Introduction

History of dairying

It is not known just when the cow first became the servant of man, when milk and milk products were first used. The domestication of cattle occurred between 6000 and 100,000 years ago. Not much is known about the history of this period, but men probably hunted cattle as wild animals prior to the time that they were domesticated.

The historians, archeologists, and paleontologists, however, have found evidence of various kinds—indicating that domestication of the cow and the use of her products goes back to the line of early development of the human race. Before her domestication the cow was probably hunted by the savage and barbarian early man. It is known that the cow has served man through the ages as a beast of burden, as the source of food, as an object of worship, as the source of sacrificial offering, and an object of mythology.

The soldiers of Genghis Khan, the Mongol Emperor who conquered Asia and a large part of Europe in the 13th century, carried dried milk as a part of their ration.

From past to the present the cow has been the servant of man. Mayflower settlers did not take cattle with them so this mistake resulted in high death rate. This mistake was recognized and governor ordered that one cow and two goats should be brought over for each six people. The oldest written records of man kind go back to three ancient cultures.
1. Ancient Mesopotamia.
2. Ancient India.
3. Ancient Egypt.

Dairying in Ancient Mesopotamia.

Sumerians of Mesopotamia are generally regarded as the oldest, going back to 6000 B.C. From ancient drawings, it is apparent that dairying was highly developed. Cow was also worshiped in Babylonia and in Egypt. Hathor, the goddess who watched over the fertility of the land, was depicted as a cow. Cow was milked from behind, still many African tribes follow the same practice. This practice is supposed to induce the cow to let down her milk. Sumerians are credited as the first to make butter.

Dairying in ancient India.

Sanskrit records date back 2000 B.C., indicating India the raiser of cattle, particularly dairy cattle. Cow milk, butter, and even urine considered holy, and was sprinkled on the face each morning by the devout Hindu, was the first to use the twirling churn. Dairy industry developed in India on sound footing, nearly four centuries ago, Abdul Fazal, the prime minister of Akbar, clearly describes in "Ain-i-Akbar" the economic position. His regulations for the maintenance of cow stables (possibly attributable to his finance minister, Todar Mal) provide the basis of sound dairy practices as adopted within the last few decades by the world's foremost dairy countries. They include:-

2. Scientific standard of feeding to promote milk production.
3. Feeding of concentrates in proportion to milk yield.
4. Maintenance of individual records of milk production.
5. Tests of quality - A specified number of cans take of fat
were expected from a stated quantity of milk.

6. Fortnightly inspection of stock with the object of insuring that the allotted ration has actually been fed. Certain scientific tests were applied to reveal any loss of condition which would indicate misuse of fodder.

But now the conditions have considerably been deteriorated and offer a gloomy picture. It would not be unwise to call present day dairying in India to cover any building — even a hovel — in which milk is handled. Complete ignorance and prejudice further adds to bad practices and problems which are socially and scientifically undesirable. The practices thus adopted will be dealt in the following pages.

**Dairying in Ancient Egypt.**

They milked the cow from the side, unlike Sumerians from the rear, but placed the calf before the cow while milking. Their records date back to 3000 B.C.

**Old Testament references to dairying.**

About forty references to cattle, references to milk, butter, and cheese are also found of which following are noteworthy:

1. The promised land was described as "A land flowing with milk and honey."

2. Book of Genesis 18:3 "And he took butter and milk...."

3. Judges 5:25 "He asked for water she gave her milk...."

4. King David in Psalms 50:21 said "The words of his mouth were smoother than butter...."

5. Isaiah 7:22 mentions "Milk and honey and butter and food."

**Dairying in Ancient Switzerland.**

There are no written records available but excavations indicate the use of cheese making equipment dating 4000 B.C.
Roman and Greek dairying.

Greek records go back to about 1550 B.C. and Roman 750 B.C. Goat in Ancient Greece and Sheep in Ancient Italy - butter used only as ointment. Hippocrates (460-377 B.C.) the noted physician - prescribed butter as a remedy to solve for burns and wounds. Galenus (A.D. 131-207) also classed butter as medicant. Why Romans and Greeks did not use butter as food probably they have abundant of olive oil.

Present-day dairying development in due to:-
1. Improvement of dairy cattle.
2. Development of scientific feeding and management.
3. Development of science of nutrition.
5. Development of chemistry.
6. Inventions.
7. Development of Agricultural sciences,
8. Extention of other educational organisations.

Dairy enterprise has significant advantages.
1. Roughages change into food products. Roughages as they are, neither have got any marketable value, nor fit for human consumption.
2. Return for family labour good.
3. Meat as well as milk produced. Old cows can be sold for meat but Hindu's susceptibilities have to be over come.
4. Sound business with good future due to:-
   1. High nutritional value of milk.
   11. Strong market demand due to change in taste and fashion of people to take Ice cream etc.
iii. Role in soil conservation.
iv. Dietary essentials supplied.
v. Synthetic milk production efforts have been a failure.

**Dissadvantages.**

1. Risk is more due to disease and large investment.
2. Knowledge and skill required for operation.
3. High grade labour needed.
5. Markets not always available.
6. Milk is perishable and deteriorates soon in quality.
7. Cattle acclimatise to extremes climates with difficulty.
8. Extensive grazing land not suitable, as extensive exercise reduces milk yield.

**Economics of milk production.**

1. **Demand** for milk production is derived from the demand for all its products to be displaced on the market and further shaped by the number of consumers, customs and habits of consumption, and price relation to income etc.
2. **Supply** affected by demand, price, government policy, cow's productive capacity, and other related factors to cow's milk yield.
3. **Relation of dairying to Agriculture.** The importance of cattle in India and their contribution to agriculture is as follows:- Unlike in other parts of the world where cattle are maintained mainly for milk and meat, in India their primary purpose is draught for the plough or the cart. "without the ox" wrote the Royal Commissions on Agriculture in India "no cultivation would be possible". Cattle supply the motive power for almost all agricultural operations such as ploughing, lifting water from
wells, and transport of produce to the market.

Importance of soil conservation.

Dr. N. C. Wright pointed, "The potential value of cattle as a means of raising the level of fertility of the soil and of thus increasing the output of both cash and food crops is incalculable."

In the absence of adequate information regarding the proportion of cattle dung used as fuel, it is difficult to estimate the value of this contribution.

Such practice of burning cow dung is burning the wealth of nation, but Indian farmers are poor with low per capita income and in absence of suitable fuel, had no recourse except burning cow dung as fuel.

Contribution of cattle to Indian agriculture.

(in crores rupees)

<table>
<thead>
<tr>
<th>Product</th>
<th>Value (crores rupees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk and milk products</td>
<td>300</td>
</tr>
<tr>
<td>Hides and skins</td>
<td>40</td>
</tr>
<tr>
<td>Cattle labour</td>
<td>400</td>
</tr>
<tr>
<td>Cash value of manure (assessed)</td>
<td>270</td>
</tr>
<tr>
<td>Total contribution</td>
<td>1000</td>
</tr>
</tbody>
</table>

Total value of Indian agricultural products 2000 per annum.

("Dr. C. N. Wright, Livestock in India")

+ A. Oliver and M. Vaidyanathan.

4. Absence of a substitute. The cow tree in tropics which secretes milk like rubber tree, which when flavoured with sugar and vanilla substitutes whipped cream. But dairy farmer should not worry as it gets chalky when exposed to air, and even dogs can not be fooled to take as it gets bitter in taste.
Milk as an Ideal Food.

Originally, cow's, buffalo's, or any other animal's milk was never intended by nature for human consumption. It was solely meant for their young ones for which it constitutes an Ideal Food. Owing to man's skill in selective breeding, art of feeding and animal management, the productive qualities of the milk animals have been developed to such an extent that milk of these animals now serves as an important article of diet for all civilized nations, e.g.

1. Llama's milk used in South Africa.
2. Goats supply milk for the Arabs, S. Europeans, Latin America, and the Spaniards.
3. Camel's milk in Egypt, Arabia, and other desert countries.
4. Mare's milk in Russia and central Asia.
5. Reindeer's milk in Arctic region.
6. Sheep's milk in Greece, Netherlands, Czechoslovakia, Italy, and Balkan states.

But cow is probably the most widely used source of milk for human food.

The constituents of milk.

Milk's complex nature and unusual properties have baffled man since he became interested to know about. Most of the knowledge of the subject is the product of past 35 years. Undoubtedly, the future will show the present knowledge of the subject still to be very incomplete.

Milk may be defined as the normal secretions of the mammary glands of the mammals. All different types of milk having same constituents but differ in composition.
The following table shows the composition of milk of different species of animals and human milk.

<table>
<thead>
<tr>
<th>Species</th>
<th>Water</th>
<th>Fat</th>
<th>Sugar</th>
<th>Ash</th>
<th>Total solids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Woman</td>
<td>87.88</td>
<td>3.74</td>
<td>6.37</td>
<td>0.30</td>
<td>12.12</td>
</tr>
<tr>
<td>Cow</td>
<td>87.52</td>
<td>3.34</td>
<td>4.40</td>
<td>0.75</td>
<td>12.48</td>
</tr>
<tr>
<td>Buffalo</td>
<td>82.45</td>
<td>7.12</td>
<td>4.99</td>
<td>0.865</td>
<td>17.45</td>
</tr>
<tr>
<td>Goat</td>
<td>86.88</td>
<td>4.07</td>
<td>4.64</td>
<td>0.85</td>
<td>13.12</td>
</tr>
<tr>
<td>Sheep</td>
<td>83.57</td>
<td>6.13</td>
<td>4.17</td>
<td>0.93</td>
<td>16.43</td>
</tr>
<tr>
<td>Mare</td>
<td>90.58</td>
<td>1.15</td>
<td>5.87</td>
<td>0.36</td>
<td>9.42</td>
</tr>
<tr>
<td>Camel</td>
<td>36.88</td>
<td>3.07</td>
<td>5.52</td>
<td>0.77</td>
<td>13.42</td>
</tr>
</tbody>
</table>

*Veterinary department Punjab leaflet No 8.

Cow's and goat's milk substitute woman's milk for growing children as they are easily digestible.

Milk ranges in colour from a bluish white to almost golden yellow depending upon breed, feed, and season.

_Fresh fix_ milk has got characteristic odour which disappears after few hours milking. Fresh milk is amphoteric in reaction but has H-ion concentration which indicates it is somewhat on the acid side of neutrality.

Milk is an emulsion of fat in a watery solution of sugars, minerals, and with protein in colloidal form.

**Milk fat.** Milk fat is in the form of small fat globules which are easily digestible. Milk fat composed of saturated and unsaturated fatty acids, further these fatty acids constitute soluble and volatile, soluble and nonvolatile; insoluble and non-volatile fatty acids.

**Milk sugar.** Lactose or milk sugar is similar to sucrose or cane sugar, but only differs in molecular configuration and sweetness.
Protein of milk. Casein has got nutritional as well as commercial values, e.g., hair combs and other plastic bodies are manufactured out of it.

Minerals of milk. Calcium deficiency is made good, which is most vital for good bone formation. Milk also supplies potassium, sodium, iron, and chlorine.

Vitamins of milk. A and B are in abundance, B, B2, B6, nicotinic acid, pantothenic acid, ascorbic acid, ie Vit C, alphatocopherol ie Vit E, and K are present.

Minor constituents. Minor constituents of milk are phosphates, cholesterol, carotene, and enzymes.

Non protein nitrogenous substances. Urea nitrogen, creatine, creatinine, uric acid, adamsine and guanine, are measured in parts per million.

Nutritional value of milk.

*A quart of milk provides all the calcium needed by an individual for one day, all or practically all of the phosphorus, a liberal amount of vitamin A and C, one third or more of the protein, one eighth or more of the iron, at least one fourth of the energy, and some of vitamins.*

Considerable evidence has been accumulated to indicate that a diet composed predominately of milk and dairy products increases the life span and promotes vitality. Dr. Robert Mccarrison of the British Medical Service tells a race of people in the Himalayas with magnificent physique, who retain the characteristic of youth until late in life, those people, he found, live on a frugal diet of goat's milk and vegetables.
**Requirements of food are**

1. Water  
2. Carbohydrates  
3. Fat  
4. Protein  
5. Minerals  
6. Vitamins

**Requirements of suitable food are**

A. Man requires a food to be palatable.  
B. Man requires a clean and wholesome food.  
C. Man requires foods which are digestible.  
D. Man requires economical food.

Milk ranks first in answering above requirements.

Our foregoing analysis of milk constituents and its place retained in nature as an Ideal Food need not require any amphotaxis.

Where milk is an Ideal Food for growing children, adults and expectant mothers, it also confronts great problems, as its ideal nature is too true to all kinds of organisms, organisms which are useful for dairy industry e.g., cream ripening, cheese making, and curd formation etc., and organisms which spoil the milk as well as pathogenic bacteria. Milk produced under unhygienic conditions may contain billions of bacteria of each species responsible for the spread of diseases. The present day necessity of milk quality control is a great check to reduce the bacterial content of the milk. Various diseases which are communicated through milk medium will be discussed under milk quality control.