keep out dust and mice, and they will be all ready to be used when needed. "Oh," but says some one, "I have been told that bees will not work the foundation as well when it has been kept so long." After fourteen years' experience in using foundations, I am fully convinced that the bees will work it just as readily and as well as that which is newly made. When looked at in cold weather, it seems almost impossible that bees could work this old, hard-looking stuff; but wait till the warm summer days come, and the warmth of the bees affects it, and we will find it as soft and pliable as that which is fresh from the mill. We must procure a sufficient quantity of frames for next season's use; put them together, wired and the foundation put in them; then hang them in our empty hives and pile them up the same as we did our cases of sections, being sure to place a cover on the top one to keep the mice, etc., out. Now, let us be sure that we have sufficient hives, frames, supers, sections, etc. I always provide for a good honey flow, and if we do not get it, the things we do not use will do for another season; and if we do get a real good flow, and are prepared to receive it, the amount we get over what we would have got had we been unprepared will pay us many times over for the things we have to carry over in a poor season. We ought to have at least two upper stories for each hive for extracting, or three section cases to each hive if working for comb honey. Then we want to prepare hives to receive swarms; at least one brood chamber and one or two upper stories will be needed for each new swarm. Let us see that all our honey-boards and other utensils are cleaned and put away some place where they will be handy for use next season. These long winter evenings are just the time to study up and gain all the knowledge possible pertaining to our pursuit, therefore every bee-keeper ought to have one or more of the many text-books, and should take some journal that is either in part or wholly given up to bee-keeping, and read and study up everything that will be likely to be of benefit to him in our line of business; and we are assured that any one doing this will be more likely to succeed than he will if he spends his evenings at the corner store or the saloon. After having attended to all the above and any other of the many things we may see necessary to be done, if we still have any time on our hands, let us visit other bee-keepers and have a chat with them about the honey market prospects of the coming season, or any of the many topics which bee-keepers can find to talk about, and my word for it, you will be a better man for the visit, and will be more likely to make a success of your calling than if you always stay at home, or, leave everything to be done until the bees are swarming.

VETERINARY.

Dentition and Dental Diseases of Farm Animals.

BY DR. MOLE, M. R. C. V. S., TORONTO, ONT.

(Continued from Page 485.)

The determination of age by means of the horns in cattle has been long known, but very little has been recorded on the subject. The horns of cattle rising more or less gracefully from the frontal bones were undoubtedly intended for weapons of offence and defence. The base of the horns is composed of two cores or conical bony projections of porous structure, richly supplied with blood vessels, and always communicate with the sinuses of the head. Soon after birth the calf shows two little button-like points of horn, which slowly emerge from the skin; in eight or ten days the points are through, showing the color of the horns; at three weeks flexible horn has appeared; at five or six months the horn commences to curve on its long axis, which continues for twelve months.

In the second year the horn starts a fresh growth, and a small groove is found encircling it between the substance secreted the first year; during the third year a second groove forms. These grooves or furrows are not well marked, and all traces of them disappear as the animal becomes older. From three years the growth of horn is marked by a decided groove or furrow: between them is a decided ring or elevation of horny substance, which forms an accurate basis for judging the age of cattle. The growth of a new coat of hair in the spring of the year is marked by the development of an extra thickness of horn, while the cold season corresponds to a period of comparatively interrupted growth.

With this proviso, counting the apex as three years, add one year for each groove or ring which is present towards its base; this will give an accurate record of the animal's age. The rings are always better marked on the inner than the outer side of the horn.

Many causes tend to diminish their value in estimating age. The horns are frequently sandpapered, filed, scraped and polished, to give them fine appearance when fitted for show purposes, so that for the first four years the teeth are the most valuable indications, whilst from four to ten the horns furnish the more accurate signs. Dealers will scrape and rasp the horns to destroy the evidence of age, but to any one acquainted with the anatomy of the growth, they can rarely be deceived. The two horn processes arising from the frontal bone correspond to the shape of the horn which they support. These are termed the flints or horn core, which are porous in their nature, especially at the roots; as age advances the interior sinuses become larger, and the foramina or holes through which travel arteries and veins are continuous with the frontal sinuses to the nostrils. We suppose some unenlightened individual happened to pierce one of these foramen, and finding a cavity made the marvellous discovery they were hollow; from that, we are inclined to think, dates the absurd designation of every cattle complaint in America "Hollow Horn."

How it arose we cannot get any data. It is not known in the Old Country, that we are quite certain; it is one of the common and popular errors that will never die. The cavity in the horn core is a part of the system of air chambers, which serve to lighten the head without altering its size or shape. This bone of the horn has a rough, uneven surface, which holds firmly the fibrous and vascular membrane known as the matrix or horn shell.

The blood required for the nourishment of the bone is furnished by capillary vessels passing into the bone; from the deep layer of the periosteum the nerve trunk enters the horn on the inner front above the eye, and there branches off into numerous filaments.

PART II.—THE TEETH OF THE OX.

It is difficult to get specimens of oxen that will show exactly the age desired. We should be pleased to receive from any of our numerous readers the incisor teeth of pedigreed stock, where the birth has been recorded, as illustrating the extreme age of cattle.

The anterior surface of the frontal bone is flat and broad, especially in the male. A cow with too broad a forehead is likely to prove a poor milker, having very small teats; whilst an animal fine in the horn will have fine hair, get fat easy, with a fine sleek skin. If too broad in the bull or steer, the animal is usually a bad feeder—as butchers say, "all front"—that is, big lumbering shoulders, no quarter, and very small hind parts. In front of the mouth there are eight incisors or cutting teeth in the lower jaw only; in the upper jaw there is an elastic pad of fibrous tissue covered with mucous membrane. As bearing on the question as to how the teeth of the ox disappeared from the upper jaw, it is to be seen by comparative anatomy, that when an animal required weapons of offence or defence, the canine teeth disappear and horns appear, showing as one weapon increases in efficiency another dwindles or disappears.

The kind of food made use of has also another bearing in determining the character of the organs of mastication of an animal. The muscles may be divided into two classes—those opening the jaws and those for biting, crushing and grinding. The temporal or biting muscle is inserted into the lower jaw, near the angle or hinge, being far too weak to do much work in crushing or masticating the food; but what they lose in power they gain in quickness. Hence we find it largely developed in the badger, hyænas, cats, wolves and dogs, whereas in the herbivorous sheep and ox it is exceedingly small. In chewing the crushing power requires greater force, hence we find the masseters are large, as in horses and oxen. True ruminants embrace many widely spread and numerous species. Vast herds of antelopes in Africa, which browse on the open plains, retreat to the hills, woods or marshes to chew the cud, living less in the woods than the deer tribe, depending on their fleetness rather than upon their horns as weapons of defence.

Gordon Cumming, in his African travels, relates an instance of an antelope, when brought to bay, stabbing right and left by means of his horns amongst his hounds, killing four of them before he was able to arrive to their assistance.

Sheep and goats select mountainous districts to feed, and their horns are generally so turned at the end to protect the head and receive the brunt of falls over rocks, etc. Oxen depend upon their powerful horns and mutual association for defence.

The mass of grass which ruminants have to chew requires to be cut and crushed in every direction. The means adopted for this purpose is very perfect.

The molars are so arranged that they fit into one another; the tops of the lower teeth fit into the cavities of the upper, so that when they pass each other there is a sort of scissors-like action, by means of which the food is first divided, and there held until the crowns meet and crush it.

The incisors may be distinguished as centrals or first pair, middles or second pair, laterals or third pair, and corners or fourth pair, the same terms being applied to the temporary and permanent teeth. Why should all animals have two sets of teeth—temporary and permanent? One author suggests that it is in order to accommodate the adult animal with a larger set than would have been convenient for its young state; they are easily distinguished from the temporary by their size and dark color. The fangs of the temporary teeth are much shorter; the size whiteness and smallness point out their distinguishing character, whilst the term "broad teeth" indicates the permanent.

[TO BE CONTINUED.]

POULTRY.

Prize Essay.

Mr. W. J. Stevenson, Oshawa, Ont., offers a setting of Wyandotte eggs to the young man or woman, under twenty years of age, who sends us on or before February 20th the best essay "On the Management of Fowls on the Farm." Mr. Stevenson writes us: "My flock of Wyandottes are very fine; the cock now in use won a prize at the World's Fair, the hens are of equal quality."

Poultry on the Farm.

BY MRS. IDA E TILSON, WEST SALEM, WIS.

At the Juneau Co., Wis., Institute, where I read a poultry article, there was some discussion concerning the kind of hens to be recommended, and one speaker thought tame hens, which could be handled and controlled, answered the inquiries. At another western Institute, where the best breed of swine was being sought, an old lady said the "swillpail breed," I presume meaning any sort that would eat thankfully what was offered. These general answers, though suggestive, hardly answered after all. There are many varieties which it might be possible but not expedient to keep in certain localities and circumstances. The main things to be considered are our purpose and our climate. For several virtues I have tried and loved several or more breeds. There are Leghorns, which a modest young woman called "Limbhorns," known time out of mind in the Mediterranean countries, probably akin to the very fowls of Socrates and Cæsar. Recent travellers tell of Leghorns seen tethered to stakes in the very hearts of old Italian cities—so easy, common and persistent is poultry culture there. They find the brown color prevailing, and I think such are more active than the white, though with combs still larger and tenderer. If we raised fowls for sentiment, everybody would choose Leghorns. In the course of a year they do, by unanimous assent, yield more eggs than any other breed, but, unfortunately, are apt to lay most of them in summer when prices are lowest. A neighbour, whose flock averaged 132 eggs apiece last year, said all the work was done in warm weather, and she had not coaxed an egg this winter. I think Leghorns are the choice a little farther south, but here they sit on the roost too often, nursing their toes and combs. Mine lay fairly all the time, and good care is much in their case, but a five or six-months winter is more. Other fowls can endure a severer climate with less attention and better results. Though it is impossible to secure everything in one breed, hardiness can never be ignored at this latitude, nor permanent success come till we use as breeders, each year, those strongest and heartiest, and thus get a weather-proof flock. I have done very well with a first cross of Plymouth Rock and White Leghorn. Some settings of such eggs given an old lady, a mile or so away, brought two of her neighbors here to ask the name of that large white breed laying so beyond usual in winter. Brown Leghorns are so small that the surplus cockerels are not ready for market till they are nearly grown, which, on a farm, where chicks cannot so conveniently be forced along, makes their sale late and profit less. My Plymouth Rock broilers, pure and crossed, were fine eating the last of June, but at a neighbour's I saw Brown Leghorns only just suitable in August, and their owner proposed changing breeds for that very reason. An acquaintance of mine disposed of his common stock and secured an entire flock of full-blooded White Leghorns; warned that the latter were non-setters, he declared he had never met a hen but would set all he wished her to, yet, notwithstanding Leghorns may set when old or late in the season, and prove extra mothers, his wife did borrow Plymouth Rock cluckers, and their chickens were late and few. On a farm, where fowls are not yarded, it is usually best to keep one breed—some general purpose kind. Nevertheless, I shall part from my Leghorns with genuine regret. They seem to say, "Are we such very poor little things?" as young Indian girls at Hampton, Virginia, asked their teacher when a visitor exclaimed, "Poor little things!" These fowls are good foragers, and not excessive eaters. They have an extra quantity and quality of breast meat, which I, with many others, enjoy. A Leghorn egg is large, its pearly white outside is always fashionable for boiling in the shell.

My own choice for this climate lies between Wyandottes and Plymouth Rocks. A Minnesota paper has stated that Mr. Gilbert, of your own Canadian Central Experiment Station, endorses them. For me, the Wyandottes lay rather better, and provide more breast meat with a less greasy flesh throughout. They also grow old more gracefully, that is, do not as soon nor often put on excessive fat and then set "forever and a day." I have seen Plymouth Rock hens so fat they could be of no use except to show lazy pullets what any of them might become. I believe the Wyandottes are hardy enough, and they are proving particularly suitable for crossing on and grading up common flocks. Each year get a new Wyandotte rooster, constantly save the best pullets, and, without much expense,