agriculture, through its Department of Veterinary Service, has carried the responsibility for meat inspection in slaughterhouses, and the Ministry of National Economy through its Department for Consumers' Protection (Repression des Fraudes) has been responsible for control of adulterations and chemical composition standards of all foods and milk. Lack of clear rules and practices has caused certain difficulties and overlapping of services. About half a year ago the Cabinet decided to issue a number of decrees redefining the functions of various ministries. As for the Ministry of Health, its functions are outlined and defined in public health decree No.24 of 5 February, 1953.

It must be noted that the ministries and government departments dealing with food control, besides holding administrative authority over this field, are carrying also to a large extent the actual executive functions in food control by means of government personnel. With the exception of the Municipality of Beirut, local authorities (Municipalities) practically

are engaged only in meat inspection, while all other activities of food control and food inspection are carried out by government departments and government personnel. A decentralized system of food control, based upon local health laws and local health units seems premature at the present stage of administrative development in the country at large.

The Ministry of Health. In the Ministry of Health, two sections are dealing with food hygiene and food control: section of sanitation and section of laboratories and research.

Section of Sanitation. is headed by a sanitary engineer. According to public health decree No. 24, it holds authority and responsibility over environmental sanitation such as water supply, sewage and garbage disposal, beaches and swimming pools, housing, cemeteries and production and transport of foods, milk sanitation and sanitary inspection of restaurants. It is supposed to have a staff of sanitary inspectors to carry out sanitary inspections in all parts of the country and to collect samples of foods etc. for examination in the public health laboratory of the section of laboratories and research. Concerning meat and milk, the section of sanitation must cooperate with the department of Veterinary Services of the Ministry of Agriculture. So far, however, no agreed practices for this cooperation exist. The Ministry of Health used to employ eighteen sanitary inspectors, but this service now is in a process of reorganization as it has been decided to replace the old personnel by new inspectors that should be graduates of the American University's sanitarian course. This course is now under way.

Section of Laboratories and Research. This section is headed by a medical doctor who has had a course in public health at Harvard University. At present the government has no laboratory facilities of its own; so the samples which the ministry wants to have examined are sent to the laboratories of the French School of Medicine. The head of the Section of Laboratories and Research returned to Lebanon in 1951 after studies abroad and since then has been making preparations for a central public health laboratory which the Government is planning to build in Beirut. Technical Cooperation Service, Point Four, has allocated 135,000 dollars for the establishment of this laboratory. Supplies are being purchased, and actual construction is expected to start in October-November this year. According to public health decree No. 24 of 5 February, 1953, the public health laboratory should undertake diagnostic bacteriological, parasitological, chemical and hematological examinations of clinical material from government hospitals and dispensaries, the production of sera and vaccines, sanitary chemistry and the examination of water, foods and milk. Besides the central public health laboratory in Beirut, it is planned to establish four district public health laboratories, one in each of the four administrative districts of Lebanon: Mount Lebanon, Becca, North Lebanon and South Lebanon. The district laboratories are to be located at government hospitals. It seems however, doubtful, whether in a foreseeable future qualified staff can be found for all the laboratories, and even for the central laboratory the country will have to depend upon fellowships from Point Four and possibly technical assistance from WHO.

When this system of government laboratories is completed, the Government's contract for laboratory examinations with the French School of Medicine and private analytical laboratories will be ended.

With its staff of sanitary inspectors in a process of reorganization and its section of laboratories and research still in the planning stage the Ministry of Health at the moment hardly can be expected to be operating a regular food inspection and control programme. In fact, as will be mentioned

later, the most extensive food control programme in the country for the time being is run by the Ministry of National Economy (Repression des Fraudes).

The Ministry of Agriculture. Meat inspection is a municipal service executed by municipal veterinary officers or by lay municipal inspectors that in doubtful cases are supposed to call upon district veterinary officers or municipal medical officers; but the Ministry of Agriculture, Department of Veterinary Service, has the authority to issue regulations on meat inspection and to supervise the service. In milk control the Ministry of Agriculture, Department of Veterinary Service, is supposed to cooperate with the Ministry of Health. For the time being, however, such cooperation does not exist, as there is no regular milk control working except for chemical control for adulterations.

The veterinary personnel in Lebanon comprises nine or ten veterinarians, all of them in government or municipal service:

| | |
|---|---|
| Government district veterinary officers | 4 |
| Government veterinary laboratory, Beirut | 1 |
| Central administration, Beirut | 3 |
| Municipal veterinary officers, (Beirut, Tripoli) | 2 |

The district veterinary officers - one for each of the four districts of Lebanon - have an office in their district, at which farmers can, free of charge, call for help (including vaccination) against infectious disease. Recently four jeeps were provided for this service by Point Four. Before that the veterinarians did not have their own means of transportation. Regular veterinary practice hardly exists as farmers show no inclination to call veterinary assistance to sick animals and pay for drugs and treatment themselves. Three veterinarians (the municipal veterinary officers of Beirut and Tripoli and one district veterinary officer) are regularly engaged in meat inspection work.

The Ministry of National Economy. The Department of Consumers' Protection within the Ministry of National Economy is divided into three sections: 1) Section for Weight and Measure. 2) Section for Price Control. 3) Section for Food Control (Repression des Fraudes). The department has a district office in each of the four administrative districts and one in Beirut. Each office has a leader, a clerk and two controllers who inspect shops and factories and collect samples for laboratory examination. Apart from this staff, the department has at its disposal a special detachment of 15 policemen that can be directed to go by car to any part of the country for inspection and sampling, whenever special assistance is needed. Besides sampling of foods offered for sale in the local market, the department also examines imported goods to see that composition and quality standards comply with legal standards, before the consignment is being released from customs.

The department has a contract for laboratory examinations with the French School of Medicine which makes the analyses at a fixed price per sample, (at the moment seven L.P. per sample). The reports from the laboratory list specified results of the various tests used, and give a final conclusion based upon the findings, as to whether or not the sample is in compliance with declaration and legal standards, where such standards exist - or else whether or not the sample can be accepted. With this guidance, the head of the department decides upon action to be taken. Consignments that

fail to pass the examination will be confiscated and the owner fined. According to present legislation the department administratively can impose fines from 50 up to 1000 L.P. Defendants have the right to appeal to courts that then will act upon the matter. Through the year of 1952, close to 3200 samples of various foods from the local market were submitted to laboratory examination. On top of this number comes an equal number of samples of imported goods from customs. The types of foods examined include: wine, liquor, lemonade, mineral water and other soft drinks, coffee, chocolate, flour, oils, fats, butter, cheese, lobbén, ice cream and fluid milk.

This food control system primarily is designed to control chemical composition, quality standards, adulterations and falsifications, poisonous components and the like. Fluid milk is examined for fat, specific gravity and solids non fat, and numerous cases of added water and skimming are found. In some respects, however, the control enters into the field of sanitary and hygienic food control. Ice cream, cheese, lobbén and soft drinks are submitted to bacteriological examinations, especially tests for coliform bacilli, but also more extensive bacteriological analyses covering indolpositive putrefying bacteria, enterococci and yeasts are used, for instance for cheese. According to the results of the bacteriological analysis, the products are classified as: "Produit normal" - "Produit suspect" - "Produit dangereux". Coliform bacilli are reported as number per litre. Hundred coliform bacilli per litre is classified as "suspect", and two hundred coliform bacilli or more per litre is classified as "dangereux". For milk products such as lobbén, ice cream and cheese this system of judgement must be considered extremely rigorous.

As a whole the system of sampling and registration employed by the department seems very satisfactory, and there is prevalent an energetic desire to tackle the problems in the best possible way. What is needed is: 1) a more modern legislation defining legal standards for foods where such standards are useful and discarding other standards that seem to be outdated or unnecessary. 2) better and more modern methods of laboratory analysis, 3) and last but not least, a different approach to the problems of bacteriological food examinations.

Bacteriological examinations judging the hygienic quality of foods cannot be managed in exactly the same way as chemical and physical examinations judging composition standards, quality grading and adulterations.

In the case of adulterations, mislabelling and false composition, the reasons for the faulty quality are so obvious that all that is needed is a laboratory examination of properly collected samples followed by punishment and legal action. In the case of bacteriological food control only people having experience and training in food bacteriology, epidemiology and food sanitation are in a position to evaluate the results and to determine what action should follow. The reasons for bacteriological contamination of foods generally are not so obvious that punishment and legal action are sufficient to correct the situation. Progress in this field is to be expected only when the laboratory results are used as a basis for a field inspection and advisory service that is able to assist producers, manufacturers and handlers of food in correcting their methods and practices according to sanitary and hygienic principles. In hygienic food control, everything depends upon a close cooperation between the laboratory and the field inspection service, and an intelligent utilization of laboratory methods to investigate field conditions. Automatic punishment is largely unjustified and useless, and legal action ordinarily

should be regarded as the last resort.

If the plans for a government public health laboratory, which should include a section for chemical and bacteriological food examinations, succeed, this would present an excellent opportunity to recondition the laboratory methods and the application of these methods, and to lay down a sound division of activities within the field of food control between the Ministry of Health and the Ministry of National Economy.

Municipal Activities

The city of Beirut. The city of Beirut, the capital of Lebanon, has a population of about 500,000 or between one half and one third of the total population of Lebanon. The municipality accordingly constitutes an administrative district of its own and, in certain respects, maintains an autonomous position. It has its own city board of health and a department of environmental sanitation, headed by a sanitary engineer. Moreover, it employs a municipal veterinary officer in charge of meat inspection in the municipal slaughterhouse. The department of environmental sanitation is dealing with the following subjects: 1) housing and plumbing. 2) food, milk and restaurants. 3) water and sewage. 4) classified establishments (industrial hygiene). 5) insects and rodents. 6) garbage and refuse. It employs a number of inspectors of whom four are dealing with food inspection. The city has no laboratory for food examinations. Samples are taken to the same laboratories as are samples collected by government agencies. It is said that food handlers (personnel in butcher shops and in restaurants) are required to submit a health certificate every three months. It seems however, that regular examination of stools for intestinal pathogens is made only occasionally in suspicious cases.

It should be mentioned that the Lebanese Public Health Association, a small group of Lebanese professionals in human and veterinary medicine and in sanitary engineering, with economic aid from Point Four, is operating a Demonstration Urban Health Centre in a small part of modern Beirut. The activities of this centre are localized in a part of Ras-Beirut around the American University, housing about 5000 people. The idea is to develop as a demonstration a sanitary urban community and to use this area for practical field training of university students in public health and sanitation. Among the measures taken are also intensified sanitary inspection of food establishments, grading of restaurants and regular health examination of food handlers.

Slaughterhouse meat inspection and meat hygiene. The municipality of Beirut as well as a number of other municipalities are operating municipal slaughterhouses and, except for Beirut, slaughterhouses and meat inspection are practically speaking the only items of food hygiene and food control in which the municipalities take an active part, leaving all other items a government responsibility to be carried out by government agencies as described earlier in this report. While other food hygiene and food control activities mean expenses, slaughterhouses and meat inspection are a source of revenue to the municipalities. The municipality collects a slaughterhouse fee or tax which for instance in Beirut at the moment, is fixed at the following rates per animal : sheep or

goats: 1,25 L.P., cattle: 4 L.P., calves: 2,25 L.P. Below is a list of the most important municipal slaughterhouses in Lebanon which the writer had an opportunity to visit, besides information on number of animals killed per day and the existing arrangements for a meat inspection service.

| Municipal slaughterhouse | <u>Animals killed per day</u> | | | <u>Meat inspection performed by:</u> |
|--------------------------|-------------------------------|---------------|-------------|--------------------------------------|
| | <u>sheep, goats</u> | <u>cattle</u> | <u>pigs</u> | |
| Beirut (popul.500,000) | 600-1000 | 50-100 | 5-25 | munic. vet. off. |
| Tripoli (popul.125,000) | 200-400 in total | | | munic. vet. off. |
| Zahle (popul.75,000) | 50-100 | 5-10 | | district vet. off. |
| Sidon (popul.80,000) | | ? | | non veterinary munic. inspector |

As already mentioned, it should be noticed again that the majority of animals killed in these slaughterhouses are not raised locally, but imported from Turkey and Syria. The weight of the dressed carcass of sheep averages 25 kg, and of cattle 50 - 125 kg.

Slaughterhouse construction. All slaughterhouses are constructed according to the same basic pattern. Building material is concrete or brick. Floors are concrete with deep gutters for drainage. Walls are covered with tiles or concrete finish. There is running water with cold water taps for washing of intestines and for flushing the floor. There is no overhead rail system to carry the carcasses, only primitive non-removable iron hooks. For those slaughterhouses located directly on the sea-shore, the sea breeze provides a good fresh air ventilation and does much to keep off flies and odour. Blood, water and intestinal contents are drained off directly to the sea. The slaughterhouse of Zahle, which is inland, has a septic tank with outflow to a small river. Usually there are two halls, one is for killing and dressing, and from there the meat is carried on the backs of the workers to another hall for inspection. There are no refrigeration facilities, and it is the general practice to carry away the meat immediately after inspection, and although many shops have refrigerators the meat to a very great extent is sold on the very same day on which the animals are slaughtered. There seems to exist a very strong preference for absolutely freshly slaughtered meat, there is no tradition for ripening or ageing of meat, so cold storage of meat is not a big problem with present practices.

Slaughterhouse practices. Killing is performed in the ritual way by bleeding without stunning. Inflation of air under the hide is generally used in the skinning of sheep, and the slaughterhouses have electrically operated air compressors with numerous outlets distributed on pipelines along the walls. There are no special rooms or equipment for gut dressing; this is done on the slaughterfloor itself. The butchers working in the slaughterhouses are generally highly skillful workers. Skinning and removal of viscera is performed quickly and without too much contamination despite the primitive and usually crowded working conditions. The carcasses are lifted and hung on the hooks by hand or by hand hoists. If no hoists are found, the carcasses of heavy animals

are parted while lying on the hide on the floor. No water and no cloths are used on the carcasses. The working operations, however, cannot be considered hygienically satisfactory primarily because of lack of facilities for keeping hands and instruments clean and because of lack of proper protective clothing.

Meat inspection technique. The meat inspection as far as observed by the writer is unsatisfactory. The personnel employed is too small to cope with the amount of work required. The slaughterhouse of Beirut, for instance, has only one veterinarian with one lay assistant. No official rules and instructions exist, and the government veterinary service does not carry out an effective technical supervision. Ante-mortem inspection is said to be performed. The following technique of post-mortem inspection of cattle was observed: lungs, heart and liver were inspected, but without examination of any lymph glands. In the heart, a slight superficial cut into the muscular tissue was made to look for *Cysticercus bovis*. Intestines, intestinal lymph glands, spleen and head including tongue were not inspected. On inspection of the carcass an incision was made in the subiliacal lymph glands and into the muscles of the abdominal wall and of the hind leg (musculus gracilis) to look for cysts. The inspection of about 30 animals was completed within about five minutes. No systematic examination of lymph glands is carried out and there is no effective system of identification of carcasses and viscera. The butchers display a serious lack of discipline in "trimming away" lymph glands, fatty tissues and odd pieces of muscles prior to inspection. Despite the high incidence of *Cysticercus bovis*, referred to earlier in this report, it appears that no regular inspection of the sites of election of this parasite is carried out. Consequently, it is not surprising that only very heavily infested carcasses will be discovered by the meat inspector. As a whole, it can be said that only very obvious pathological conditions are being considered, and numerous lungs and livers with Echinococcal cysts or Distomatosis are passed without notice.

Meat inspection statistics. Findings and condemnations are not reported as no records or statistics were seen to be kept. Nowhere incinerators or plants for utilization of by-products and condemned materials were to be found.

Disposal of condemned materials. Condemned carcasses and offal seem to be dumped without special precautions on the city garbage dumping grounds or elsewhere where dogs and other animals may have free access to the infective material. Sometimes a practice of burning in an open fire was claimed.

Transportation of meat from the slaughterhouse. In Beirut the carcasses and viscera are carried from the slaughterhouse to the butcher shops by means of trucks with covered beds equipped with hooks for hanging the carcasses. Viscera are packed in chip baskets. In principle this system could be considered satisfactory if the trucks were kept in a clean and sanitary condition.

The need for new slaughterhouses. Among the slaughterhouses mentioned above, the slaughterhouse of Tripoli in El-Mina was found the best. It was built by the British Army in 1942.

The slaughterhouse of Beirut is absolutely inadequate, and the municipal authorities for several years have been considering plans for reconstruction. Blueprints and drawings have been made, but financial considerations are holding up execution of plans. At a meeting with the Beirut city board of health on July 28, the writer was asked to express his views upon the matter and to review the existing plans for a new slaughterhouse. Following another meeting on July 31 with the sanitary engineer of the city the writer drew up his suggestions and comments in a letter to the chairman of the city board of health (letter to Dr. Dahan chairman, Municipal Board of Health, Beirut, dated 2 August 1953). The meetings and discussions were attended also by Dr. C.T. Beechwood, veterinary adviser of Point Four Administration in Lebanon.

Control of Trichinosis. From pigs killed in the slaughterhouse of Beirut, samples of muscular tissue are sent for microscopic examination to the veterinary laboratory in Beirut. The samples taken consist of a piece of pars costalis diaphragmatica, and the examination is performed simply by squeezing a small piece of muscular tissue between two ordinary microscopic slides and examining this preparation through the microscope. This practice must be considered inadequate and should be improved by adoption of the classical technique for microscopic trichinosis control. The proper sample for examination is a part of crura diaphragmatica because this muscle is number one among the sites of election for Trichinella spiralis. By using this muscle as a sample for examination, the chances of detecting Trichinella probably are increased by a hundred per cent. Moreover the examination of the samples should be performed in the regular way by means of a compressorium which allows the preparation and examination of 14 separate cuts from each sample. This equipment was found to be present in the laboratory.

Slaughterhouses in smaller communities. In smaller communities throughout the country, meat inspection (and collection of tax on slaughter) are carried out by lay municipal agents acting nominally under the supervision of municipal medical authorities and district veterinary officers. There are either small slaughterhouses or open air slaughterplaces. In many places obviously slaughterhouses are lacking, thus in Batroun the site of a former slaughterhouse on the sea-shore was inspected. The building had been completely destroyed by storm and high tides several years ago and never rebuilt. Fresh traces of blood and manure, however, showed that the completely wrecked site still was being used as a place of slaughter. In Jounic (popul. 15000) the old slaughterhouse was abandoned several years ago, but construction of a new slaughterhouse was stopped for some local reason, thus leaving the community without a slaughterhouse. In both places, the municipal medical officers expressed their interest in reviving the drive for bringing slaughterings back to orderly conditions.

III. MILK HYGIENE

The animal population of Lebanon is somewhat differently estimated by different authorities. No official census has been held. One estimate given by the department of veterinary service is as follows:

| | | |
|-----------------|-------|---------|
| cattle in total | about | 60,000 |
| milking cows | " | 6,500 |
| goats | | 500,000 |
| sheep | | 60,000 |
| buffaloes | | 5-600 |

| | | |
|---------|-------|-----------|
| pigs | about | 3000 |
| horses | - | 2000 |
| donkeys | - | 4-5000 |
| mules | - | 4-5000 |
| poultry | - | 1.5 mill. |

The total milk production is estimated as follows:

| | |
|--------------|-----------------|
| | per year (1949) |
| cows milk | 10 mill. litres |
| goats milk | 10 " " |
| sheep milk | 200,000 " |
| buffalo milk | 200,000 " |

Cows milk

Of the total number of milking cows about 15 per cent is estimated to be good type Damascus cows, the rest mainly cross-breeds (between Damascus breed and Dutch or Jersey breeds), or small primitive animals of local breeds (Munzer A. Khair, Agricultural School, American University of Beirut, 1953). Most herds are very small, 1-3 cows, a few have 10-30 cows. There is practically no pasture for cows; the cows are fed in pens. The main foodstuffs are "tibn" (what remains of grain crops after threshing), some clover or alfalfa hay, hay from wild grasses, and in some places concentrates (cottonseed, linseed, horse-beans, bran).

Hygiene of milk production. Most of the milking cows are kept under very primitive conditions. An agricultural student of oriental nationality at the American University describes in a study essay the conditions as follows: "being poor and of low standard of life most holders can ill afford the housing and sanitation which would be desired. Hence cows live in sheds or adobe brick constructions. The floor is usually dirt without litter. The urine and droppings are not removed periodically, the cows usually lying on their own droppings. The skin of the animals is dirty and it is not infrequent at all to see udders covered with manure. Sometimes, the herd is washed in a river or a pond. Ticks and lice are quite often found". Another study, also from the agricultural school, on sheep in Lebanon, after having described similar poor conditions of housing, gives the following interesting explanation:

"Reasons for lack of sanitation, the most important being lack of interest: the big herd owners feel too proud to do the work themselves, so they engage illiterate backward peasants who, in their turn, not being owners, care no more than the owners".

As is evident from these descriptions and the writer's own observations, the majority of milking cows at the moment are being kept under such conditions regarding management, housing, water supply and location that the most primitive foundations, upon which realistic hopes for the development of a hygienic milk production for city markets necessarily must be based, are missing. The writer has observed a few exceptions, for instance, two herds in the Sidon area and the Armenian village of Angar.

The two herds near Sidon are both located fairly close to the main road; there are primitive but usable milking barns with concrete floors, concrete milk cooling basins for keeping milk cans in ice water, and

a milk house could be added to the barns. The average daily milk production at present was 700 and 250 litres respectively with 34 and 16 milking cows. One of the herds, however, is affected with Brucellosis (confirmed by milk ring tests), and in the other several severe cases of mastitis were observed.

The Armenian village of Anger with a population of about 600 people has approximately 300 cows. Milk production in this village was introduced and organized several years ago by the Middle East Foundation and later by the Foundation for Armenian Refugees. A communal milk house was built in the village where the villagers deliver their milk immediately after milking in the morning and in the evening. The milk is cooled in a cooling basin with ice water, and every morning brought to Beirut by truck. The milk house is fairly well constructed; it has a good water supply and a room for cleaning of milking utensils. Maximum daily delivery of milk is about 1500 litres. Unfortunately it is in this village that tuberculin tests are said to have shown approximately 49 per cent reactors.

The milk from the three producers mentioned above is delivered to a dairy company in Beirut which is operating two small plants for pasteurization and bottling of milk. This company is daily selling about 1500-2000 litres of pasteurized, bottled whole milk in Beirut, besides cream, lebben and butter. It has vat-pasteurizers, surface coolers and primitive bottle washing and filling machines. Retail price for one litre of pasteurized, bottled milk is 75 piastres (3.7 per cent butter fat). Producer price is 39 piastres per litre plus transportation costs. Premiums are paid for milk that has more than 3.7 percent butter fat. This milk which is to be considered comparatively satisfactory constitutes only a few per cent of the total amount of milk sold in Beirut. The largest quantity is raw milk which originates from herds of cattle kept under primitive conditions in the surroundings and outskirts of the city. This milk is being distributed by street vendors and shops as loose milk measured from cans into customers' containers. The hygienic quality of this milk, without doubt, is very low, and adulterations (added water and skimming) are very common, as may be seen from the records of the Food Control Department of the Ministry of National Economy. The price of this milk is 60 piastres per litre.

How much disease actually is transmitted through milk and milk products is difficult to tell but various circumstances and practices help to protect the population and to limit the problem so that the situation can be tolerated apparently without too much trouble. First, several groups within the population are not accustomed to use milk in their diet at all; the largest quantity of milk is used for cooking purposes, and if used for drinking it is mostly in the form of lebben (soured milk) which ordinarily is produced from beiled milk. Secondly every housewife using milk will boil the milk immediately upon receiving it, because the keeping quality of the milk is so low that boiling is a practical necessity to keep the milk in a usable condition. There is, however, every reason to believe that low quality milk causes considerable trouble in feeding of infants, and, when the self-protection against contaminated milk fails, incidents like the angina epidemic at the American University, described earlier in this report, may easily occur.

Nevertheless, as long as uncontrolled sale of raw milk is permitted to continue, the majority of the population will refuse to pay a higher price for a safe and better quality pasteurized milk. For this reason, no changes are likely to occur unless forced by the authorities responsible for health and for agricultural production.

The possibilities of improvement. Except for the few herds mentioned that belong to a regular organization for marketing of liquid milk, it seems hardly possible to give any realistic suggestions for improving the hygiene of milk production under present conditions. If a work to improve the hygienic quality of the milk sold in Beirut (or other cities) is to be started, the first thing to do seems to be the establishment of regular dairy herds under agricultural conditions and formation of a sufficiently large organized group of producers. The second step would be the creation of a marketing organization and the establishment of a dairy plant that can contract with the milk producers and take over processing and whole sale distribution of the milk. The third step would be to outlaw sale of raw milk within the city as soon as enough pasteurization capacity is available to permit this step.

The milk preferably should be sold as bottled milk, but if economic considerations, as seems likely, are a hindrance to this, there is no reason why loose distribution of pasteurized milk cannot be established in a hygienically satisfactory way through properly designed milk shops with modern equipment for measuring milk into customers containers from closed cans kept under refrigeration (milkmeters). Bottling in itself does not exclude recontamination of pasteurized milk because it requires very good operational standards to maintain milk bottles and filling machines in a perfectly clean condition. Besides bottled milk could be allowed on a competitive basis so as to suit customers who insist on having the milk brought to their houses.

Goats and sheep milk. The majority of these animals are kept as wandering flocks in the mountainous areas, and their milk for the most part is turned into cheese. The question of feed poisoning from this cheese has been mentioned earlier in this report. When goats are being kept together with herds of milking cows their milk often is mixed into cows milk.

It seems obvious that the century-old practices of the nomadic or half nomadic shepherds herding the flocks of goats and sheep in the traditional eastern way and making the various milk products in the fields provide little or no basis for any developments in the field of milk hygiene.