THE GEOGRAPHY OF MILK

Jacques M. May

American Geographical Society, New York

There are many factors governing whether or not milk will be part of a people's diet. Most important among these factors is tradition, then comes availability. The body needs come last, and in most parts of the world are not even considered. In a review of the most important populated areas of the world, these statements are discussed. One can gauge the degree of advancement of the various countries by the ability of the local culture to produce wholesome milk.

I believe that a good criterion of a country's advance in technology is to assess its ability to produce and distribute wholesome milk. A large number of factors govern what people eat throughout the world. Availability, which in turn depends greatly upon land forms and climate, and tastes, which have been developed through the centuries in accordance with cultural beliefs and economic conditions, are certainly foremost in determining the daily menus of mankind.

The physical needs, the bodily requirements, however, play a much smaller role than one would think. Whereas they should be the governing factors, these physical needs seem to adapt themselves to culturally developed tastes and beliefs, and to local availability. Thus, we find that people accept foods that do them little good and refuse to consider others that would be of great value in their diets, which is thus a part of their culture.

Culture in turn is the sum total of the techniques and beliefs which help a group of people to adapt to their environment and which reveal the degree of adaptation. It is quite different from civilization which to my mind is the ability of man to use his primitive instincts toward a higher ideal, as typically represented by the ability to live in a city.

Let us have a bird's eye view of what milk means to men, throughout the world. It is a strange thing that although no man alive has ever grown to manhood without depending upon milk in the first months of his life, hundreds of millions of adult human beings frown upon its use and disregard the help it could bring them. It is still more puzzling if we consider that these people are, more often than not, underfed or even starved. Many people of the world have prejudices against milk. Some feel it gives worms to children, others, like the Singhalese, believe that it causes disease, which it very well may do, if produced without the proper techniques and protection.

Contempt for milk is an almost essential characteristic of the Chinese civilization, which, as you know, strongly penetrates the surrounding countries of Southeast Asia. It is not that the Chinese have no cattle, they do, but they use them chiefly for labor in the fields. The Chinese have not been permeated by their milk drinking neighbors, the Mongols, Tibetans, and Hindus. In China all the causes which result everywhere in scarcity and poor quality of milk are further implemented by cultural taboos. There is a saying, "Whomsoever drinks the milk of a cow creates a bond of familial parentage with the cow, which is degrading." This is a surprising attitude among people who have developed considerable talent in the culinary arts and know how to prepare tasty dishes of dog meat, snake filets, rat roasts and other foods which we in our own culture have a feeling of disgust.

If we turn to Africa, we find a varied picture. In Tanganyika women are forbidden to drink it; in Uganda, men. This is surprising in view of the fact that in neighboring Kenya the Masai people willingly feed on milk from their cows and on blood from their bulls. In most places there is no milk so that the taste for it could not develop, and it is not part of the culture.

There is no doubt that the taste for milk could be developed in places where it is frowned upon now. In Asia, for instance, I have in my own lifetime seen the demand for small, low-priced cans of European condensed milk grow to considerable proportions. I believe that several factors have made it attractive. Foremost among them is the fact that it was presented in cans, thus overcoming the prejudice of getting it from the cow's teats (like an animal). Second, is probably the fact that smart exporters from Europe merchandised the milk in small quantities for a very low price, and a third reason might well have been fashion. The powerful conquering Europeans who often, of course, drank whiskey, seemed also to hold milk in great appreciation and made a point of giving it to their children. Those who lived near or worked in European households sometimes gave the condensed milk to their own offspring as a spread on

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pancakes or on European bread. A spread of this kind could be a tremendous help against human starvation.

Starvation in many places takes the form of "Kwashiorkor" an African word meaning "little red boy". In vast areas, the weaning of the children occurs around the age of two, because this usually coincides with the time when a new baby is born in the family and requires most of its mother's milk. From one day to the next the child is fed a diet of carbohydrates, chiefly manioc, which is poor in protein and, of course, completely devoid of animal protein. As a result, a nutritional disease due to lack of animal protein, called Kwashiorkor, is widespread. The child loses its pep and energy, falls into apathy and slumber, loses the pigments of its skin and of its hair, which becomes silky and brittle, and takes a reddish hue which has given the disease its name.

If nothing is done the child dies. If not enough is done the child may survive for a number of years but its chances of succumbing to fatty infiltration of the liver when he reaches adolescence, or perhaps, as some believe, of primary cancer of the liver when he gets to his twenties or thirties, are considerable. This disease, although designated by different local names, is found in India, China, Indonesia, South America, Central America, Mexico and the Caribbean Islands.

To treat this disease is very simple: feed these children skimmed milk. If this is done in sufficient amounts and for a long enough period of time the disease is cured. Thus, in the most important starvation areas of the world, Asia, Africa, and South America, milk can open the way to health and well-being. Other than these countries and societies where milk is held in contempt, there are places where it is liked, but where local factors make it so scarce that the taste cannot be developed and the benefits from its consumption cannot be enjoyed.

India presents the most interesting problem of them all. Its people are starved, they like milk, they have the greatest herd of cattle in the world; yet milk is not available. The reasons for this situation can be better understood if we study culture. There the cow is a sacred animal which cannot be killed. Thus a large proportion of the herd is made up of old cows that have long ago outlived their ability to reproduce and, hence, to give milk. Yet the food they eke out from the meager pastures deprives productive cows of much needed nutrients.

The severe competition between animal crops and human crops makes itself felt to the point where the cattle are as starved as the people. There is almost no chemical fertilizer to give production a boost, because such is expensive and there is little foreign currency with which to buy it. Local industry cannot as yet fill the need. The animal fertilizer which is used cannot return to the land much more than it received from it and, therefore, is of little value. This problem of competition between food and animal crops is not new, nor is it peculiar to India. Until very recently it existed in Europe, where cattle were considered a necessary evil. It only has been in the second half of the last century that Europeans and Americans have advanced their agricultural technology to the point where these two do not compete.

In India the problem is to squeeze as much milk as possible from the poorest fed, ill-bred, animals in the world. This daily fight for milk is pathetic. The calf, of course, has to be taken away from the cow, lest he drink everything there is. As he cannot be killed, he is left to fend for himself, sometimes in the jungle, sometimes in the sun. Naturally the mother cow is not cooperative, and won't yield her milk unless she sees her young. Hence, this typical Indian street scene which I still see in my memory: the milkman going from door to door with his one-legged stool and the likeness of a calf, consisting of a moth-eaten calf's head, stuffed with straw mounted on a piece of wood. This he would plant in the ground in front of the cow for her to lick as he drained her of a few ounces of watery milk, which he sold to his customers.

In Indonesia, the people like milk but they, like the Indians, and for similar reasons, have not enough to go around. They import milk and cream from abroad in spite of their lack of foreign currencies. Approximately $5,000,000 worth were imported in 1956.

In other countries herds of cattle are not valued for their milk, although they are valued for their meat. This applies chiefly to the herdsman of tropical Africa, especially in the Chad region, in Madagascar, and among the Peuls of French West Africa. There, milk has become a valuable product only since these populations have had contact with Europeans. However, if they have learned that they could sell this milk, or on occasions even drink it, in most cases they have not yet learned how to produce clean palatable milk.

Milking a cow is quite a job in Ruanda-Urundi. Only men can milk cows, and when I say men I mean several men. One holds the calf, another one pampers the cow, the third chases the flies away and the fourth tries to squeeze a few drops of milk from the beast's empty udders. In the Chad region the milk is thought to keep longer if the container is previously washed with cow's urine and then smoked.
This procedure, of course, may destroy quite a number of germs, but at the price of a taste which gives fermented beverages an unfair advantage.

In the West Indies cattle are currency. People are interested neither in milk nor in meat. They do not like milk; for some reason which I cannot understand, they prefer rum. They cannot afford meat because who would think of frying a defense bond or a golden jewel or any valuable element of capital for lunch or breakfast?

I will always remember my days in the West Indies. There was some milk sold in the markets of an obscure little island which I will not name, but you had to boil it the minute it got into the kitchen and very often it curdled before it got to a boil. Then, one day I brought some to my laboratory and was interested to find that it contained more than 4 milligrams of fecal matter per liter. Since there was about twice as much of the same in the local water system, it was not difficult to trace this pollution to some commercial enterprise intended to make much out of little. In the end, I decided to pay the very large price that they fetched, and buy myself a cow. In order to do this I consulted the Chief Veterinary Officer of the Island. He was dubious as to the success of my enterprise and told me point blank that if I wanted anything resembling a cow with four teats and a full udder I had better forget it. Most of the cows were sick and some had visible lesions on their milking parts. Out of a herd of 60,000 head, it might be possible, with luck, to find a few animals with three teats, but most of them had two, and some only one, the others being either atrophied or covered with dermatitis. Finally, I succeeded in getting a tip on an animal which was reputed to yield up to two quarts of milk a day and to be in fairly healthy condition. I do not know how this quantitative data had been ascertained because when the animal came to my compound, it was obvious that it had never been milked and that it never would be. A full cuadrilla and a matador would have been needed to keep it quiet and even then I doubt if a few ounces of milk could have been squeezed from the flat bag of flesh, which for some reason best known to herself, this cow carried between her hind legs.

If we turn now to the nomadic people who live in the deserts of Asia and Africa, we find people with a genuine fondness for milk, probably enhanced by the fact that for many of them it means relief from the danger of dying from thirst. The Tuareg, the Beduins, and in general the various tribes living in African deserts can go as far as their camel can go, and feed on its milk. I mention this, because, although it is not cow's milk, the taste for the beverage is highly developed. If economic conditions were to improve it would not be difficult to make them appreciate good nutritious milk. As it stands now, milk has not become a staple item of the diet in these areas because the animals produce so little, due to the aridity of the environment. In the deserts of Asia, Mongol and Tibetans use milk in various ways; fresh or curdled, in cheese or butter; in Tibet the latter they put in tea. They also have practical uses for butter, putting it on their hair, or on their faces to protect their skin from the freezing wind, or in lamps. In certain instances, it is even used as a modeling material from which they sculpture religious images. In certain cases, the Chinese Turkestan people have preserved the taste for milk and milk products in spite of the fact that there are no pastures and that complicated trade exchanges are required to bring the milk to the consumers.

In the north, we find again that milk is foremost in the food planning of many people living on the fringes of the northern ocean. There milk comes from the reindeer and like their brothers of the sub-tropical climates, these people go as far as their reindeer go, which means that they are found where the reindeer find food. There too, milking is a problem. It is done by a man and a woman combining their talents. The man lassoes the animal around the antlers and after a fight usually ties it down. Then, the women milks it quickly, collecting the milk in a wooden container. Each milking yields a cupful of thick, creamy milk.

So far I have mentioned many places where milk was not appreciated, and regions where, although appreciated, it was not produced in sufficient quantities to meet the demand. But what about our own country and the countries from whence our civilization came, namely, Western Europe? No milk was drunk in the pre-Columbian Western Hemisphere, since no cattle were reared. After European conquerors introduced domestic bovines and ovines, some isolated communities acquired the taste for milk. This was a slow process, however. In 1874, as noted by Voikof, wealthy Mexican ranch owners purchased condensed milk from the United States in large quantities to meet their own needs, which shows that even at this recent date, the rather primitive cattle industry which prevailed below the border was not equipped for the production of milk.

I am sure that most of us would be surprised to read that up to the middle of the last century people who wanted milk in certain regions of France, now the second largest producer of butter in Europe, went shopping at the apothecary's shop, since milk was a beverage fit only for infants or invalids. In many
parts of the rural areas there was the same sort of
disgust for milk which we have described in China.
However, a combination of factors led to the applica-
tion of the dairy technology of western civilization.
It is hard to tell how these factors combined in time or
even which was the most powerful. Like everything
else in life and history, it just happened because the
time was ripe.

Science demonstrated the nutritional value of milk.
It discovered that, speaking in terms of pastures
of average quality, ten units of feed produced six
thousand calories in nine quarts of milk, but only
a thousand calories in one kilo and a half of live
beef; and that yield in useful animal proteins is about
twice as great in milk as in beef for the same quantity.

Then it was found that a market existed in the
rapidly growing industrial towns which arose out
of the industrial revolution of the last century. Then
the science of increasing the yield of an acre of land
by rotating crops and applying well prepared ferti-
lizers established itself and replaced custom and tra-
dition. Genetics and medicine taught the western
man how to develop milk-yielding cows from breeds
of cows and bulls carefully selected for that purpose.
At the same time the science of bacteriology and im-
munology taught how to protect these animals against
diseases of all kinds.

In the line of production and distribution, the
capture of energy, the new fuels, the better understand-
ing of the use of steel and of glass, even of paper, the
science of refrigeration, the huge development of
fast, cheap and frequent means of transportation—
all this resulted in a considerable increase in the out-
put of the animals, in a development of the taste, and
in the marketing of the product which brought the
situation in Europe and America to the point where
it is today. If we add to this, excellent recipes of all
sorts which serve to introduce milk in appetizing
dishes and formulas, and if we understand that this
is the result of a combination of effort of scientists
in every discipline and of historical factors, such as
the ones I have just tried to describe, I am sure no
one will dispute my initial premise that the degree
of advancement of a given country on the road to
civilization can best be measured by its ability to pro-
duce large quantities of wholesome milk and milk
products.

Now that we have had a bird’s eye view of what I
can perhaps call the “geography of milk”, I would
like to integrate this in quantitative terms, if possible,
into the general picture of human diets. I hope this
will give a better idea of what the needs for milk are
in the world, and how and in what quantities they
could be met.

Beginning with our own country, a vast cattle
land covers three-quarters of the United States’ area
—from the eastern border of California to the eastern
border of the Atlantic states and from Canada to
Texas. Cattle raising is also undertaken on a very
large scale in South America, especially in Argentina,
Uruguay, and Paraguay. Herds of cattle are also
found in Brazil, in the fertile Magdalena Valley of
Colombia, in Venezuela, in Peru, and in Bolivia.
In Europe the great cattle regions are Ireland, the
south of England, a certain part of France, Switzer-
land, Germany, Denmark, Hungary, and Rumania.
Herds are also found in the Balkans, Italy, Portugal,
and Spain.

We lack details on the present situation of the
cattle industry in Asiatic Russia but there seems to
be no doubt that vast herds of cattle extend deep into
Asia. In Africa the distribution of cattle is patchy.
There is some cattle industry in north Africa and it
is found in tropical Africa in areas where the tsetse
fly is not found. In Asia, India and Pakistan own
between them the greatest herd of cattle although
perhaps the least productive. Some are found in
China, and there are large cattle regions in Australia
and New Zealand.

While the absolute number of cattle in a region
may be important, of more significance is the ratio
of cattle to the population, as contrasted with the per
capita milk consumption. The ratio of cattle to people
ranges from 4.5 animals per capita in South West
Africa to 0.005 in Hong Kong, where 5,000 people
must share one animal. The United States ranks 18th
in this respect, with not quite one animal per person.
Among the top-ranking countries we find Uruguay,
New Zealand, and Argentina; also South West Africa
and Bechuanaland. If we compare these findings
with those based on the availability of milk, we see
that, the United States ranks fifth among the milk
drinking nations of the world, with Iceland heading
the list. Tanganyika, on the other hand, has a rather
high ratio of cattle to people—more than 1 animal per
person; yet, there are only a few ounces of milk avail-
able per day for those who care to drink it. This is
not surprising in view of the low production per
cow.

Let us now consider present human diets through-
out the world and the part which milk could play in
changing these starvation diets into adequate diets.
In the Western Hemisphere, only five countries and
a small part of a sixth can boast of having adequate
diets. We must not forget that starvation can occur
in various ways. We can eat enough to supply us
with energy, but not the kind of foods that would
protect us against gradual decay of our tissues. We
MILK QUALITY PROBLEMS ASSOCIATED WITH PRESENT-DAY MARKETING

H. F. Ford and F. J. Babel

Dairy Department, Purdue University

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Milk distribution systems in use at the present time have been criticized for impairing the quality of milk. The basis for such criticism is the time interval between pasteurization and consumption. Several years ago, the usual time between processing and consumption of milk was 48 hours, or less. At present, the common interval is 72 to 96 hours and frequently it is more. Considerable data (4, 5) are available on the bacterial content and growth of bacteria in pasteurized milk, but data concerning the effect of present-day marketing systems on the bacteriological and flavor qualities are not so numerous. The study reported here was conducted to obtain information on the effect of the distribution system on the bacterial population and flavor of pasteurized milk. The market selected for study was served by three local and four other distributors.

Methods and Procedures

The milk used in this study was obtained from seven wholesale distributors supplying an urban area in Indiana. Three of the distributors processed within the urban area and the other four within a 150-mile radius of this area. The former will be referred to as local and the latter as outer-market distributors. Samples were collected from each distributor at the time of bottling, when delivered to the retailer, and 24 hours after delivery to the retailer. The samples were collected monthly over a one-year period. Two samples were taken at the filler and also from the retail store 24 hours after delivery. One sample from the filler was analyzed immediately, the other after storage for 5 days at 45°F. One sample from the retail store was analyzed immediately, the other after storage for 3 days at 45°F. Each sample was analyzed for bacterial content (total, coliform, and psychrophilic bacteria) according to Standard Methods (1), and the flavor and temperature noted. Plates for total counts were incubated at 32°C.

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