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D00027



United Nations Industrial Development Organization

Distr.
LIMITED

ID/WG.28/9
17 February 1969

ORIGINAL: ENGLISH

Expert Group Meeting on Scientific Approaches to
the Problems of Preservation and Refrigeration of
Food in Developing Countries

Vienna, Austria, 24 - 27 February 1969

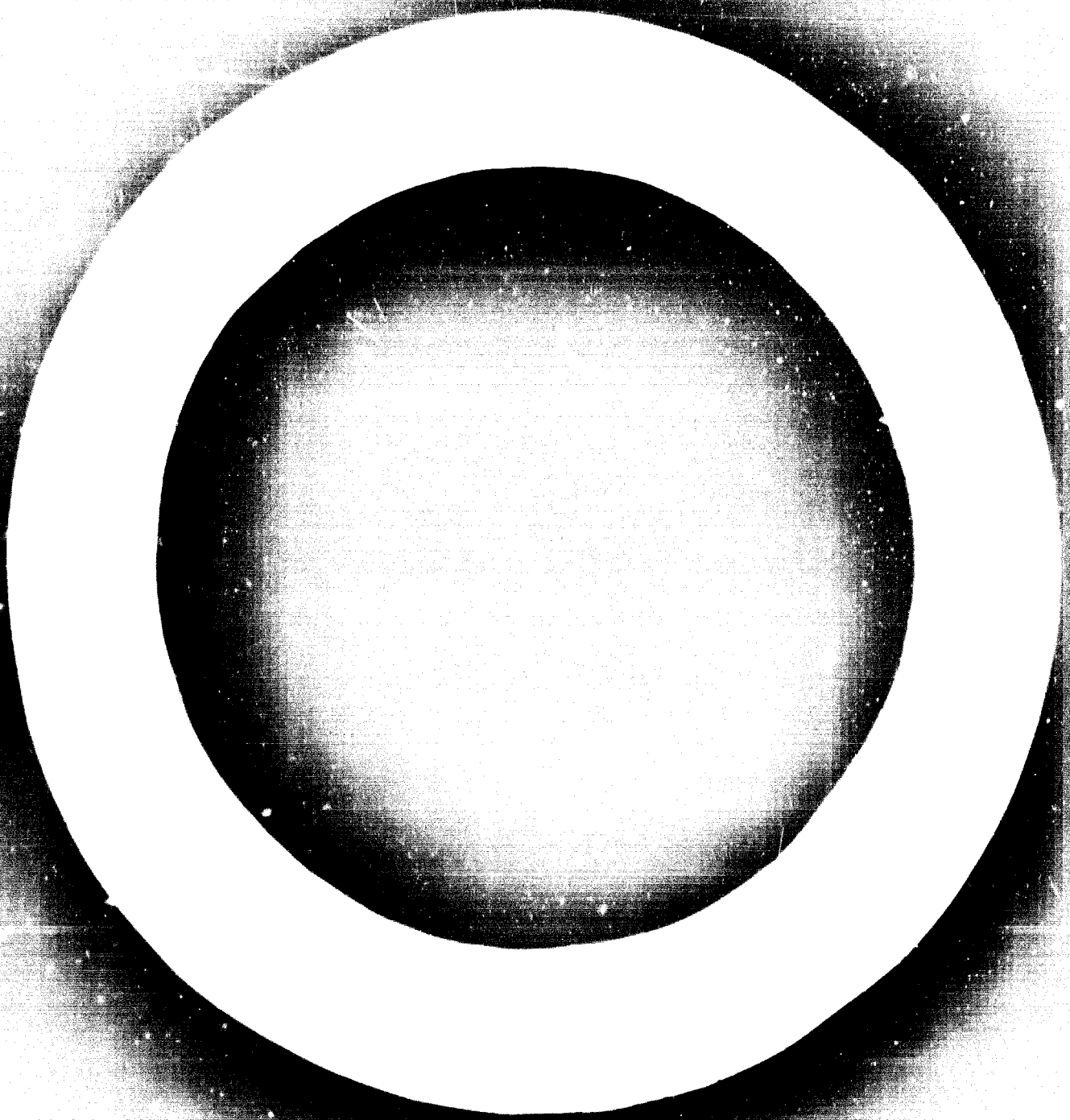
REFRIGERATING AND FREEZING MEAT IN
TROPICAL AND SUBTROPICAL COUNTRIES^{1/}

by

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1. Generalities

The freezing and refrigerating of meat is necessarily a valuable recourse to permit its transportation and preservation, as it was a century ago, the movement of meat conserved in its natural state was difficult and almost impossible between greater distances and, in particular, in respect to the countries of tropical and subtropical climates.

In developing countries the use of refrigeration and freezing is still very limited and as a consequence the grade of benefit and the meat quality commercialization are not acceptable.

In these countries, in some cases, the easy disposable of livestock doesn't make too obvious the importance of the maximum possible benefit of the cattle and therefore the most important factor in these countries, becomes the obtainment of meat itself and the limited or no interest at all for some valuable subproducts such as: blood, glands, skin and viscous. This defective utilization of cattle stock results in a destruction of the meat and makes the meat price in itself higher, aggravated by the lack of quality and adequate processes of enough and hygienic benefit as to justify the price that all consumers are paying for in these countries. It is very common to observe in developing countries how the blood, glands and viscous are wasted.

On the other hand, we have to bear in mind the usefulness that we can give to the industrial applications of the cold, as far as refrigeration is concerned, to the preservation of feeding products in natural state. The refrigerated compartments for the storage of meat in relative periods of no more than three weeks, are very difficult to find in developing countries. Though these results are hard to conceive, are even more difficult to find in tropical and subtropical countries, instead of the climatic conditions which are adverses and accelerates the enzymatic process and the fast destruction of the meat. In those countries a sound project has to tend, therefore, to integrate all stages of the process of meat production, processing and marketing. If these systems are not enough generalized in developing countries it seems to be due to the lack of knowledge and appreciation of the services that they can get through effective plans of refrigerated storage for the feeding products which because of the fact of been naturals are subject to a fast perishing if they are not kept at a special temperature and humidity. On the other hand, the lack of resources for investments in instruments that collaborates to an adequate

commercialization of products, has originated the actual system of distribution of meats in a very defective or primitive way in all these countries.

In addition to the previous statement there are other circumstances that are participating in a negative way as to develop in these countries an adequate system good enough to be utilized in a properly way the drove recourses available; they are: the meat qualities are not acceptable in the international market or they receive prices that are not remunerable as to cover all slaughter expenses and preparation added to the regular prices of the product in the country. They should consider that a very particular situation occurs in tropical and subtropical countries because of the effort made to improve the domestic breeds by crossing them with breeds from abroad to adapt them to the climatic conditions and feeding methods of the country. Further problems hampering the normal production of meat in animal husbandry of developing countries are connected to the lack of water, compound feeds,uff production, inconvenient buildings and many other inconveniencies.

2. The cattle stock development in tropical and subtropical countries

In most of the tropical and subtropical countries, at least, as far as Latin America is concerned, the stock of cattle has been and is a traditional and conservative exploitation with scarce enterprise in its handling and improvement.

The stock of cattle has been and still is the attribute of one group of wealthy families to whom doesn't represent any importance the technological improvement in the formation and exploitation of their farms. The conservative cattlemen in many tropical countries became a major factor to the progress towards upgrading of breeding, ranching, handling and exploiting cattle.

Studying the meat industrialization, the preservation and commercialization is impossible to separate these last aspects of the use of physical instruments of aid like refrigeration, from those that are related to the meat production, i.e., with the cattle development itself, so that, it would be always interesting to research the problems concerning to the meat elaboration farther than circumscribing the action of transformation. Speaking of meats it is indispensable to talk about cattle stock, therefore the relation between one and other is direct and close.

We hope that all aspects of livestock breeding fattening, transport and exploitation in subtropical and tropical countries will be examined one day. Such matters could be in our opinion the following: species, crossing, pasturage and foraging, animal sanitation, boundary farms, irrigation, etc. We will talk about those previous aspects in a document, each one containing our observations and experiences in the tropical and subtropical countries in Latin America.

a) Species. The livestock in tropical and subtropical countries, mainly in the cattle, is fundamentally made up of domestic cattle species of native origin which have been adapted and developed to the difficult conditions that meadows present in these countries. However, the domestic species do not show favourable conditions to promote the cattle stock, i.e., as far as, they may produce meat really acceptable on the markets. This livestock due to a number of reasons, has a very low value of meat. The situation pertaining to the improvement of a breed which has been confronted with little results on the part of the cattlemen of the tropical and subtropical countries, with the help and experience of the developed countries which maintain cattle of this type and make efforts to get intermedium species that could join favourable aspects to subtropical countries, i.e., for one part the new breed as in the case of Santa Gertrudis, a breed developed in the USA, have the quality and capability to support in good conditions, unfavourable climates, the hard pasture and a high resistance to sicknesses; on the other side, have the advantage to offer good efficiency in meat as far as quality and weight is concerned.

However, of the above mentioned paragraph, these species which have been promoted for the tropical and subtropical countries are not successful when they are brought to countries in which besides the tropical conditions other adverse factors are dominating such as: the low level of sanitation, the scarce availability of pasture, the great extentions that animals may have to run for their supply of water, etc, etc. In some tropical and subtropical countries of Latin America it has been intended that some of these breeds, like Santa Gertrudis, be raised and they are getting to certain point some success.

The breeds in particular which is dominating in tropical and subtropical countries are the Cebú-Brahm- which is very resistant and capable to support under unfavourable conditions their development. Moreover of the kind of the Cebú, the cattlemen of these countries are inclined by the appearance and quality

of meat of the Shorton, the French Charolé, with whom they have the purpose to adapt these breeds to the climate conditions prevailing in the tropical and subtropical areas, and, therefore, in this intent are getting some results. In our opinion, due to the gained knowledge that we have had of these facts and of course, without authority to judge these aspects, the Sebú and Braham must be improved and carried out to the highest level.

b) Pasturage and forages. In the tropical and subtropical countries of Latin America, the farms employed for livestock have only natural meadows, which creates a series of inconveniences that we may mention further.

The lack of artificial meadows gives place to use a big extension of ground by one animal, in effect, in tropical and subtropical zones of Latin America the average place needed by one head of cattle fluctuates between 1.5 and 3 hectares of ground. Instead of this big surface occupied by animals it is not even possible to suberate the factor derived from the lack of pasturage in winter seasons, which gives origin to big fluctuations in the animals' weight. In one study realized in 1967, as assessors of UNTAO in Paraguay, we came up with the fact that, in this country, the fluctuation of weight originated from the lack of feeding in winter seasons, oscillates between 40 kilos in a period of three months; a similar situation is the one registered in other countries of tropical climates like in the case of Nicaragua with its livestock located on the Atlantic coast.

Undoubtedly, some solution has to be sought to create within these tropic and subtropical countries the development of artificial meadows that permits with continuous frequency the feeding of cattle, that is possible to obtain in the same agricultural surface actually destined to cattle stock to maintain a superior stock reducing the place occupied by an animal from 3 hectares approximately to one half a hectare an animal.

c) Animal Sanitation. Animal sanitation may be one of the most serious aspects and most difficult to overcome in tropical and subtropical countries of Latin America. Diseases like foot and mouth disease have been considered inevitable, and its elimination will demand such a big investment that cannot possibly be made by the cattlemen or the governmental organizations. However knowing the causes of the foot and mouth disease in livestock a solution or project must be developed to solve this problem in Latin American countries, particularly in tropical ones.

Along with the foot and mouth disease there are other endemic diseases, such as tuberculosis, parasites, itching, etc. In order to get an acceptable meat extraction of quantity, quality and price it will be necessary to coordinate the sanitation and extension of livestock together with programmes of industrialization and preservation of meats.

d) Division of barns. Another problem which is adverted, as a negative factor, is the one concerning the subdivision of barns or farms so that the places occupied by the cattle would be appropriate and the long trips to get feed and water would be avoided.

e) Availability of water. In the tropics and subtropics the availability of water for farms is scarce. The damming system for feeding quarters are badly distributed and the cattle have to run long distances. This situation is aggravated by the absence of rain. The subdivision of barns and the improvement of the availability of water are problems that have to be solved simultaneously; facts that will contribute to the avoidance of the propagation of epidemics.

3. Slaughter and transportation

a) Traditional system of transportation by foot. In tropical and subtropical countries mostly the cattle is moved by foot from the grazing lands to the slaughtering house in the consumption areas. This traditional system is detrimental to the cattle stock which has to suffer losses due to death along the trip and to dehydration of the animal. Generally, in these countries the slaughter houses are located in the principal cities, very distant from the places where the cattle were raised and the transportation on foot of the cattle reaches superior distances up to 100 kilometres. During the conduction, the cattle do not dispose of water and food.

The above described situation is bound to the small development of the infrastructure in these countries, which does not facilitate the establishment of slaughter houses and freezing shops in places very close to farms. On the other hand, the lack of electrical power, the inadequacy of roads to be travelled the whole year, communications and insufficient supply, maintains the actual situation as far as transportation and location of the slaughter house is concerned.

b) Location of slaughter houses and improvements. The location of slaughter houses and plants of improvement of meat must be promoted in a different way than the one which dominates today in tropical and subtropical developing countries. In other words, it is, advisable to acknowledge the cattlemen that in their countries because of the circumstances of the development state and in their own interest it would be the best to divide the process of converting the cattle into meat in two stages. The first stage which includes: increase of weight, selection, slaughter, freezing, would have to be located in a suitable place for the cattle.

The second stage, i.e., the centre of classification of meats, which includes the slaughter, packing and distribution, would be in the cities or centres of commercialization. This reorientation will permit the reduction of losses, avoid the dehydration of meat which is harmful to quality and be the cause of improved weight and percentage of yield etc.

c) Slaughter process. The cycle of slaughter in these countries of reference is practically limited in the course of the whole year, to a certain number of days in the week, in other words, one continuous cycle in the year. For what is said previously, as far as the seasonal difficulties of pasturage, the continuous period affects the improvement of the cattle stock due to the fact that in rainy seasons this has a notable loss of weight. In Paraguay we suggested to cattle breeders to postpone slaughtering during three critical months when there is no good condition for grazing. For these months the consumption needs can be covered by good fattened cattle preserved in refrigerated compartments. Ideas like these should be discussed referring to the slaughter process.

4. Cold storage for freezing and preservation of meat

In general the cold storage for freezing and refrigeration of meats in tropical and subtropical countries of Latin America are scarce and the technological design is out of style. In this respect it is necessary to see clearly apart among the slaughter freezing compartments, refrigerated storage of preservation and selling stores with freezing counters.

The slaughter houses, excepting others dedicated to the exportation of meat, do not have freezing compartments, are of small capacity to the daily slaughter of supplying an urban centre. The improvement of cattle is not entirely

finished and the glands and viscus are generally wasted. The slaughter houses that export or store meat in cans are old-fashioned and generally belong to foreign companies established during the beginning of the century.

In heavily populated cities there are small compartments for the storage of frozen meat to balance the demand with the daily slaughter or to supply the necessary amount of meat in those days of the week when the provision of meat is limited.

The stores where meat is sold except a few supermarkets do not have refrigeration. The grocery stores are almost always municipal departments with deficient installations which in its maintenance leaves a lot to be desired. The rules for inspection cutting and handling of meat are not kept.

The primitive situation in the slaughter process and the selling of meat gives origin to serious problems such as: the lack of meat selection by qualities; unappropriate cut of meat which allows for considerable waste; meat that reaches the consumer in deficient conditions hygienic and sanitaries, etc.

In our opinion this fact would have to be considered in the document that will be examined during a meeting of a Committee of Experts, about the following matters:

- (a) Cold storages for freezing and preservation of meat as a centre of commercialization, classification and supply.
- (b) The distribution of meats and the slaughter houses and public selling.
- (c) Perspectives of the packing houses in the developing tropical and subtropical countries.
- (d) The congelation of meats to internal consumption and exportation in the referred countries. Technologies adapted to the dominant conditions in those countries.
- (e) The problems of dehydration, texture and placing of congelated meats kept in long periods of time.
- (f) The training on a regional level in techniques of processing and marketing of meat.
- (g) Applicable legislation in tropical and subtropical countries to the normal working of freezing compartments of meat, slaughter houses, inspection of meats and commercialization.



