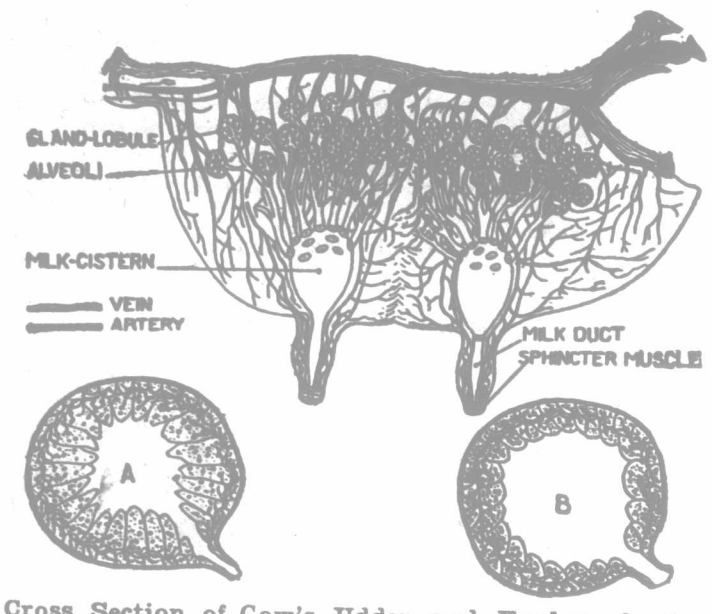
THE DAIRY.

UDDER OF THE COW.

The following article, from the book, "First Lessons in Dairying," by Prof. H. E. Van Norman, of the Pennsylvania Agricultural College, was reproduced in a recent issue of Hoard's Dairyman. It is good enough to pass on. A dairyman cannot inform himself too thoroughly concerning the structure and physiology of the cow's udder. Accurate knowledge is the best antidote for mistakes and irrational treatment.



Cross Section of Cow's Udder and Englarged Alveoli, Showing: (A) Epitheleal Cells Enlarged, as when Giving Milk, and (B) the Same when Not in Milk.

INCENTIVES TO SECRETION.

The birth of the young is the primary incentive to the secretion of milk by all animals which suckle their young. In some cases, manipulation of the secretory glands has induced the secretion of milk.

DEVELOPMENT OF THE UDDER.

In the wild animals and the modern scrub cow the udder is small and imperfectly developed. Improved feeding, selection and breeding have developed the udder of the cow until we have reports of an udder which weighed 41 pounds and 6 ounces; another which measured nearly 6 feet in circumference, or within 6 inches of the animal's heart-girth; and others that have secreted over 100 pounds of milk in a day; another, more than the animal's weight of milk in less than two weeks, and its own weight of butter-fat within a year, and over ten tons of milk within a year.

STRUCTURE OF THE COW'S UDDER.

The udder of the cow is described as one large gland, with four distinct quarters; also as two separate glands. It is suspended from the abdominal walls in a fibrous capsule, and is held together by fibrous tissue. Doctor Bitting has shown, by injecting colored liquids through the teats, that the halves are again very distinctly divided into two parts, and that only the milk produced in any quarter can be drawn from the corresponding teat.

A longitudinal section of a quarter and teat shows that the opening of the teat is guarded with a sphincter muscle. A cavity through the length of the teat is lined with folds of tissue, and just above the teat is another cavity, known as the milk cistern. This is not large, holding but a few ounces, and ducts open from this into the tissue of the gland. These ducts divide into smaller branches, which eventually end in little groups of cavities, the alveoli or ultimate follicles. They are in groups, which may be likened to a small bunch of grapes. They are lined with epithelial cells, and surrounded by a network of little blood vessels which nourish them. They vary in size from 1-250 to 1-100 of an inch in length, and from 1-1300 to 1-800 of an inch in diameter.

The blood leaves the heart through the posterior artery, which divides in the region of the hips. Here it again divides into two arteries, the common iliacs, and again into two more arteries, from which, after these have divided into many small capillary arteries, the cell tissue in the alveoli is fed.

MILK VEINS.

The cells use such portions of the blood as they need, and capillary veins begin to gather the venous blood into ever-enlarging veins, until it is collected in large veins just under the skin and surrounding the upper part of the udder, much like a rope tied around it. From this surrounding vein, or rather group of veins—for, according to Bitting, there are from fourteen to seventeen of them—large veins run from the fore part and posterior part of the udder back to the heart. These are the so-called milk veins. They do not contain milk, but are an indication of the milk-making capacity of the udder, in so far as they indicate the quantity of blood carried from the gland. If there happens to be pressure on the anterior veins, the blood may return to the heart by way of the posterior veins. The veins which run forward are often very tortuous, and may branch several times. They enter the chest wall through openings, termed milk wells, which are sometimes large enough to insert the end of the finger. Large, tortuous veins are considered an indication of ability to secrete large amounts of milk. However, if the hole in the abdominal wall is small, these large veins may be the result of congestion of the blood at that point.

THEORY OF MILK SECRETION.

The work of the mammary glands is secretory. Milk, as such, does not exist in the blood or elsewhere in the body. Dean says the source of the different milk constituents are probably somewhat as follows:

"The water is derived from the food and drink of the cow, by transudation from the blood, hence the importance of clean food and pure water for the cow.

"The fat comes from the albuminous portions of the food, and, also, in all probability, to some extent, at least, from the carbohydrates and fat of the food.

"The casein, albumen and sugar of the milk are probably derived from the nitrogenous parts of the food, through a special cell activity.

"The ash or mineral matter comes partly from the mineral matter in the food by transudation, and partly as a result of cell activity in the gland."

These are brought together in the udder and discharged as milk. Much of the activity takes place during the milking operation, as the slaughter of cows which have been giving large amounts of milk up to the time they were killed, with apparently full udders, showed only a small amount of milk in the udder immediately after death.

A Well-shaped Udder.

SHAPE OF THE UDDER.

The well-shaped udder is one that comes well forward, extends well up behind, has good-sized teats, squarely placed, and which is covered with elastic, yellow skin, and fine hairs.

A fleshy udder consists largely of fibrous tissue, and lacks in the secreting glandular tissue. Such an udder does not milk down when the milk is withdrawn. In the young animal, the udder is held firmly to the abdominal walls, while in old age the muscles stretch, allowing the udder to become pendant.

DAIRY PROGRESS IN FACTORY AND ON FARM.

The 23rd annual report of the Bureau of Animal Industry for the United States has recently been received by us. This is one of the most valuable reports published in English, with reference to agriculture. No country in the world is doing so much for the farmer as is the Republic of the United States. We in Canada are fortunate in sharing, free of cost, the benefits of the research and practical work done by our neighbor. Our conditions are very similar to those found in the Northern and North-western States, where most of the dairying operations are carried on; hence, any investigational work undertaken by the American people is of direct value to us, also. For this favor, we thank our friends. The duty is high on products between the two countries, but we are thankful that ideas interchange freely, without the intervention of the customs officer.

The report covers a wide field, but we shall refer briefly to dairy matters only.

BUTTER INVESTIGATIONS.

The effects of salt, exposure to air, churning sweet and sour cream, temperature for storing, etc., gave results as follows: Butter containing low percentages of salt kept better than butter of the same lot containing higher percentages of salt. Butter kept best in full cans or tubs, as compared with packages partly filled. Butter made from sweet cream gave better results than similar butter made from sour cream.

CHEESE INVESTIGATIONS.

Cheese made with 3 to 6 ounces of rennet per 1,000 pounds milk, scored higher in both cases when ripened at 32 degrees F. than did similar cheese, ripened at about 65 degrees F. It was also shown that taints develop more noticeably in the factory curing-room than in cold storage, and that taints and acidity were checked more by storage at 32 degrees F. than at 40 degrees F. It appears, also, that cold-curing derives its value chiefly from its effect on what otherwise might be poor cheese. In view of the growth of the popular taste toward mild cheese, it appears that the time is soon coming when all cheese, if ripened at all, must be ripened at low temperatures and the sooner it is put into cold storage the better."

The foregoing is in accord with similar investigational work done at the Ontario Agricultural College, Guelph. The sooner our cheesemakers and others interested develop the cold-storage plan of ripening cheese, the sooner will many of our present difficulties in the cheese business disappear. Many of the problems connected with the selling of cheese can best be solved by cold-storage.

THE DAIRY BARN AND STABLING.

The work of "Market-milk Investigations" is being rapidly extended, and includes studies concerning the production, delivery and distribution of market milk, and the organization and working of milk sanitary commissions and other organizations, tending to improve the quality of market milk. Plans are under way for organizing some system of scoring and registering dairies.

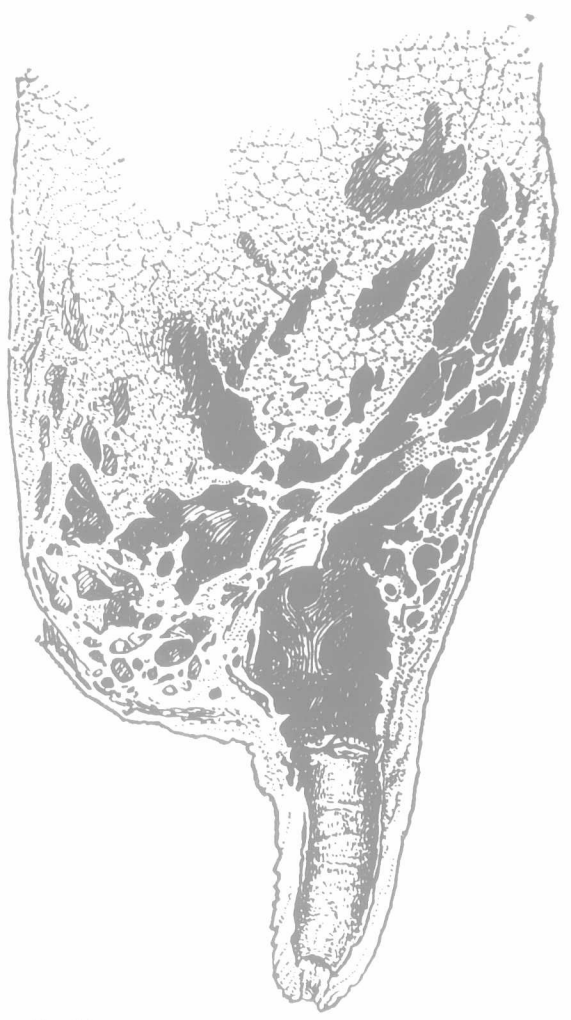
A special article on "Designs for Dairy Buildings," by Chief Webster, of the Dairy Division, contains a number of suggestions and illustrations of great practical value for dairymen. We select a few of the practical points, likely to be of service to Canadian readers.

1. The plan of stable for 24 cows, which is fully illustrated, contains 6 square feet of window for each cow.

2. The width of stall is 3 feet 6 inches, which is as narrow as should be allowed, while the length is 4 feet six inches, but this may be varied, according to the size of the cows in the herd. The manure gutter is 14 inches wide and 6 inches deep.

3. The entire floor is of concrete, 6 inches in depth when finished, laid over at least six inches of cinders or broken rock. Concrete is considered the best material for a floor for several reasons: (1) It is the only material that is sanitary: (2) it is economical, because of its durability; (3) when a reasonable amount of bedding is used, it is comfortable to the animals, and no bad effects result.

4. The alleys behind cows are 4 feet wide. Manure should be taken away from the barn daily, and deposited in a manure shed, or on the field. It is undesirable from the standpoint of



Longitudinal Section of a Quarter of an Udder.