The immunization of swine against cholera has been done on a large scale in the United States for several years. Some rather perplexing problems arise relative to losses after vaccination. It is probable that the larger per cent of losses after vaccination are not due to cholera. But certain factors should be given some consideration, thus from the clinical aspect, cholera is apparently less acute than it was prior to the time of extensive vaccination; that is, cholera virus is less virulent or swine are more resistant. Because of the extensive use of serum and virus it is very probable that there is increased resistance of swine to cholera virus and therefore it may be advisable to increase the dosage of virus.

Sweet clover hay is a splendid food, but unfortunately poisoning sometimes occurs and many feeders have had rather extensive losses. The safety of sweet clover can be ascertained relatively easily and with little expense, according to Schalk. The safety test is made with rabbits. The rabbit is, as a rule, more sensitive to the injurious influence of the sweet clover than the bovine, and the poisoning occurs earlier in the rabbit than in the bovine. Thus rabbits show the effects of the sweet clover in from 6 to 20 days, or an average of from 7 to 11 days, and this is about 10 days earlier than cattle become affected.

When sweet clover is to be fed, it is therefore advisable to begin feeding 4 to 6 rabbits at the same time, and if they develop the disease and the feeding of the sweet clover to cattle is discontinued, there should be no loss of cattle.

A method of examination of milk by ultraviolet light is said to show clearly the difference between dirt from outside sources and alteration in milk due to casein or albumin curds. This method of examining milk is being perfected by Litterschied.—Science, 58-1759.

Various methods of immunization against anthrax have been advocated. Because of the apparent variation of the virulence of the anthrax germ in different localities and during different seasons, practically all methods of immunization regardless of the product used have been both successful and unsuccessful. In other words, the control of anthrax is still a problem. However, there is a possibility that anthrax aggressin may solve the problem. According to some reports the intradermal injection into the caudal fold of 0.2 c.c. of the Pasteur anthrax vaccine in a series of over 400 cattle has given splendid results.

Vitamins have been supposed to be chemic substances possibly similar to ferment. A group of investigators at the University of Copenhagen conducted experiments recently in which it appeared that vitamins are a by-product of a virus.—Science.
The Show Window of the Live Stock Industry

ARM relief has been and continues to be a pressing and pointed issue of politics. What it constitutes is a matter of spirited dispute.

Farm resources are facts of the moment. What they constitute, and to what ways they may be turned to yield the greatest amount of profit to their producer is to be seen each year in the International Live Stock Exposition.

From December 1 to 8 this colossus of live stock shows will open its doors out at the Chicago Union Stock Yards to both farm and city folks, and to the finest array of crops and live stock that the nation can produce. Chicago will have the eyes of the agricultural world upon it, and Chicago is looking forward to it.

For over a quarter century this has been the established time when the country comes to town. The International brings them. Humanity swarms to the great pavilion out at the Chicago Stock Yards that houses the finest specimens of stud, feed-lot, and range. Here the millionaire live stock fancier from the East meets and mingles with the shepherd and cowboy from the range.

In the Grain and Hay Show products of the fields of Saskatchewan will be seen along with those from Australia and New South Wales, and will vie for the attention of the visitor along with those from the United States.

Testimony to the good work being done by the young people of today in agriculture will be seen in the Boys' and Girls' Club Congress, which is the annual national gathering of junior livestockmen and youthful homemakers. These young men and young women of the farm represent the cream of each year's crop of the on-coming rural generation. Most of them attend on the basis of trips won in reward of some particular line of 4-H Club work, wherein they excelled in their home state and county shows.

Railroads, fair boards, breed associations, packing companies, and various other organizations interested in the future welfare of the American farm, recognize this splendid way of assuring it, and so offer these trips each year, where these outstanding youngsters may meet one another, thereby broadening their contacts, and where they may further compete with each other for the national honors that the Club Congress and the International Live Stock Exposition offer them.

An exhibition that attracts a good many is the "Meat Shoppe," first shown at the 1924 International. It serves the valuable purpose of spot-lighting the various cuts of beef, sheep, and swine carcasses together with the comparative grades of each. Several different associations, organized for the purpose of extending the production and consumption of meats on the basis of better quality, are co-operating with the International in arranging this interesting and at the same time highly educational exhibit.

It is considered a notable addition to the educational function of the International, since the visitor is now shown not only what top-notch quality of beef, lamb, and pork looks like on the hoof, but on the hooks as well, and as a third step, on the butcher's block. It all works back to a stimulus to the breeder and feeder of live stock to produce better animals, the superior cuts of which bring a better market with the retail trade.

Since with the fatted steer on the hoof, the judge's opinion is subjected to the exacting test as to how well his various winners appear on the block after slaughtering and dressing, the work of judging the steer classes is considered as belonging only to the most expert. Distance is no factor in obtaining this authoritative opinion, as witnessed by the fact that foreign countries are...
frequently drawn upon to send judges to the International.

So excellent and pleasing an impression did Walter Biggar, of Dalbeattie, Scotland, make at the last International, in the discharge of his duties as judge of the individual fat bullocks, that a promise was secured of him to return to the United States for two more years, with the express purpose of tying the ribbons in this division of the show.

Another foreigner who will be wearing one of the judge’s badges at the coming International is Mr. Martinez de Hoz, an Argentinian, who is now on the way to the United States from Buenos Aires to judge the Shorthorn cattle at the International. A Canadian of note among live stock circles, who will visit the International in the capacity of judge, is William Dryden of Brooklin, Ontario. He will serve as one of a committee of three to pass upon the Aberdeen-Angus breed.

Among the many features of the coming exposition that will hold in them much of interest for all the family are the price soaring auctions of fat cattle that follow the judging of these classes, auctions of carefully selected breeding stock of the Aberdeen-Angus, Shorthorn and Hereford breeds, a brilliant evening Horse Show, and many different educational exhibits and others.

As an added encouragement to all who wish to attend the International, railroads entering Chicago are offering special reduced round-trip fares during the week of the exposition.

Undulant Fever in Man

As a problem for veterinarians, undulant fever in man is probably more to the fore in Montana than in any other state. In that state the Livestock Sanitary Board has supervision of the dairies and sanitary control of the milk supply within the state. Commenting on the situation there, State Veterinarian Butler says:

“There is hardly a day goes by that the question of undulant fever or the effect of the Br. abortus on the human system is not brought to our attention. At every meeting of the State Board of Health and at every meeting of public health offices of the state this question is discussed.”

Undulant fever in man due to infection from milk has been shown to be more frequent in Denmark than typhoid fever. Pasteurization of the milk is an effective safeguard against the infection.
Veterinary Medicine in 1928

THE conditions surrounding veterinary practice probably did not differ much during the year that is closing from those of 1927. The average income of salaries of veterinarians was, of course, increased by the material increase in salary that accrued to the 1,300 veterinarians in the Bureau of Animal Industry, upon the passage of the Welch bill and the Veterinary bill by the Congress. The salaries of veterinarians in school, state, county, municipal and commercial employ will unfaithfully be favorably influenced by the increased salaries in the Federal employ. The income of veterinarians engaged in general practice is largely controlled by agricultural conditions. The agricultural industry seems satisfied with its prospects, judging by the vote of agricultural states in the national election, and if its guess is right, better practice and better income is in store for the general practitioner.

In the matter of scientific progress, 1928 has been fruitful. Some important research work has been concluded and information supplied on other projects. The articles and abstracts that have been published in Veterinary Medicine during the year tell the story of the profession for the year better than any summary here can tell it. The more outstanding among the new things in 1928 are:

In cattle, the hypocalcemia theory of milk fever; infectious pulmonary edema; the communication of undulant fever from cows to man by contact; and additional information on B. C. G. vaccine.

In swine, infectious pulmonary edema; anemia of suckling pigs; swine dysentery; and the communication of undulant fever from swine to man by the handling of uteri infected by swine type of Br. abortus.

In small animal practice, paratyphoid and epizootic encephalitis of foxes; the pathogenicity of B. bronchisepticus from canine (and other animals) sources for man; the cause of black tongue or Stuttgart disease; and additional information on canine disin-temper.

Among other matters of a general nature worthy of particular mention in the record of the year, may be included:

A more general use of anesthetics. This is easily noticeable. At no time during the most extensive veterinary clinic ever held—the A. V. M. A. clinic in Minneapolis—was there a cry of pain from any animal. The same can be said of many, perhaps all of the smaller clinics held by state and district veterinary organizations during the year. The

1 Abstract in this issue.
2 Specific Pulmonary Edema of Cattle, by J. D. Ray; Veterinary Medicine, Vol. XXIII, No. 11, November 1928, pp. 490-491.
3 Undulant Fever, by Bernard Ange; Veterinary Medicine, Vol. XXXI, No. 1, January 1928.
4 Undulant Fever in Man from Bovine Abortion Organisms, by F. A. Hardy; Veterinary Medicine, Vol. XXIII, No. 6, June 1928, p. 246.
5 Contagious Abortion in Cattle and Its Relation to Undulant Fever in Man, by M. J. King; Veterinary Medicine, Vol. XXIII, No. 11, November 1928, pp. 492-493.
6 Abstract in this issue.
7 Veterinary Medicine, Vol. XXIII, No. 1, January 1928, p. 3.
8 Prophylaxis of Bovine Tuberculosis, by C. Guerin; Veterinary Medicine, Vol. XXXII, No. 2, January 1928, p. 91.
9 B. C. G. Vaccination; Veterinary Medicine, Vol. XXII, No. 4, April 1928, p. 176.
10 Reports of B. C. G. Vaccination, by Sir John M'Fadyean; Veterinary Medicine, Vol. XXIII, No. 4, April 1928, pp. 185-186.
11 Research on B. C. G., by E. A. Watson; Veterinary Medicine, Vol. XXXII, No. 9, September 1928, pp. 393-394.
12 B. C. G. A Matter for Experiment, by C. E. Cotton; Veterinary Medicine, Vol. XXIII, No. 9, September 1928, pp. 396.
13 Abstract in this issue.
14 Swine Dysentery, by R. A. Whiting; Veterinary Medicine, Vol. XXIII, No. 10, October 1928, pp. 466-467.
15 Abstract in this issue.
17 Is Canine Distemper a Danger to Children, by Arthur H. Bryan; Veterinary Medicine, Vol. XXIII, No. 11, November 1928, pp. 496-497.
18 Abstract in this issue.
22 Canine Distemper, by Chas. Lebailley; Veterinary Medicine, Vol. XXIII, No. 2, February 1928, p. 96.
23 Virulence of the Cephalo-Rhachidian Liquid in Distemper, by V. Robo; Veterinary Medicine, Vol. XXXII, No. 4, April 1928, pp. 189-190.
24 Observation on Canine Distemper, by F. W. Wood; Veterinary Medicine, Vol. XXIII, No. 9, September 1928, p. 391.
same universal use of adequate anesthesia has extended very generally to ordinary veterinary practice. This, of course, is ascribable very largely to an improved technic for local anesthesia—the epidural or Benesch method—which, introduced in this country but little more than two years ago, has been adopted everywhere to the improvement of veterinary surgery not only from a humane point of view, but from a surgical viewpoint as well.

Feeding in its relation to the prevention of disease has received unusual attention from research workers and while it is too early to announce conclusions, this is a field of promise. This is a subject that vitally concerns veterinarians and they will watch with keen interest developments now on the way that may have more far reaching effects in the prevention and cure of disease than the vitamin discoveries of the past few years have had.

In this issue the reviews of veterinary literature of the year have been grouped for the convenience of readers and in the introduction to each group as "Public Health," "Cattle Practice," "Animal Husbandry," etc., is given a further mention of matters of outstanding interest pertaining to that particular subject.

In preceding years an attempt has been made to abstract in the December issue of this magazine all valuable contributions to the veterinary literature of the year of permanent importance to the practitioner.

During 1928 the literature of the profession has been too voluminous, the important articles that have appeared too numerous to permit of their being abstracted within the space limit of a single issue of VETERINARY MEDICINE. Hence, it has been assumed that readers of this review have read the preceding eleven issues of this publication and have preserved their copies, and no review of what has already appeared in this publication is given.

The abstracts already published during the year number 70 and give a summary of that number of important articles published in the United States, Canada, Europe, Australia and Africa. No review of the veterinary literature of the year can be considered complete without the inclusion of those abstracts, or without the important articles that have been given original publication in this magazine, which incidentally number more than have appeared in any other publication.

This annual review then is supplementary to what has been published previously during the year in this magazine.

NECESSARY EXPENSE INCURRED IN ATTENDING CONVENTIONS DEDUCTIBLE ON INCOME TAX, RETURNS

The Board of Tax Appeals reversed a decision of the Commissioner of Internal Revenue, October 2, in which he held that amounts expended by a physician for railroad fare, hotel accommodations and meals in attending meetings of medical societies were not deductible in computing physicians' federal income taxes. The board held that expenses so incurred were deductible under the law as ordinary and necessary expenses.

Since a similar deduction has already been allowed to ministers and chemists, there seems no probability that deduction of expenses incurred in attending veterinary meetings will not be allowed.

It is necessary to furnish proof of the expenses when making the return and in applying for a refund for taxes paid on income used for such purpose to furnish proof of the expenses and file the application for refund within four years of the time the 1924 and 1925 taxes were paid and within three years of the time the 1926 and 1927 taxes were paid.

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Regional Anesthesia, by M. P. Limousin; VETERINARY MEDICINE, Vol. XXIII, No. 4, April 1928, p. 188.

VETERINARY MEDICINE

Animal Husbandry

A VAST amount of research work is constantly under way on animal husbandry problems. In the majority, such research concerns the veterinarian only indirectly. Many of the problems, however, that are being worked out by animal husbandry research workers are of as direct and almost as much importance to veterinarians as is research work on strictly veterinary problems.

For example, the McLean County system of sanitation in swine husbandry increases by fifty per cent the number of pigs that can be raised from a given number farrowed and greatly increases the profit from such pigs as are raised. Obviously, pigs that die in early life cannot be vaccinated later by veterinarians, and a swine industry that is unprofitable because of baby pig losses or for other reasons cannot furnish a profitable veterinary practice.

In the same way the constant and rather rapid increase in the average milk production of dairy cows brings with it a constantly increasing number of udder ailments that require veterinary attention, and by making dairy cows more profitable, makes the owner more inclined to go to the expense of veterinary services for ailments that interfere with the milk production, and therefore decrease the profit of valuable animals.

Likewise, selective breeding to increase the average number of lambs dropped by the ewe is important to veterinarians, since so far as our observation now goes, parturient paralysis in sheep is a disease principally or solely of the multiparous ewe. Or selective breeding to obtain a strain of chickens resistant to bacillary white diarrhea, if successful, would save millions of chickens for the possible attention of veterinarians later, and by making the poultry industry more profitable, make poultry raisers more inclined to incur the cost of veterinary services.

Processing Feeds

Certain commercial firms make strong claims for the advantages of “processing” feed in reducing the cost of feeding animals.

It is claimed that the crude fiber, the indigestible woody part of forage, is broken down into digestible carbohydrates in the fermenting or enzymatizing; that starches are converted into dextrose and other sugars, making the feed more palatable, and that roughages processed will largely do away with the necessity for feeding grain, thus greatly reducing the cost of feeding animals.

Both the Ohio and the Wisconsin Agricultural Experiment Stations have investigated the “processing,” fermenting or enzymatizing feeds and both agree that the claims of advantages for the processed feeds are not founded on fact. Careful laboratory studies and large scale experiments led to the conclusion that neither this nor any similar process now known depending upon fermentation or enzyme action is capable of breaking down the crude fiber of plants to any appreciable extent, and they were unable to find a single instance where any worthwhile amount of dextrose or other reducing sugar has been formed from hay, corn stover, straw or other roughage by treatment by these processes.

To summarize:

The fiber of feeds is not broken down by this process. Any increase of sugar even when obtained, is offset by a corresponding loss of equally valuable starch. If there be any change in the status of the protein, it is probably rendered less digestible. There is no suggestion or indication of any significant improvement in the fat, minerals, or vitamins of the feeds due to this process.

Improvement in flavor and increased feed consumption would then seem to be about the only points at which it would be reasonable to expect any decided benefit by treating feed in this way. In the judgment of the writers, this increase of palatability and of sugar content can be much more readily and

\[18\] Processing Feeds by A. E. Perkins and C. F. Munroe; Bimonthly Bulletin, Vol. XIII, No. 5, Ohio Agricultural Experiment Station, Wooster, Ohio.
cheaply obtained by the use of small amounts of feeding molasses.

Additional attention to the time and method of cutting, curing and storing the roughages may also in many cases improve their palatability and feeding value more cheaply and with less effort than would be necessary to process the feeds by fermentation methods.

None of the feeding experiments that have been reported have shown any benefit to the animals from processing their feed. Extensive laboratory studies give little indication that sufficient improvement is possible to make any similar process now known of practical value.

The Experimental Station (Ohio), therefore, must warn against the use of any such process until its usefulness and economy have been established by reliable experimentation.

__Production of Iodized Milk__

Since many farmers are feeding commercial feeds that are advertised to contain iodin, others are using iodized salt, and some milk companies claim to supply iodized milk, it seems important economically to determine the iodin content of milk and if it is increased by adding iodin to the feed of the cows, and an experiment with this in view was undertaken by Monroe.14

The milk of 20 cows was tested for iodin at the Ohio Experiment Station over a period of two years. No iodin was detected and the claim is made that the milk was either iodin free or that the iodin content was lower than 10 parts in a billion.

When two grains of calcium iodid per cow, per day had been fed for a period of 30 days, an analysis showed the presence of iodin in the milk in an amount estimated at between 1 part in 100,000,000 and 1 part in 10,000,000.

There are more direct, more convenient and more economical methods of incorporating iodin in the human food, where necessary, than giving it to cows that produce milk for general consumption.

14 The Possibility of Producing Iodized Milk, by C. F. Monroe; Bimonthly Bulletin, Ohio Agricultural Experiment Station, Vol. XIII, No. 4, July-August 1928.

__Aphosphorosis in Cattle__

Depraved appetite, a craving for things not classed as food such as wood and bones, which occurs in cattle is usually due to a lack of phosphorus in the ration. It is prevalent in regions where the soil is deficient in phosphorus. This condition usually occurs among young cattle and milking cows where the rations consist of roughages, such as hay, silage and pasture. Cattle may also suffer from a phosphorus deficiency when roughages are supplemented with cereal grains, such as corn and oats, which are low in phosphorus.

Depraved appetite can usually be relieved by feeding phosphorus either in the form of protein concentrate or as special steamed bone meal. Feeding a mixture of two parts of special steamed bone meal to one part salt will usually relieve the depraved appetite, although, occasionally, a cow will become a chronic wood or bone chewer and the addition of phosphorus has but little effect on the habit.

Most home grown feeds are low in phosphorus, which is the mineral element most likely to be deficient in the ration of dairy cattle. Phosphorus is needed for bone and muscle formation in the growing animal and for milk production and skeleton maintenance in the milking cow. Roughages, such as hay, silage and grass, are inherently very low in phosphorus.

The common protein concentrates fed to dairy cattle contain a fairly high percentage of phosphorus and when a grain mixture containing either cottonseed meal, wheat bran or linseed oil meal is fed, additional phosphorus in the form of a mineral supplement is rarely needed.

Both long and short time experiments15 have been made to determine the effect of rock phosphate as a mineral supplement to a ration deficient in phosphorus. The conclusion in both instances was that the feeding of rock phosphate to cattle is inadvisable.

In the long time feeding experiments, serious injury resulted from softening of the

teeth. When rock phosphate was fed to cows during lactation the milk flow was lowered and the appetite impaired. Bone meal did not have this effect.

In many sections growing cattle and milking cows do not receive sufficient phosphorus where pasture grasses constitute the sole ration. In such cases, a supplement of protein concentrates as wheat bran, cottonseed meal or linseed oil meal or a mineral supplement supplying phosphorus should be given. A good mineral supplement for cattle on pastures is two parts of bone meal to one part of salt. Allow free access to this mixture.

**Bitter or Margarine**

Oleomargarine, or margarine as its makers call it, is more completely controlled and supervised by the Federal government than any other article of food. Every step in the manufacture and sale of the product is subject to the most rigid and efficient inspection.

The control of the manufacture is for the purpose of insuring purity and wholesomeness; the control of the distribution, to prevent it reaching the consumer under the guise of butter.

The sale of oleomargarine has long been the subject of controversy. The product is violently opposed by dairy interests on the ground that its competition with their products is an unfair practice. Practicing veterinarians have been inclined to take the side of the dairy interests in this controversy.

However, no one questions the wholesomeness of oleomargarine. Margarine has been increasing in popularity and now occupies an important place as a food product and supplies a market for large amounts of farm products, a very considerable proportion of these being dairy products. In 1926 margarine manufacturers in this country used more than 72 million pounds of milk, nearly two and one-half million pounds of butter and more than 25 million pounds of cottonseed oil. In fact, the only important products used in oleomargarine manufacture that are not produced on American farms are cocoanut oil, about 100 million pounds, and salt of one-fifth this amount.

Of oleomargarine, Dr. W. A. Evans of Chicago, in his "How to Keep Well Column," stated recently: "Any mother who wants to feed her family butterine instead of butter can do so with the certainty that she is not harming them."

**Low and High Producing Cows**

The difference in profit from cows of varying production is strikingly shown in the records of a five-year study of cost accounts on a number of Medina County, Ohio, dairy farms.

Cows in herds averaging less than 6,000 pounds of 3.5 per cent milk in a year produced this milk at an average cost of $3.08 per hundred pounds at the farm, while those producing more than 9,000 pounds annually had a cost of only $2.29 per hundred pounds. Feed cost per hundred pounds of milk was $1.72 in the low-producing group and only $1.33 in the high-producing group.

The data on returns from milk indicate that, under conditions then prevailing, cows producing less than 7,500 pounds of milk per year were not returning their owners a very large wage for labor. With milk selling at $2.67 per hundred at the farm, the average cow in herds producing less than 6,000 pounds of milk failed by $21.67 of breaking even when all costs were charged against her, while those in herds producing more than 9,000 pounds made an annual profit over all costs, including labor, amounting to $36.96 per cow. Those farmers whose cows were in the low-producing class were realizing a return of less than 11 cents per hour of labor spent on the dairy enterprise, while those whose cows produced more than 9,000 pounds per year were receiving 51 cents per hour. Farmers should be as much interested in selling their labor to the best advantage as in getting good prices for their products. Selecting cows with a capacity for production and feeding them accordingly...
to approved standards form the basis for successful dairying.

Starvation Not Immediately Harmful to Cattle

Studies were undertaken by the New Hampshire Experiment Station\(^1\) in cooperation with the Nutritional Laboratories of the Carnegie Institution of Washington, to determine the maintenance feed needed for cattle. It was discovered that the bovine has a remarkable capacity to accelerate or slow down its activities in accordance with the available supply of food, and that steers may be carried through a period of three or four months on exceedingly low rations without affecting their general health or lessening their power to regain a suitable market condition with subsequent liberal feeding—a conclusion of practical value to the stock man.

With steers there was a distinct tendency for the fat to fall off rapidly during the first one or two days of fasting. As fasting continues however, the heat or energy production continually and regularly declines. This is important on the range where herds are sometimes exposed to inclement weather (blizzards) and lack of feed at the same time. If the fasting continues for more than two days, the capacity of the animals to withstand cold is very much lessened.

The authors believe that the “hunger feeling” is merely the temporary sensation caused by physical contraction of the alimentary tract to meet requirements of a diminished bulk, and in no sense represents distress due to lack of nourishment of the tissues.

Oats a Valuable Feed for Swine

Methods of utilizing oats to better advantage are greatly needed in regions where this crop is grown extensively. At the Ohio Experiment Station,\(^2\) a number of tests were made and from the results the following conclusions were reached:

1. Oats are too bulky as the only grain for pigs;
2. As a partial substitute oats have a higher value than as a complete substitute for corn;
3. Oats should be ground for pigs;
4. Hulled oats produce rapid gains;
5. Hulled oats with corn constitute an economical feed;
6. Soaking oats for swine is of little value.

Hay Essential to the Growth and Reproduction of Cattle

There are circumstances under which a complete concentrate ration for the large animals would be very advantageous, and such a ration has long been sought, but unsuccessfully. In various armies the search for a ration for horses that can be concentrated into small bulk has been diligent, but so lacking in success that starvation and exhaustion, in greater or less part due to an inadequate ration, remain the principal causes of the wastage of army horses in the field.

In feeding cattle, circumstances are often such that it would be economical to substitute other feed for the hay, grass or silage usually included in the ration, and many unsuccessful attempts have been made to find a ration without hay, grass or silage adequate for the growth, maintenance and reproduction of cattle. Davenport more than 30 years ago showed that calves cannot be raised on grain alone, and later showed that they cannot be raised to maturity on milk alone, and McCandish showed that they cannot be raised on a combination of milk and grain.

Davenport and others believed that the failures of the no-hay rations was due to lack of bulk, i.e., that a certain bulkiness in the ration was necessary to the digestive function in cattle, and the inability of horses to perform hard work for any considerable time without a ration of forage (roughage) has been attributed to the same cause. Recent experiments at the Michigan\(^3\) Station

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\(^1\) Discovering the Base-Line of Animal Nutrition; Bulletin 232, Agricultural Experiment Station, University of New Hampshire, Durham, N. H.

\(^2\) Oats for Growing and Fattening Pigs, by W. L. Robinson; The Bimonthly Bulletin, Vol. XIII, No. 5, Ohio Agricultural Experiment Station, Wooster, Ohio.

\(^3\) Hay is Necessary in Rotation for Dairy Cattle, by C. F. Huffman; Quarterly Bulletin, Vol. XI, No. 1, Michigan Agricultural Experiment Station, East Lansing, Mich.
seem to prove that there is something other than bulk in hay, something different from any known vitamin or mineral supplement, that is necessary in the ration for cattle.

In the experiment referred to it was shown that concentrate rations adequate for rats and swine are not sufficiently complete to meet the needs of cattle from birth to maturity. The addition of bulk in the form of ground corn cobs, oat hulls, and shavings failed to make the concentrate rations adequate for cattle, as did also the addition of yeast as a source of vitamin B, orange juice to furnish vitamin C, and cod liver oil to furnish vitamins A and D. The addition of wheat straw likewise failed to make the rations adequate; but it showed a considerable improvement over the other roughages as a supplement to the concentrates and vitamins.

The no-hay rations resulted in the death of calves in convulsions, in some instances after normal growth and development for periods of something more than 400 days. When these rations were fed to pregnant cows throughout the period of gestation, the calves were born dead or weak and usually blind. The calves that were born blind died in convulsions at an early age.

The addition of calcium carbonate, bone meal, magnesium phosphate and iron compounds to the ration did not prevent the onset of convulsions and death in the calves, although the ration appeared to be considerably improved by the addition of iron. That is, the convulsions developed at a later period when iron was added to the ration.

The symptoms produced in calves which are fed rations without hay are similar to if not identical to those in animals suffering from parathyroid deficiency. Possibly hay contains some factor necessary to the proper functioning of the parathyroid gland in calves.

The loss in calves that die in convulsions is a large one. Doubtless factors other than an inadequate ration are in part responsible, but veterinarians are often puzzled to assign the trouble to a recognizable cause. Mold poisoning is frequently suspected without definite proof of its responsibility for the loss. Probably the findings in this experiment will assist in clearing up some of the doubtful cases.

**Twin-Bearing Sheep the More Profitable**

The New Hampshire Experiment Station have under way experiments to increase the inherent fertility of sheep so that twins will be the rule rather than the exception. The studies indicate that ewes kept for the purpose of raising marketable lambs should be selected with as much care as cows kept for the dairy.

The difference in the weight of lambs from high milking and poor milking ewes was 79%. The increase in the weight of lambs in all cases was almost directly proportionate to the yield of milk.

The fat content of milk was of secondary or no importance in the gain in weight of the lambs. Milk was fed varying from 2% to 10%. The increase from the richest milk was no greater than from milk with the lowest fat content. In fact, the highest gains were on 2% to 3% milk.

The gains in weight of twin lambs was equal to that of single birth lambs where the supply of milk was adequate.

Since, as a result of very considerable observation in different parts of the country, acidosis, stercoremia, paralysis of pregnant ewes, preparturient eclampsia of ewes, etc., is believed to occur only in ewes carrying twin or triplet lambs, breeding a strain of ewes that habitually produce twin lambs may result in an important veterinary problem not expected by the breeders.

States reporting more hog cholera this fall than a year ago are Iowa, Illinois, Ohio, Missouri, Nebraska, Oklahoma, Maryland, Georgia, North Carolina, South Carolina, and Florida. States where the extent of the disease is approximately the same as last fall are Indiana, Kentucky, Kansas, Arkansas, and Mississippi. States reporting the existence of less hog cholera than a year ago are Virginia, Alabama, Louisiana, and Texas.—U. G. Houck.

**Useful Reference:**

*Twin-Bearing Sheep More Profitable; Bulletin No. 232, Agricultural Experiment Station, University of New Hampshire, Durham, N. H.*
Public Health

THE interest of the veterinary profession in its problems having a bearing on public health cannot be said to have either increased or lagged materially during the year. The program of the annual meeting of the U. S. Live Stock Sanitary Association held at the close of last year gave unusual prominence to public health problems; Dr. Charles Mayo discussed tuberculosis at the Minneapolis meeting of the A. V. M. A.; Dr. A. V. Hardy of the Iowa Department of Health, discussed undulant fever at the annual meeting of the Eastern Iowa Veterinary Association; and Dr. M. J. King of the Research Laboratory of the Metropolitan Life Insurance Company discussed the same subject at the August meeting of the Hudson Valley Veterinary Association. Papers by public health workers were presented at some of the state veterinary associations and, of course, discussions by veterinarians of problems having a public health aspect occurred at most veterinary meetings.

The discovery that undulant fever in man as a result of infection from milk is more prevalent than was formerly supposed, aroused no particular interest among veterinarians, although it occasioned much discussion among public health officers.

In the matter of participation in the annual meeting of the American Public Health Association, veterinarians appear to have been remiss; but few veterinarians attended this great convention and only one, C. M. Carpenter of the New York State Veterinary College, presented a paper, although altogether 17 papers were presented at the meeting on subjects of particular interest to veterinarians, and on which they have special knowledge. These papers included 7 on milk, 4 on milk handling equipment, 3 on Br. abortus, and one each on ice cream, cheese and food inspection.

Of the inspection trips, officially arranged, for those attending the 57th annual meeting of the American Public Health Association held in Chicago in October, eight were to points of veterinary interest, stockyards, dairies, milk plants and laboratories.

It was everywhere apparent at this meeting that public health officials are doing a great deal to promote and increase the consumption of milk, and in this veterinarians will, of course, lend them every assistance in their power. It was equally apparent that public health officials are going to insist on higher and higher standards of quality for milk and that they will not be satisfied until no raw milk except certified milk is used—that is, until pasteurization at least of city milk is universal.

Among the educational exhibits, the milk borne outbreak of hemolytic sore throat in Lee, Massachusetts, was depicted. A chart showed a sick man infecting the milk; a milk wagon conveying the infection to the consumer, which resulted in 600 cases and 36 deaths in a population of 4,050, and finally the milk being made safe by pasteurization. The state department of health sent to Lee to assist in controlling the outbreak:

- One commissioner of health.
- Two district health officers.
- Two bacteriologists.
- Two nurses.
- One epidemiologist.
- Two veterinarians.

The moral, the state commissioner of health states, is that "raw milk is a very potent vehicle for the transmission of disease."

The educational exhibit of the Illinois Department of Health consisted chiefly of a rabies exhibit. In large letters it said: "Suspected animals should not be killed. Chain them in a safe place for two weeks for observation by a veterinarian." Approved and disapproved muzzles were shown. The approved muzzles were of the basket type. All were urged to have their dogs vaccinated against rabies.
Electrical Pasteurization of Milk

An electrical apparatus for the pasteurization of milk has been introduced into Holland.22 This equipment was designed by Prof. A. H. W. Aten and Doctor Lulofs. The new apparatus is based on the principle of all other pasteurization machines, but the pasteurization is not affected by steam but by means of a current of 3,000 volts that traverses the milk between two electrodes. The raw milk is collected in a special reservoir, from which it is pumped through pipes toward the electrodes, from which point it is collected in a reservoir specially constructed for the purpose and heated to 85°C. Regulation of the flow of milk maintains automatically a constant temperature. If the regulatory device controlling the flow of milk should get out of order for any cause, the current would be automatically checked and the nonpasteurized milk returned to the reservoir. The new apparatus marks in every respect a distinct advance in the milk industry.

Pasteurization of Milk Decreases Infant Mortality in Canada

McCullough28 gives a general discussion of milk pasteurization, including value, objections, supervision, cost, and extent. The need of pasteurization is amply proved by the numerous epidemics traced to milk. The objections are few and may be readily overcome. Any tendency to scurvy in babies fed on pasteurized milk, due to destruction of vitamin C, may be prevented by use of orange juice, tomato juice, or potato water. Pasteurization, when properly carried out, destroys about 99 per cent of the bacteria present. If the milk is then immediately cooled and kept at 40 deg. F., the bacterial increase in 24 hours will be but slight. The cost was estimated in 1922 to be less than one-half cent per gallon. It is a significant fact that, as pasteurization increases, infant mortality decreases; and it is further significant that not a single municipality adopting pasteurization has abandoned it. Tuberculin testing, in the absence of pasteurization, is a measure which affords a certain protection, not a complete one, against milkborne tuberculosis, but nothing else; whereas pasteurization affords a sure protection not only against tuberculosis but also against a large number of other infections. Inauguration of milk protection in Ontario is in the hands of the municipal authorities and is unsatisfactory.

Regulating the Production, Handling and Distribution of Milk

Walker,24 in a recent discussion, gives succinctly the reasons for, the objectives to be obtained and the methods of carrying out regulations for milk inspection. It is a valuable paper for veterinarians engaged in municipal milk or dairy inspection, for those interested in initiating milk inspection in municipalities or in procuring amendments to unsatisfactory milk and dairy inspection ordinances.

The objects of milk inspection are:
1. To protect the public health;
2. To protect purchasers against fraud.
Milk is a difficult food to produce and distribute with safety.
Milk is practically the only animal food that is used without being cooked.
Milk is subjected to many possibilities of contamination during production and distribution and it is one of the best of media for the growth of many kinds of bacteria.
Studies of epidemics show that unpasteurized milk may serve as a medium for the transmission of typhoid fever, scarlet fever, diphtheria and septic sore throat. Contaminated milk is responsible for many thousands of deaths annually from diarrheal diseases in children under two years old. Seven per cent of all the tuberculosis in human beings and about 25 per cent of the tuberculosis of children under 16 years of age is contracted from the use of milk.
To protect the public from fraud, milk regulations are designed to:

24 Regulating the Production, Handling and Distribution of Milk, by Harvey Walker, Acting Executive Secretary, League of Minnesota Municipalities, Public Health Reports, Vol. 43, No. 33, August 10, 1928, pp. 2095-2108.
1. Prevent the addition of water;
2. Prevent the use of coloring matter;
3. Prevent the introduction of preservatives;
4. Establish a standard of quality, usually at least 3 1/2 per cent butter fat and 8 1/2 per cent solids not fat.

To protect the public health, ordinances are designed to:
1. Prevent uncleanly methods in production and handling;
2. To insure that the milk is from healthy cows as shown by the tuberculin test and physical examination;
3. To prevent persons in ill health from coming into contact (chiefly as milker) with the milk;
4. To insure adequate pasteurization.

Control of the production and distribution of milk is maintained by:
1. A system of licensing for producers and distributors;
2. Providing for the grading of milk;
3. Penal methods. This third type of control may be, and usually is, used in conjunction with the others. Thus, under the first method, violation of the regulations may result not only in revoking the license, a safeguard for the future, but the ordinance may also provide for fine or imprisonment (or both) of the offender for the offense that has already been committed.

Bacteria Count Standards for Milk

The relation of microorganisms to the quality of a product has probably received greater emphasis with reference to milk than to any other food. Since it is impossible to determine in a practical way the presence of pathogenic organisms in milk, numerical limits for all organisms in milk have been established to compel the employment of proper methods in production and handling.

Since the organisms in milk increase with the age of the milk, and since the quantities of milk used by larger urban populations require its transportation over considerable distances and necessitate the lapse of from a few to many hours between production and consumption, Brew and Fisher took an investigation to determine the relation that the time required for transportation and the conditions under which it is effected, bears to the bacteria count in milk when delivered to central distributing plants.

The New York sanitary code permits a limit of 200,000 bacteria per cc for Grade B raw milk at the time of delivery, and a limit of 1,500,000 bacteria per cc for Grade B pasteurized milk prior to pasteurization. Each municipality, however, is granted the privilege of increasing the stringency of the sanitary code in any way not inconsistent with its provisions; that is, to set a higher but not a lower standard for milk delivered in that municipality.

The city council of Rochester had before it for consideration, an ordinance raising the standard for milk and particularly providing a limit of 300,000 bacteria per cc for Grade B pasteurized milk prior to pasteurization. The purpose of the investigation was to ascertain if this was a reasonable requirement under Rochester conditions. That is, if it was a requirement that the milk producers could reach, due regard being given to economical factors, and if at the same time it was a requirement that would stimulate better methods of production and handling of milk.

The investigation was carried out with great care, samples being taken at shipping stations located at not more than one-half hour driving distance from the dairy farms; and samples from the same milk again taken on its receipt in Rochester from four to seven hours later. This milk was transported in ordinary baggage cars without icing in the summer time and with heat in the winter time.

After considerable data had been collected, an experiment was undertaken on milk delivered to the state college of agriculture at Ithaca, where conditions could be under control, and altogether much useful information was procured.

The bacteria count at the time the milk was...
was delivered to the railroad station was an important, almost a governing, factor on the condition in which it was received in the city from four to seven hours later.

Milk containing a count of less than 20,000 at the railroad station stood the test of transportation and was received in the city qualifying under the 300,000 limit in 98 per cent of the cases. Apparently a 200,000 count limit would inflict no severe hardship on such milk even when exposed from five to six hours at temperatures ranging from 65 to 80 deg. If, however, the initial count at the railroad station was 100,000, the chances of qualifying under a 300,000 count limit were only about 1 to 2. With a count of more than 100,000 per cc at the railroad station, the chances of getting into the city under the 300,000 count limit were only one in fifty.

A careful record of the temperature of the milk was made at the time of receipt, during transportation and upon delivery in the city. It was found that insufficiently cooled milk increased on an average 2.8 deg. F. during the journey. The average increase of the ice-cooled milk was 10.5 deg. F., but ranging up to 18 deg. F. The conclusion was that a regulation of 60 deg. F. at the time of delivery to a central distributing plant is too stringent unless the milk can be iced during transportation.

Conclusions drawn from the controlled experiments are as follows:

"In every case in which the milk had been ice-cooled to 50 deg. F. or lower, there was no appreciable increase in the count as a result of exposure to high temperatures for four to five hours."

"Insufficiently cooled morning's milk showed no appreciable increase in bacteria content when exposed to high temperatures for four hours."

"There can be no justification for requiring a dairyman to cool his morning's milk if it can be delivered within three to four hours after production. Wherever circumstances make it impossible to deliver milk within this period, the dairyman, for his own protection, should cool the milk as soon as possible. This indicates the influence of the so-called germicidal properties in milk at the time it is drawn."

The implication that milk containing 10,000 bacteria per cc is better and safer in quality than milk containing 15,000, or that the difference between 200,000 and 300,000 constitutes a numerical basis for two grades of milk cannot be supported scientifically.

All information available indicates clearly that a bacteria count limit of 1,500,000 in raw milk as delivered to the pasteurizing plant in any upstate city in New York is so lenient as to encourage carelessness in handling. A 300,000 bacteria count limit is a lenient standard for any city in the state of New York, except probably New York City. This standard can easily be compiled with even where milk is exposed uniced to average warm summer temperatures for as long as six to five hours.

A bacteria count limit as low as 100,000 is easily within the realm of possibility, especially in small cities where the milk en route from farm to plant is usually exposed to outdoor temperatures for not more than two or three hours.

It is important to allow a certain percentage of tolerance in complying with any numerical limit.

Undulant Fever from Contact with Infected Animals

Hardy28 presents a study of 83 cases of undulant fever occurring in Iowa in the course of a year where great care was taken to ascertain with certainty the source of the infection and the manner of communication from the infected animal to the human.

It has been assumed that the Br. abortus was conveyed to man solely in unpasteurized milk and products made from unpasteurized milk, from laboratory infection or from human contact. The epidemiological studies of Hardy do not support this assumption; on the contrary, they indicate that contact with the infected animal is possibly the commonest means of transmitting the infec-

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Infection. This is important to veterinarians. It has been assumed also that the goat and the cow were the only important sources of this infection for man. Hardy's studies show the cow and the sow to be the sources of infection in 82 of the 83 Iowa cases studied.

Of the 83 cases:
In 52 cases the infection was from cattle.
In 11 cases the infection was from swine.
In 4 cases the infection was from either cattle or swine, or both.
In 1 case the infection was from human contact.
In 15 cases the source of the infection could not be determined with certainty.

The mode of transfer of the infection is of course very important.
25 cases had no contact with infected animals but consumed raw milk or cream from cows affected with contagious abortion. Other sources of infection were eliminated.
11 cases (5 packing house employees and 6 farmers) had contact with infected swine, but not with infected cattle or unpasteurized milk from infected cows. They seem clear cases of infection from swine.
32 cases (including one veterinarian) had contact with infected animals and used unpasteurized milk and cream, so it was not possible to determine whether they were contact cases or cases conveyed by infected milk, but the age and the occupational distribution of the cases was such as to strongly indicate that contact with infected animals was the principal mode of infection in these cases. On a percentage basis, the inference was that 10 cases were of milk borne infection and 22 were contact cases.

The questions arise: If contact with infected animals and infected tissues is capable of transmitting the infection to man, why do not all "snatchers" and "puddlers" and veterinary inspectors on the hog killing beds in the packing houses become infected? And why do not all veterinarians treating contagious abortion in cattle become infected? and, considering the vast amount of infected raw milk consumed in this country, why is not undulant fever many fold more frequent and widespread than it is?

Until further research is completed it is not possible to answer these questions. Doctor Hardy suggests, as others have also suggested, that there may be two or more strains of Br. abortus responsible for contagious abortion in cattle and swine and not all of them may be virulent for man. Further, the proportion, if any, of persons possessing a natural immunity to Br. abortus is unknown.

In the present state of our knowledge it would appear the part of wisdom for veterinarians treating cases of contagious abortion to use the same care in disinfecting the hands and clothing that they use when handling other cases capable of infecting by contact.

Doctor Hardy observed no cases of undulant fever in children under seven years of age, and he suggests that young children may possess a relatively high immunity or they may acquire the disease in a mild form that is not recognized. W. A. Evans, discussing this subject, says that mild intermittent fevers of unknown cause are common in babies; that no known treatment for this class of fevers is effective and that the babies just "grow out" of them. He suggests that such fevers may be due to Br. abortus infection acquired from unpasteurized cow's milk.

Canine Distemper and "Colds" in Man

In recent years much attention has been paid to the possibility that a filtrable virus is the specific primary cause of colds. Such a view has not been definitely proved, and in any investigation of the etiology of colds consideration must still be given to the following hypothesis: Colds are not due to any one specific virus but are to be regarded as reactions of the respiratory mucosa that can be brought about by a variety of bacteria. These bacteria are the well known organisms cultivated from the respiratory discharges during colds and comprise Micrococcus catarrhalis, staphylococci, pneumococci, diphtheroids, influenza bacilli, Friedländer's bacillus, and others.
Recently Walker\(^2\) has described the infection of a laboratory worker with *B. bronchisepticus*, giving rise to the syndrome ordinarily diagnosed as a cold. The infection was contracted from a rabbit.

Brown\(^3\) has recently described an infection, in a child, resembling whooping cough and due to the *B. bronchisepticus*. The child contracted the infection from a pet rabbit. Brown cites two other instances of human infection with the organism.

The *B. bronchisepticus* is a frequent inhabitant of the respiratory passages of normal and diseased guinea pigs, rabbits, cats and dogs. It is always present, at least during the later stages, in canine distemper, in fact so intimate is its association with canine distemper that it was long thought by many to be the cause of this disease.

It follows since the *B. bronchisepticus* is capable of causing “colds” in humans, and since this organism is constantly present in canine distemper, the intimate association between dogs and persons, that often prevails during an attack of distemper in the former, holds some hazard for the latter.

Bryan,\(^4\) in a recent article, has pointed out this danger and cited a number of instances where acute influenzal diseases in persons followed their intimate association with dogs suffering from distemper.

After recalling that canine distemper was suspected of complicity in the pandemic of “flu” in 1928, Doctor Bryan relates his personal experience as follows:

The common colds of the human, with their varying ramifications of coryza, influenza, bronchial catarrh, pneumonia, etc., all have etiological and pathological pictures very much like the varying forms of canine distemper, with the added uncertainty of the actual causative agent.

In February 1927 and 1928 the writer was veterinarian to the Maryland Kennel club dog show, and following both shows I went down with a severe case of “La Grippe.” In an effort to throw light on the inter-relationship existent between the two diseases, human and animal, I carried out some experimental inoculations of the heavy, yellow, mucopurulent discharges from my nose, and bronchial exudates expectorated by me, and injected the material directly into four mongrel puppies, all out of the same litter, aged about seven months, and all in perfect health. Within seven to ten days all four puppies went down with the typical picture of canine distemper, which included serous and later purulent conjunctivitis; rhinitis and later mucopurulent discharge, two of them developed the exanthematous pustules on the abdomen so typical of distemper. Two died within a week of broncho-pneumonia, one case seemed likely to recover but developed the nervous form with its attendant twitchings typical of chorea, the other one went through all the stages of the catarrhal form of distemper and slowly recovered. The post mortem examinations of the three that died were characteristic of the usual lesions found in the respective forms of the disease.

Doctor Bryan cites cases occurring in his practice where four children played with a dog having distemper, and all promptly came down with heavy colds and influenza. In another case three boys aged 3 to 6 years all came down with broncho-pneumonia following playing with a dog affected with typical canine distemper. Another case of a girl 11 years old that after nursing a police puppy suffering from distemper. A fourth case was of three children who developed severe colds, tonsilitis and influenza after their puppy playmate was attacked by distemper. A fifth observation was of a fox terrier puppy that died in convulsions, following the bronchial form of distemper. A little girl who fondled the dog a great deal immediately came down with a heavy cold.
Bureau of Animal Industry Activities

The Bureau of Animal Industry of the U.S. Department of Agriculture contains approximately 1,300 veterinarians, much the largest single organization of veterinarians in the world. Its activities cover a wide field, many of them of direct and vital importance to veterinarians and others only indirectly and some others only remotely of importance to the profession.

The past year cannot be counted as other than a successful one for the Bureau. Adequate funds were provided for the tuberculosis eradication project and increased funds for many research projects, including a large increase for the study of parasitisms by the zoological division.

The Bureau carries on a large number of research, regulatory and executive functions. Of course, no complete record of these varied activities could be given here, but in general, it may be said that the number of employees in the Bureau now numbering 4,171, increased 100 during the year. This is, in reality, a decrease of 50, since the Packers and Stockyards Division was transferred to the Bureau during the year, together with its 150 employees. The Bureau requires about 100 veterinarians a year for replacements.

As is generally known, the veterinary employees of the Bureau received very material, and long over due, increases in salary during the year, the minimum salary at which veterinarians in the lowest grade are appointed in the Bureau being raised from $1,860 to $2,000 a year, and the highest salary increased from $7,500 to $9,000. Considerably more than half of the veterinarians in the Bureau now receive $2,800 a year or over, and with the present schedule of increases, in a few years all except the newer appointees will receive $2,800 or more.

A brief mention of some of the more important work by divisions follows:

Tick Eradication Division

The co-operative work of suppressing splenetic, southern or Texas fever in cattle and the eradication of ticks, which transmit that disease, was continued throughout the year in each of the infested Southern States, and, effective December 1, 1928, will result in the release from Federal quarantine of 23 whole counties and 5 parts of counties, distributed as follows:

The release in Oklahoma, one county and parts of three counties, place all of that state above the quarantine line, and make it the ninth state of the original 15 tick-infested states to be entirely released from Federal quarantine restrictions. The states that previously reached that goal are: California, Georgia, Kentucky, Missouri, North Carolina, South Carolina, Tennessee, and Virginia.

The outstanding state achievement in this project during the year was the action taken by the Mississippi legislature in making available an appropriation of $500,000 with which to complete tick eradication in that state. For four years prior to this action, tick eradication in Mississippi was practically at a standstill, and this renewed interest, backed by a substantial appropriation, indicates the determination of Mississippi to remove the tick handicap from within her borders.

Tuberculosis Eradication Division

The national campaign for the eradication of tuberculosis from livestock progressed in a satisfactory and wholesome way throughout the past year. More cattle were tuberculin tested and a lesser degree of infection reported than for any preceding period of time. More than 11,250,000 cattle were included in the various tests throughout the country, including those for interstate shipment, and the percentage of infection was only 2.3 of this large number. Incidentally, it is noteworthy that approximately 54,000,000 tests have been made since the inception of the work. Noteworthy accomplishments were surveys to determine any outstanding achievement in the reduction of the disease as reported in cattle and swine.

A study of meat-inspection statistics in-
icates a marked reduction in both the reten-
tions for tuberculosis and the condemnation
of carcasses both in cattle and swine. A
new survey looking to the incidence of the
disease as reported in the respective coun-
ties throughout the United States likewise
showed a marked reduction, the figures
being 4% in 1922 as compared with 2% in
1928. Cattle under supervision number ap-
proximately 22,000,000, or about 35% of the
total cattle of the United States.

Probably the most noteworthy achieve-
ment pertaining to the area work was that
on October 1, 1928, there were approxi-
mately 19% of all the counties in the
United States listed as "Modified Accred-
ited Areas." On that date one state, North
Carolina, reported the completion of testing
of all the cattle in the state, and the modi-
fication of 100% of its counties. It is ex-
pected that other states will have made a
complete state-wide tuberculin test within
the next two years.

Much good was accomplished in putting
into effect plans for the control and eradica-
tion of tuberculosis from the poultry flocks
of the nation, especially in the badly infected
centers of the corn belt. Results of that
work, as determined by special reports, in-
dicate that the plan of disposing of known
diseased flocks, and their replacement with
young birds raised on new ground is meet-
ing with marked success, not only from a
standpoint of tuberculosis-free flocks, but
also from that of better poultry husbandry.

Based on all available reports, it is ap-
parent that despite the limited and decreas-
ing opposition the work of tuberculosis eradi-
cation is progressing in such a way as to
indicate that in the next ten years the actual
eradication of the disease will be practically
an accomplished fact.

Packers and Stockyards Division

Probably the most important activity that
has received the attention of the Packers and
Stockyards Division this year has been the
 study under way to place in the hands of
the Secretary of Agriculture data which will
enable him to determine and prescribe just,
reasonable, and nondiscriminatory charges
for stockyards services.

Meat Inspection Division

The results obtained in the meat-inspec-
tion service during the fiscal year 1928 in-
cluded a proficient examination as to the
health of seventy-five million animals and
expert inspection extending throughout all
phases of converting these animals into meat
and product at a cost of less than seven cents
for each animal slaughtered. The personnel
consisted of 2,489 inspectors and experts in
sanitation and in the handling and inspection
of meats and the ingredients and equipment
used in the preparation of meat and meat-
food products. This service was conducted in
829 establishments engaged in interstate
and foreign commerce in 255 cities and
towns throughout the country, where more
than 75,277,000 food animals were inspected
alive and also at the time of slaughter.

Through these inspections over 252,000 ani-
imals and carcasses, together with 1,038,800
parts of carcasses, were condemned on ac-
count of 41 diseases or other conditions, and
were removed from the food supply.

Following the initial inspections of the
various carcasses, reinspections were con-
ducted throughout all of the various
processes of preparing, curing, canning and
packing to insure sanitary conditions, equip-
ment and methods, and for the detection of
products which had become unfit subsequent
to previous inspection. Unfit meat and
products were condemned and destroyed for
food purposes and those passed for food
were designated by officially approved marks
and labels. The total reinspections were
represented by more than 8,974,319,000
pounds of product, and upon these reinspec-
tions more than 9,222,000 pounds were con-
demned and destroyed on account of being
tainted, sour, rancid, or otherwise unwhole-
some.

The laboratory work constituted a very
important factor in the protection of health
and prevention of false labeling. This work
at seven separate laboratories covered the
examination and analyses of more than
43,560 samples of meat and products, water
supplies, salts, spices, and other ingredients,
for the detection and exclusion of unwhole-
some substances.
Other important activities of the meat inspection service include the supervision of the destruction of condemned animals and meat; the limitation of water and cereal in sausage to prevent adulteration; the cooking, refrigerating or curing of pork to destroy trichinae, which cannot be discerned by any practical method of inspection; the pasteurization of dairy products used in the preparation of oleomargarine to eliminate dangerous organisms; the approval of many thousands of master labels to insure that no false name or statement appears on any meat or container; and the supervision of meat transportation throughout the devious channels of commerce as contemplated by law. Special reinspections were made of 56,212,803 pounds of meat for the Army, Navy and other government organizations, 1,286,680 pounds of which were rejected.

A total of over 1,155,710,000 pounds of meat and meat food products was certified for export; this included 8,187,208 pounds of fresh pork cuts to Great Britain under special inspection arrangements with that country.

Over 132,739,000 pounds of foreign meat were inspected and passed for entry into the United States and 234,536 pounds were condemned and destroyed or refused entry because there was insufficient evidence of wholesomeness.

The service covered about 70% of the meat and meat-food products produced in this country at a cost of one cent for each twenty-six pounds of dressed meat and lard produced.

During the seven-month period from December to June foreign animal casings were admitted as follows: Upon certification 9,861,440 pounds; upon disinfection 261,667 pounds; total, 10,123,107 pounds; 35,006 pounds offered for inspection were rejected and removed from the United States.

The number of "exemptions" given retail butchers to ship uninspected meat interstate increased more than 10% during the year. The time would seem to have arrived to begin to shut down on this practice.

Division of Hog Cholera Control

The control of hog cholera is based on systematic co-operation with state regulatory authorities, extension workers of agricultural colleges, practicing veterinarians and farmers. The policies are fixed and do not materially change from year to year. Therefore, nothing of an outstanding nature is recorded. The situation at this time so far as hog cholera is concerned is quite favorable. While sporadic outbreaks of the disease have occurred, they have been promptly suppressed through the use of the serum-preventive treatment.

Effective July 1, 1928, with the approval of and in co-operation with the officials of the states involved, a modified plan of hog-cholera control work was inaugurated in Alabama, Arkansas, Florida, Georgia, Louisiana and Mississippi. Under the plan the activities of the inspectors assigned are limited to specified territories in each state. Efforts are directed to the detection and investigation of swine diseases within those territories instead of throughout the states. The inspectors treat infected and exposed herds, the serum being furnished free of charge by the states or the counties, or by both.

In this plan of work, which includes improved methods of swine raising, sanitation in the hog lot and the elimination of swine parasites in the herd, it is intended to use every means possible to stimulate hog growing in a given farming community. A preliminary survey of the project gives promise of success, but the plan has been in operation too short a time to give concrete data on what may be accomplished. The profitable growing of hogs in specified areas will serve as an example of what may be done in the entire South.

Field Inspection Division

Among the activities of this division is the enforcement of regulations which govern the importation of livestock, animal by-products, feeding materials, etc. It is very gratifying that no infection of foot-and-mouth disease or other serious disease of livestock has passed the barriers set up by the Bureau at ports through which animals
and animal by-products have passed. Also in the inspection of livestock for exportation to foreign countries our reputation to certify only such animals as are free from disease and hence acceptable to receiving governments has been maintained.

Good progress has been made during the year in the work of eradicating dourine on the Indian reservations and scab of cattle and sheep has been held under satisfactory control.

Animal Husbandry Division

The Bureau's nutrition laboratory is collaborating in a study of the relation of diet to skeletal development of swine which has been begun in co-operation with Johns Hopkins University and the American Dental Association.

Investigations at the Rockefeller Institute for Medical Research, in which inbred guinea pigs from the Bureau's stock were used as material, have shown that the capacity to produce hemolytic antibodies for beef and sheep corpuscles and agglutinins for Bacillus typhosus and Bacillus abortus (Bang), differs by families. These differences show an imperfect but suggestive correlation with differences in resistance of the same families to inoculation tuberculosis. It has also been shown that there are clearly recognizable familiar types of local lesions produced by intracutaneous inoculation with tubercle bacillus. The available evidence indicates that multiple unit characters are concerned in the inheritance of these differences.

During the year a milk technologist was appointed by the Bureau and assigned to the study of goats' milk, using the Bureau's herd of milk goats at Beltsville, Md., as the primary source.

Studies of factors affecting the hatchability of hens' eggs have revealed that egg production, preceding the hatching season at least if no longer than for four or five months, does not affect hatchability. Nor does antecedent egg production affect chick mortality up to four weeks after hatching. The results also show that there is no correlation between fertility and hatchability and that causal factors affecting hatchability do not significantly affect chick mortality up to four weeks after hatching.

Causal factors affecting embryo mortality up to the seventeenth day of incubation and chick mortality up to four weeks after hatching are shown to be unrelated nor is there any relation between embryo mortality during the last three days of incubation and chick mortality up to four weeks after hatching.

Full-brother-and-sister matings and half-brother-and-sister matings tend to decrease hatchability by increasing both the percentage of embryos dying during the period from the first to the seventeenth days and the percentage of embryos dying between the eighteenth and twenty-first days of incubation.

Such close inbreeding affects embryo mortality from the eighteenth to the twenty-first days of incubation to a greater extent than embryo mortality from the first to the seventeenth days of incubation.

Hatchability results are affected to a greater extent in the first year of inbreeding than in successive years, though there is a general decline in hatching results each year that such close inbreeding is continued.

Experiment Station, Bethesda, Maryland

Researches in animal diseases, such as the station is engaged in, often require several years before results are obtained. Studies have been confined principally to three diseases—infected abortion, tuberculosis, and vesicular stomatitis.

In infectious abortion, results of investigations carried on for the past three years in the vaccination of heifers during calfhood indicate that animals treated at this time are enabled to resist abortion infection, when subsequently bred, quite as effectively as those vaccinated shortly previous to conception. This method of vaccination promises to be safer and more practical than those now in general use.

Experiments with an avirulent strain of Br. abortus used as a vaccine for cattle indicates, but further work will be required to definitely prove, that it has considerable virtue when used on pregnant animals but little when used before conception. Experiments
with a swine strain of *Br. abortus*, used for the same purpose, gave similar results with the exception that the immunity afforded when administered to pregnant animals was somewhat stronger. However, the vaccine was found to infect the udders of some of the animals treated, and since the indications are that the swine strains of *Br. abortus* may be more pathogenic for man than the bovine, vaccine prepared from the swine organism is eliminated as a possible agent to be used in protecting cattle against infectious abortion.

Studies on tuberculosis have included investigations to determine the value of Calmette's B. C. G. as an immunizing agent. These investigations have been in progress for several years. Results thus far indicate that, while the vaccine increases resistance against tuberculosis somewhat, it does not provide anything like complete immunity. This seems to lead to the conclusion that, while this agent may be of value in countries in which tuberculosis eradication is not economically possible, it does not follow that its use in the United States, with its relatively small amount of tuberculosis, will be justified.

Within the last two years it has been proved that there are two strains of vesicular stomatitis, each of which induces a lasting immunity against itself but little or none against the other.

Biochemic Division

Researches during the year have resulted in complete confirmation of the earlier work, which indicated that, in comparison with other foods, lean pork is relatively rich in the antineuritic vitamin.

An effective disinfectant for sausage casings was developed during the year. This disinfectant serves as a cleansing, purifying agent and removes from the casings practically all kinds of bacteria. Its use has enabled importers to continue to import casings which would otherwise have been excluded.

The investigations in the Bureau laboratories regarding the biochemical characteristics of tuberculosis bacilli have progressed very satisfactorily and much information has been gained. For example, an artificial medium has been prepared which is capable of yielding more abundant growths of the tubercle bacilli than have ever previously been reported. This is important in the production of tuberculin.

Pathological Division

Experimental studies into the nature of warty or papillomatous growths of the skin of cattle have shown that the causative agent of these papillomata is of the nature of a filterable virus. Filtrates of emulsions of the warts which proved free from cultivable microorganisms were capable of producing papillomata when injected intradermally into healthy cattle.

Rabies, while not so prevalent in the District of Columbia and nearby states as in the previous year, was nevertheless demonstrated in 70 cases, of which over 50% were in dogs, the other affected species being cats, cows, horses, and squirrels.

Experimental work on the prophylactic vaccination against rabies indicated that this product is not effective against intra-ocular inoculation. The investigation of its protective value against natural infection is not yet completed. Tests of vaccines on the market failed in every case to show the presence of active virus.

The toxic constituent of the plant *Eupatorium articulatum* (richweed) was isolated, purified, and studied chemically and pharmacologically. This toxic principle has been named tremetol. This settles a question in connection with trembles in cattle and milk sickness in humans that has puzzled physicians and veterinarians for more than a century.

Anaplasmosis investigations have definitely proved the existence of that disease in pure form in the following states: Florida, Louisiana, Texas, Oklahoma, Kansas, Nevada, and California. These studies have done much to clear up the difficulties formerly encountered by veterinarians in making a diagnosis of the affection.

Rather extensive tests have been made of
the sodium cacodylate treatment of anaplasmosis in cattle.

Two hundred and five cases, in which positive diagnoses were made by microscopic examination of the blood, were treated by one or more intravenous injections of the cacodylate. Of these only 12 animals died following treatment. The dose used was 200 grains per 1,000-pound cow, and 100 to 200 grains 36 to 48 hours later. Further injections were given as the cases required.

Up to the present the work on determining the vector of the disease has not progressed sufficiently to make a definite announcement.

Zoological Division

The investigation of poultry parasites has resulted in ascertaining the life history of some parasitic worms and in finding some previously unknown intermediate hosts. Considerable work has been done on the relationships of parasites of poultry and of game birds to ascertain the extent to which each of these groups of birds is responsible for parasitism in the other group.

In the work on swine parasites additional facts of interest have been ascertained in connection with the life history of swine kidney worms, and the experimental test of the swine sanitation system in the South has been found to give a fair degree of control for kidney worms as well as ascarids. Statistical investigations indicate that the loss from kidney worms as the result of condemnation of parts of carcasses in meat inspection is very high.

In experiments with sheep in the South it has been found that shortening the dosing period from every three weeks to every two weeks in treating sheep for stomach worms is effective in controlling these parasites where dosing at the longer intervals had been ineffective.

A campaign against liver flukes in sheep has been inaugurated in California with the enthusiastic co-operation of the authorities and of the sheep men.

Work on horse parasites is being carried out along the lines of prevention and an attempt to ascertain the precise damage done by these parasites and the benefits obtained by their removal.

Investigations are under way to ascertain the fate of worm eggs and larvae in manure piles and to devise measures for insuring the destruction of these eggs and larva. Experiments are also being undertaken with a view to devising some generally applicable measure for the destruction of worm larvae on pastures.

Experiments with several cows affected with demodectic mange indicated that sunlight, sanitation and good feeding may prove of value in the control of this condition. The results were better than those obtained by the use of coal-tar-creosote dips repeated several times at 5-day intervals. Thus the same principles seem to apply in this affection in cattle that have been recognized for a number of years as governing mange in dogs and swine.

B. A. I. HOG CHOLERA CONTROL

Thirty-five Bureau veterinarians were engaged in hog cholera control work in the field during the month of August. The number varying in the several states from three in Illinois and in Iowa to one-twentieth of the time of one veterinarian in Colorado.

The outbreaks of hog cholera reported to the Bureau veterinarians varied from 120 in Maryland and 96 in West Virginia to 1 each in Colorado and South Dakota, 2 in Kansas and none in Wisconsin.

The amount of work reported per man in the hog cholera control forces showed almost the vagaries of the disease, varying from 370 premises investigated, 15 demonstrations held, 364 hogs treated, 100 farms quarantined by two men in Maryland to 9 premises investigated and 2 autopsies performed by one man in Wisconsin. Three men in Iowa investigated 94 premises and held 19 autopsies. One man in Missouri investigated 100 premises and held 16 autopsies and besides gave 9 demonstrations.

The anti-hog-cholera serum produced under license during the month was 79 million cc. During August, 1927, it totaled 137 million cc. The production for the eight months ending with August, 1928, was 40% less than the production for the corresponding months in 1927.
Cattle Practice

The results of some valuable research work on bovine physiology and bovine pathology in addition to the abstracts below, were published during the year. The report of the Foot-and-Mouth Disease Commission of the United States Department of Agriculture, The Normal Blood of Some Domesticated Animals by C. E. Hayden and P. A. Fish; the Physiology of Milk Fever by P. A. Fish, fall within that category as does also The Regional Lymph Glands of Food Animals by John S. Buckley, and Johnin versus Avian Tuberculin as a Diagnostic Agent for Paratuberculosis of Cattle by W. A. Hagan and A. Leissig.

**Bovine Coccidiosis**

In a recent publication, Roderick states that coccidiosis of cattle is endzootic in North Dakota, constitutes a serious problem for the cattle industry and entails heavy losses. He believes that similar conditions obtain in South Dakota, Montana, British Columbia, Saskatchewan and Alberta.

The disease is of world-wide distribution and has been reported sporadically in many of the states in the Union. It is not prevalent in the Red River Valley nor in the eastern part of North Dakota.

The conditions under which coccidiosis occurs in the Northwest and the season of its greatest prevalence differ sharply from conditions described by European writers. In the Northwest the disease rarely occurs in cattle at pasture or in the spring of the year. It usually makes its first appearance with the onset of inclement weather in the fall and reaches its greatest prevalence during December.

In Europe the mortality is reported as being 2 per cent to 20 per cent. In the Dakotas the mortality is 10 per cent to 50 per cent of the untreated animals. It is rare in young calves or in very old cattle. Animals more than six months old seem most susceptible.

"The frequency of the occurrence of the disease in the Northwest is at least highly suggestive that some accessory or predisposing factors are operative at times in addition to the accessibility of the causative coccidia. . . . It looks like a better opportunity for good, intelligent medical treatment and nursing than for immunization procedures as a means of reducing losses from this protozoan disease."

**Milk Fever a Hypo-Calceemia**

Milk fever was first recognized as a clinical entity towards the close of the 18th century, and for nearly a century and a half its cause has intrigued the interest of investigators, but only in recent years has reasoned argument and experimental test been applied to the problem.

Four years ago the authors undertook the study of the problem. A consideration of all the facts known concerning the disease in the light of physiological principles indicated the possibility that a parathyroid deficiency was primarily accountable for the genesis of the complex syndrome called milk fever, and their

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conclusions were published in March 1925.

Since that time, the parathyroid deficiency theory has been subjected to the test of experimental research with the result that the theory seems to have been confirmed.

The parathyroid glands play an important part in the maintenance of the level of calcium in the blood. They are also credited with bringing about the destruction of toxic metabolites. The normal level of calcium in the blood is essential to the destruction of metabolites and when it falls tetany followed by coma occurs in certain diseases.

A parturient cow about to fall a victim to milk fever is in a condition of latent tetany and, in fact, symptoms of tetany more or less pronounced and frequently unrecognized are prodromal in all attacks of milk fever.

The normal calcium content of the blood varies between 9 mgr. and 11 mgr. per 100cc. of serum. It is quite unvarying for the individual. There is no difference in the calcium values in normal parturient cows and those in advanced lactation.

The beginning of lactation and particularly the secretion of colostrum, which is exceedingly rich in calcium, removes a great quantity of calcium from the blood. In fact, were not a reserve supply drawn upon, the drain in colostrum and early milking is sufficient to remove all the calcium from the blood.

When the calcium content fell below 8 mgr. per 100cc of blood serum, mild milk fever resulted. When it fell below 6.5 mgr. per 100cc, severe cases of milk fever resulted, and the severity of the attack of milk fever was in all cases directly proportional to the fall in the calcium level in the blood.

It was remarkable that in none of the cases examined was there any overlapping. That is to say, no individual variations were shown. Down to a certain level, all animals remained normal. Below that level, pathological conditions supervened in all cases.

The effects of mammary inflation on the calcium content of the blood were noted in the 40 cases of milk fever and a considerable number of normal cases (controls). In the normal animal, inflation of the udder in all cases produced a temporary rise in the calcium level of about 10 per cent. In the milk fever cases it produces an abrupt rise to 6.5 to 8 mgr. per 100cc and a gradual rise from that point on, reaching a point 10 to 15 per cent above normal on the third to fifth day. In the cases where the abrupt rise was to 8 mgr. there was a prompt and complete recovery from the attack of milk fever. In cases where the abrupt rise reached only 6.5 mgr. the recovery was less rapid, but in all cases was complete when a normal or rather less than normal calcium level was reached.

The authors believe that the inflation of the udder brings about the rapid rise in the calcium level in the blood by stopping the secretion of milk, particularly the colostrum, and permitting the calcium reserves in the body to catch up with the drain upon the blood.

Biochemical aspects of the disease received consideration by the authors, who point out that it is already well known that the destruction of metabolites in the liver is greatly reduced where there is a calcium deficiency in the blood, and even in the case of diseased liver, is greatly increased by supplying an increased amount of calcium to the blood; that the calcium in the blood to be useful should be ionized, and the control of this calcium level is maintained by the parathyroids.

They suggest that the milk secretion of the high-producing dairy cow is from a physiological viewpoint, pathological, and that in maintaining the calcium level in the blood under this condition, the parathyroid glands are contending with what is essentially a pathological condition, and sometimes fail. They believe that now that the cause of milk fever and how the condition is brought about...
Diseases of Newborn Calves

Newborn animals are exposed to prenatal and postnatal infection, improper diet, poor housing and wide variations in resistance and habits. Diseases of the young are classified as white scours, navel ill, enzootic pneumonia, and as dietetic or nutritional disorders. The etiology of the first three is attributed to infection and a long list of bacteria have been implicated.

The author classifies infection of the newborn into:
1. Prenatal infection.
2. Postnatal infection.

Years ago authorities doubted that prenatal infection was of more than very rare occurrence and it was not until W. L. Williams emphasized the probability that fundamentally the diseases of the newborn are due to intrauterine infection that this mode of infection was given serious consideration.

The author cites many instances and many authorities to show the frequency and importance of prenatal infection, but points out that the infections merge into one another and often times it is difficult to say definitely that a given infection is prenatal or postnatal.

As a cause of white scours in calves, which is the principal subject of discussion in this article, Doctor Udall regards postnatal infection as by far the most frequent, and B. coli as being the most important organism. Predisposing causes are an improper diet, the ingestion of foreign substances (bedding), exposure to cold and such other causes as filthy wet pens, dirty pails, irregular feeding, etc.

Symptoms of calf scour or white diarrhea of calves is given as follows:

About the second or third day, sometimes later, the calf suddenly develops a fetid watery diarrhea. Occasionally it is weak or dull at birth. Often the onset is gradual, dullness and anorexia being the first symptom. Blood-flecked meconium is a premonitory sign. Infrequently, sudden prostration leading to death in a few hours, without diarrhea, is observed. Stiffness when walking is common. The conjunctival sclera often contains congested or hemorrhagic spots, and these, like the blood-flecked meconium, may be premonitory signs. The hair is rough and the skin dry. The hind parts are usually smeared with fetid fecal material that removes the hair and sets up an inflammation of the skin. The pulse is 100-140; the breathing is usually around 30, but it may be much faster near the end—a symptom of intoxication; and the temperature is 102.4 deg.-105 deg. F. Absence of rectal elevation of temperature is of little significance when considered alone. If the extremities are cool and the skin clammy, a normal temperature means nothing. Occasionally the dam has been sick before birth, while the calf has been sick from birth, and the former may die of septic metritis.

A herd had a history of heavy losses of newborn calves from calf scour and such calves as were raised were, because
of disease in early life, largely unsuitable for replacements. The author assumed control and under a plan which is described at length, achieved a high degree of success in raising normal healthy calves. Essentials of the plan are:

The cow should freshen in a clean parturition stall.

The offspring should receive colostral milk at the earliest possible moment.

The calf is left with the dam for 12 hours.

At the end of 12 hours, the calf is muzzled and all food withheld for the next 24 hours.

At the end of the starvation period, a pint of milk and a pint of lime water are given, warmed to body temperature.

Twelve hours later, the regular feeding begins, the amount of milk allowed daily being 6 per cent of the weight of the calf. This quantity is divided into three feedings, to each of which a pint of lime water is added. The quantity of milk is gradually increased until at the end of a week the calf may receive 8 per cent to 12 per cent of its body weight daily, with a pint of lime water added to each of the three feeds.

Feeding utensils are sterilized after each feeding.

Calves are kept in individual, dry, warm, clean pens or if allowed to run together, are kept muzzled.

The feeding of colostrum is very important since it has been shown that colostrum contains antibodies that protect the calf against B. coli and other infections.

The 24-hour starvation period is important to give the intestinal tract an opportunity to rid itself of meconium and to permit it to adjust itself to the digestive function. In the herd under consideration, every calf that remained with the dam for more than 48 hours developed scours. This, the author believes, was due to gorging the digestive tract with milk. Permitting the calf to run with the modern dairy cow gives too great a quantity of milk for any calf to consume.

In weak calves, the author doubts the advisability of the 24-hour starvation period. In healthy calves, he strongly advocates it.

For diseased calves, calf scour serum is believed to be a valuable treatment. Success depends, however, on finding a serum that corresponds with the strain of infection responsible for the disease. In the treatment of scours, he advises 50 to 100cc of serum every hour.

Injection of the dam’s blood into affected calves is a simple and believed to be a valuable treatment. 10cc to 20cc of blood is withdrawn from the jugular vein of the dam into a syringe and immediately injected into the calf subcutaneously. The operation is repeated until 80cc to 100cc of blood have been given.

Since it has been shown that certain outbreaks of scour may be controlled by prompt disinfection of the navel, this precaution should be taken as a routine procedure.

Evacuation of the bowels is indicated when they are overloaded with milk. A high saline enema is beneficial in the removal of decomposed feces and meconium, and the replacement of lost body fluids. A laxative of four ounces of liquid petroleum or one ounce of castor oil is also effective. After the bowels are rid of irritant material, give bismuth subnitrate, 10 to 20 gm., twice daily. Stimulants and antifermenters are required from the beginning.

The author concludes:

“The raising of healthy vigorous cows depends to some extent on the growth, health, and vigor of the calves. Evidence is accumulating to support the belief, held by some, that a sick calf is likely to become a poor cow. A farmer who raises poor calves soon has a poor herd. The heifers breed late and the adults are undersized. Many failures in the dairy industry can be traced to this source. The farmer should be impressed with the economy that comes from providing favorable conditions for the rapid and continuous growth of the young.”
Johne's Disease

Johne's disease has been under investigation by the Wisconsin Experiment Station since 1915, and yet our knowledge of this disease is still fragmentary and promises to be so for many years. This is not surprising, however, when it is considered that the disease is more difficult to study than tuberculosis and the gathering of information concerning it has been limited by the general failure to recognize its importance. Tuberculosis has engaged the attention of thousands of students for nearly 50 years, and has left many questions unanswered. On the other hand, Johne's disease has occupied perhaps a score of workers for 20 years.

Johne first demonstrated the causal organism of this disease in 1895, but believed it to be the avian tubercle bacillus. It was not until eleven years later (B. Bang 1906) that Johne's disease was differentiated from tuberculosis.

Johne's disease is primarily a disease of cattle, but is found also in sheep. A single case has been reported in a deer. The disease is marked by intermittent diarrhea and by emaciation. It produces a diffuse thickening of the bowel wall, which brings about a corrugation of the mucous membrane, which does not flatten out when the bowel wall is stretched.

The disease has been recognized in 27 states. Knowledge concerning its distribution and prevalence, however, is exceedingly meager. V. A. Moore has compared the present position of Johne's disease to that of tuberculosis 60 years ago, and prophesies that, if not controlled, it may become a more troublesome scourge to future generations than tuberculosis is to the present generation of cattle owners.

The losses occasioned by Johne's disease are very large, but the disease is even more insidious than tuberculosis and it is believed that it has heretofore been recognized in only a small percentage of the cases. It is known to be prevalent in Denmark, Holland, Switzerland and England, including Channel Islands, and is found in all countries that have imported cattle from these sources.

Though the progress of the disease is usually slow, on occasions it has caused heavy losses in a short period of time. Cordesn describes a herd of 120 animals in which 110 died in a period of 15 years from this disease. O. Bang mentions a loss of 150 animals in Denmark in one year from 29 Jersey herds, and in another case, where, in a herd of 150 animals, 22 were removed in one year on account of Johne's disease.

The period of incubation of Johne's disease is unbelievably extended in some cases, varying from six months to more than as many years from the time the animals are infected until clinical symptoms are shown, and probably averaging, in young animals, more than two years.

The disease is an almost perfect parasitism and animals frequently live for many years after marked, and even after advanced symptoms are shown. The disease presents but two characteristic symptoms, loss of flesh and intermittent diarrhea that resists all treatment. The marked lesions are likewise but two, the thickened intestinal wall and wrinkled mucous membrane previously referred to, and extreme emaciation. In the later stages, there are sometimes secondary infections that produce other lesions. Microscopic lesions are also discussed by the authors.

The disease is invariably fatal. Though, as before mentioned, it may continue for many months, or even years, the infection is never overcome by the bovine animal. The organisms are eliminated only in the feces. In clinical cases the elimination of the organisms is believed to be constant, and it is probable that infection occurs only by way of the digestive tract.

Johne's bacillus belongs to the acid-fast group and is closely related to both avian and bovine tubercle bacilli. It is exceedingly difficult to culture and the difficulties in making johnin, a reliable diagnostic agent, are so great that they have only re-
cently been overcome. An improper technic in the production of johnin and the use of avian tuberculin as a diagnostic agent have been responsible for failures in the past to detect Johne's disease by the biological test. The authors believe that this difficulty has been overcome, and that johnin, as they make it, is a dependable diagnostic agent.

However, they do not advise its use intradermally, but hold that at present we must rely upon intravenous injection of the diagnostic agent. They have no faith in vaccination against the disease, but believe it can be readily eradicated by the use of johnin. An extensive bibliography on the subject is given in the bulletin.

Phenomena of Rumination

The authors while engaged in teaching physiology and pharmacology to veterinary students, were impressed with the utter lack of, and great need of more information pertaining to the physiology and pharmacology of the ruminant stomach, and began investigations into the subject in 1915. The present publication\(^{39}\) records the investigations made since 1920, the earlier investigations having already been reported.

The present publication deals at length with the anatomy and physiology of the stomach of the ox and with the technic of the investigators. It is well illustrated and a large amount of new technical information given.

To practitioners, the following findings are perhaps of the greatest interest:

Both forage and whole grains are but partially and incompletely masticated during the feeding or eating period. They are conveyed to the stomach in bolus heavily coated with saliva and mucous. Approximately 50% of shelled corn kernels arrive uncrushed in the stomach.

Ruminination is the result of a highly complex, reflex mechanism dependent upon proper stimuli, the nature and quantity of the food, and quite definite moisture requirements.

The phenomena of regurgitation, and the initiation of ruminination is the culmination of a systematic succession of events governed by a very complex reflex mechanism. The necessary moisture or liquid requirements of the ingesta being present, an extra recticular contraction occurs just a fraction of a second previous to the diaphragmatic contraction and immediately previous to the regular recticular contractions. The cardia becomes submerged by a volume of porridge-like material, the glottis closes, the cardia opens funnel-like, the ingesta rushes in, the cardia closes, the bolus is formed and starts upon its retrograde course up the esophagus by antiperistalsis, possibly aided by a vacuum-like suction.

The regurgitated bolus is practically composed of forage. The grains that do enter into the bolus are only a comparatively few of the uncrushed kernels which accidentally become incorporated in the meshes of the forages. As an overwhelming majority of the uncrushed kernels are not regurgitated and remasticated, they run the entire gamut of the alimentary tract in the whole or intact state.

The act of ruminination can be artificially initiated in most animals. Normal forages, shavings or one's finger tips drawn over the mucosa in the field of sensitivity for a time invariably arouses the animal to ruminatory movements.

The moisture content of the ruminant stomach is obtained from three sources: water, saliva and moisture of the foods. As the saliva and the moisture in the respective foods are fairly constant, it devolves upon water to make up any moisture deficiency that may prevail in this organ.

An adequate water supply, readily accessible to the animal is an absolute requisite for physiologic ruminamination, the absence of which causes disturbance in, and in many cases, complete failure, or loss, of the act.

A large percentage of the so-called cases of suppressed ruminamination (lost cud) are the direct result of insufficient mois-
ture. Supplying liberal quantities of water via stomach tube or other means, readily restores this lost function in most cases.

Foreign bodies such as nails, wires, screws and small bolts are invariably ultimately lodged upon the floor of the recticulum. Occasionally these foreign bodies are carried with the boli into the rumen but eventually make their way back to the recticulum.

The ingesta of the abomasum is always of a semi-liquid consistency. The muscularis is comparatively thin and the cavity is maintained in more or less continuous dilatation.

Anaplasmosis in Recently Dehorned Steers

Hilts reports an outbreak of anaplasmosis in 340 head of steers in Nevada. Thirty-five cases with 13 deaths occurred in January. The weather was very cold; there was a foot of snow on the ground, and none of the suspected insect or acarian vectors present. It is believed that the inoculation was by means of the dehorning shears. The disease appeared 42 to 49 days after the steers were dehorned.

Arthritis Deformans of Cattle

A condition in cattle described by Moussu under the name of infectious pseudo-rheumatism, but which has since received little attention in veterinary literature, was observed by the author in a number of dairy herds in Pennsylvania.

In human medicine this condition is common and is called arthritis deformans. It differs from osteoporosis and from rheumatism, although the principle lesions is an enlargement of the bones at the joints and the principle symptom chronic lameness.

The condition was first observed when the skeleton of Garclough's May Mischief, an Ayrshire that had held the world's record for her breed in milk production for three years, was prepared for the college museum.

The shafts of the long bones was normal, but around the epiphyses and in the articulations a mass of bony deposits were found. The bones were normal in weight and size.

May Mischief had never aborted nor had retained placenta, but she suffered from panaritium a number of times and during the latter years of her life was continually lame.

In a herd visited by the author, all animals had been well until the introduction of some new cattle some time previously. Following this, abortion had appeared in the herd and at the time of the author's visit, all animals were assumed to be infected with contagious abortion. Most of the pregnant heifers had aborted and many of them had suffered from retained placenta. Nine animals in this herd had suffered or were suffering at the time from chronic lameness and in all cases, except that of the bull, the trouble had commenced shortly after the animals had aborted.

In humans, arthritis deformans is usually the result of chronic focal infections, of tonsils, teeth, gums, middle ear, sinus of the nose, pelvis of the kidney, genito-urinary tract of appendicitis.

In the case of May Mischief the author believes the cause to have been the absorption of bacterial toxins from the lesions in the claw. In the cases in the herd mentioned and in other similar herds that the author has visited, he believes the condition to be due to the absorption of bacterial toxins from the infected uterus. In the case of the bull mentioned and in one other bull observed, that was similarly affected, he thinks that focal abortion infection may exist, although there has been no opportunity for an autopsy to prove or disprove this assumption.

More can be done to prevent the disease than to cure it after it has become established. As a means of prevention the elimination of abortion disease comes first, and following that, careful attention to uterine infections, mastitis, panaritium, abscesses, etc. The disease is diagnosed by the permanence of the lameness, which does not change from joint to joint as in rheumatism,
and by the history of a previous pyogenic infection.

The author was not able to detect the bony deposits ante-mortem, but in several cases the joints were visibly enlarged.

Red Water Disease of Cattle

Red water disease of cattle is a local name for bacillary hemoglobinuria, which is more or less prevalent throughout Nevada and is known to occur in California, Oregon, Washington and Chile. It is thought that it may have a considerably wider distribution.

Red water occurs only where cattle are pastured on poorly drained land and sometimes in animals fed on hay cut on such land, or that drink water draining from such areas.

Although red water is primarily a disease of cattle, it occurs occasionally in sheep. Its rarity in sheep as compared to cattle may be due to a greater resistance in this animal, but it is more likely that it is due to the fact that sheep are rarely kept on areas where the disease is prevalent.

Although losses from red water vary greatly from year to year on individual ranches and in different localities, taking one year with another, it constitutes a fairly serious drain on the livestock industry of Nevada.

Sudden outbreaks of the disease occur but are infrequent; its usual occurrence is in occasional cases. The season of greatest prevalence is from July to December, but occasionally cases occur at other seasons in involved districts.

The diagnosis of red water is fairly easy, although since it occurs in the same localities and under the same conditions as anthrax, it should be carefully differentiated from this disease.

The symptoms shown by an animal afflicted with red water disease are fairly constant and uniform from the time the disease first becomes apparent to the death of the animal. Appetite and cud chewing, bowel movements and milk flow in milking cows suddenly cease. The animal is apt to stand apart from the herd. It does not want to move and usually grunts with each step taken. The hair is dry, dull and raised. The eyes have a peculiar sunken appearance quite characteristic of the disease and are usually bloodshot or yellow. Breathing is rather rapid but shallow; the animal may grunt slightly each time the breath is expelled. The nose is dry and hot. The temperature is high, reaching 106° F, early in the disease, but it falls rapidly and is usually subnormal some time before death. The pulse is increased in rate but weak, with marked visible pulsations in the veins of the neck.

As the disease progresses, bowel movements become very frequent, and small in amount. Later they usually contain much blood. Urine is passed frequently and generally in fair amounts. Starting with a faint pinkish tinge, the color of the urine changes until, late in the disease, it is a deep garnet or port wine color. The coloration of the urine, due to dissolved blood pigment, is the most striking symptom of the disease and the one from which it gets its common name, "red water." In this connection it should be borne in mind, however, that blood-tinted urine may also occur in anthrax.

The duration of the disease after it becomes noticeable varies from a few hours to several days, averaging about thirty-six hours. The death rate is very high, in most localities reaching practically 100% of all untreated cases definitely diagnosed.

The general picture on opening a red water carcass is one of hemorrhage. There is extensive deposits of blood beneath the serous surface. The kidneys are speckled with petechia and any urine left in the bladder is dark red in color. A characteristic lesion always present in this disease and found in no other disease is a sharply circumscribed, firm rather brittle, dirty rather yellowish gray area in the liver, slightly raised above the surface and from a few inches in diameter up to a size of one-fifth of the liver.

Medicinal treatment is useless. A serum was produced at the Nevada Experiment Station.

Red Water Disease of Cattle (Bacillary hemoglobinuria), by Edward Records and L. R. Vawter; Bulletin No. 113, Agricultural Experiment Station, University of Nevada, Reno, Nevada.

Red Water Disease of Cattle (Bacillary hemoglobinuria), by Edward Records and L. R. Vawter; Bulletin No. 113, Agricultural Experiment Station, University of Nevada, Reno, Nevada.
Station that is successful in 75% of the cases. This serum is now marketed by a commercial firm. A single dose is ordinarily sufficient, but a large quantity is required and the cost is about $6.00. As a prophylactic in exposed herds, a smaller dose costing about $1.00 has been successfully used.

A vaccine for the prevention of the disease has been evolved at the Nevada Experiment Station and may be obtained on the market at about 15c a dose, and has proved highly effective. It is thought that the vaccine offers protection for at least six months, but as protection is not established for a period of two weeks after vaccination, the authors think it advisable to use the serum (as a prophylactic) in the presence of an actual outbreak.

Cost of Infectious Abortion in Cattle

In introducing this bulletin reporting experiments made to ascertain the effect of Br. abortus infection on various tissues, Hallman and associates state that there are no statistics on which to base an accurate estimate of the economic importance of abortion disease in cattle. They quote Mohler that the economic importance of this disease "must be ranked as nearly, if not actually supreme among the infectious diseases of animals" and remind the readers of the findings of White and others that the average loss per year due to abortion disease in reacting cattle is $44.01 per cow. With White's experiment, of course, our readers are already familiar but it cannot be recounted too often nor should one forget that approximately two-thirds of the loss is due to lowered milk production and only one-third to the loss of calves and loss due to a depreciated value of the cows.

Further, it should be remembered that the loss applies to all reacting cows and not alone to those that aborted. Perhaps the most interesting, and to the practitioner, the most important conclusions given in this bulletin is the authors' statement with regard to the effect of abortion organisms in the udder.

Other investigators (Theobald Smith, Buck) have stated that abortion organisms in the udder do not appear to produce harmful results to that organ, but that the multiplication of organisms in the udder occur in the residual milk in the ascini and ducts rather than in the udder tissues. The authors find that the organism in the udder acts much as it does in other tissues, producing "an extensive subacute interstitial mastitis." Referring to this effect on the udder tissues, they say:

"To us, they explain the increased cell content of milk from Bact. abortus infected udders, reported by Cooledge and confirmed by Tweed. It also appears that they at least offer a partial explanation of the reduced milk production reported by White and his associates. It is common knowledge that mastitis is of considerable clinical importance in Bact. abortus infected herds. Whether primary invasion of the udder by Bact. abortus bears any relation to this we do not know. Our researches indicate quite clearly to us that we can no longer assume that Bact. abortus infection of the udder is without harmful effects. We shall not be surprised if future researches reveal that it is in the udder that Bact. abortus assumes its greatest economic importance."

It is disappointing to find the authors express no opinion on, nor make any reference to a matter that has been a subject of controversy at many veterinary meetings recently. That is, as to whether vaccination against abortion disease with live organisms is capable of causing this lowered function of the udder as does the natural infection.

Despite the fact that the tuberculosis eradication campaign started in 1916, tuberculosis in hogs continued to increase up to 1924. We now know that this increase was largely due to avian tuberculosis. Apparently the results of the efforts to control avian tuberculosis are now being reflected in the reduction of tuberculosis in swine.—B. H. Killham.
Importance of the Bull in the Spread of Abortion Disease

Gilman, in a recent article, reviews the literature on this subject, showing that formerly it was quite generally regarded that the principal channel of infection in abortion disease was via the vagina, and at that time the bull was looked upon as a possible and probable carrier of the disease of first importance.

However, experimental attempts to transmit abortion disease by the bull have failed in all or a large majority of the cases, and recorded instances where natural infection occurred in this way are few and in the main inconclusive. However, there seems to be a general agreement among authorities on the subject that until the part that the bull plays in the spread of this disease is more definitely and more certainly known, it is unwise to breed non-infected cows to infected bulls or to bulls in an infected herd.

There is ample evidence that the percentage of infection in bulls is perhaps as large as in cows and that such infection constitutes a very important problem in sterility.

As a result of his review of the literature on the subject and of his own research extending over a period of four years, and comprising agglutination tests made on 123 bulls, 80 of which were negative and 43 positive. The author concludes:

"Most clinical evidence indicates that the bull is not a very great factor in the disease. However, instances where the bull was probably the only means of introducing the infection into a negative herd are by no means rare. Unquestionable proof, however, is lacking in most instances. Until we have more accurate data, it seems best to classify all reacting bulls as potential spreaders, unless proved otherwise. To leave a positive bull in a herd, while taking out the positive cows, is not a safe procedure. The use of herd bulls for service to cows in other herds is, in general, to be condemned, both with regard to Bang abortion disease and other infections."

Science Is Seeking to Curb Abortion of Cattle

More than $50,000,000 a year is a conservative estimate of the losses from the great animal plague of abortion. Ten years ago the losses from tuberculosis and abortion were approximately equal. In ten years the tuberculosis losses have been halved and the abortion losses doubled.

The abortion situation in cattle is serious but there is hope for eventual solution. Marked progress in the understanding of the disease has been made. Up to the present no medicine for the cure of abortion has proved an effective agent. The variable activity of the disease in a given herd has made it difficult to measure the value of remedies and has led to giving undeserved credit to substances of no value. The heavy toll of the disease includes not only the loss of calves, loss of milk flow directly incident to the abortion, temporary and permanent sterility and other breeding troubles, but also the reduced milk flow due to the presence and activity of abortion bacilli within the udder.

The abortion bacillus may live for months in dead animal tissue; it may be killed by careful pasteurization and by ordinary disinfectants; its favorite habitat is the pregnant uterus and it does not remain long as a rule in the non-pregnant one; but it may reach the udders of infected cows and there maintain itself for long periods and continue to infect the milk.

The principal channel of infection, is the digestive tract. This is contrary to the early belief which incriminated the genital tract as the principal portal of infection. Infection is spread by the aborting cow through the products of abortion and the discharges which follow in enormous amounts. Cases of apparently normal birth, accompanied by infection in the placenta and discharges, are grave dangers because they are unsuspected.
A long step toward control is found in the two blood tests, complement fixation and agglutination, which may be administered by veterinarians to detect infected animals and separate them from healthy ones. Studies of infected herds have indicated methods of taking advantage of natural immunity and of increasing resistance by artificial means, and this work is being carried on by experimenters with the expectation of developing new facts and improved methods of increasing immunity.

Many cattle owners, perhaps most, can not practice isolation or elimination of infected animals from their herds. But there are few cattlemen who can not reduce the amount of infection that may reach susceptible animals. By careful and intelligent effort it is possible to reduce greatly the chances of infection and to eliminate gradually the disease itself.

The abortion bacillus sometimes causes illness of human beings with a disease generally resembling undulant or Malta fever, and it is possible this may account for many illnesses not explainable in the past. There is no need to become panic over this recently discovered fact. Fortunately, pasteurization kills the bacillus. It would be a serious mistake to reduce milk consumption to a degree where the loss of the milk food would do more damage than the bacillus. In the cities pasteurization will make milk safe, and on the farm or in the small city where the milk comes from one or a few cows it is a simple matter to test the cows for the disease and use milk only from healthy animals. It is not wise to drink raw milk from cows that are positive to the blood test.

There are infective organisms, other than the abortion bacillus of Bang that cause abortion and the disease has also been traced to feeds that do not supply a sufficient quantity of certain vitamins or minerals.

The heavy losses from abortion are adequate reason for a vigorous program of study and control. The Bureau of Animal Industry has asked for an appropriation of $125,000 for the work on abortion from July 1, 1929, to June 30, 1930. It hopes to carry on extensive field trials for the control of the disease on the basis of information now in hand, and an additional program of investigational work to discover more facts.

**Nutritional Causes of Abortion in Cattle**

Abortion and sterility in dairy cattle may be due to any one of a number of causes. The Bang organism has come in for its full share of the blame and rightly so, for it is the important factor. However, there are many cases the cause of which may be traced to nutritional imbalance, and we are of the opinion that this is one source of trouble that is frequently under-estimated.

Consider for a moment the drain of minerals on the average dairy cow. Every time a ton of milk is produced, fourteen pounds of minerals are taken from the system of the cow. In the case of heavy producers, this is obviously more than can be replaced by the regular dairy ration. It is questionable if the regular ration is capable of replacing the constant drain of minerals from any good cow.

Of course, the generative organs are first to suffer from a mineral deficiency. If this nutritional imbalance is not corrected, abortion and sterility, rheumatic arthritis, decreased milk flow, and unthrifty calves are the inevitable result.

**Anaplasmosis of Cattle**

Giltner in a comprehensive paper on this subject states that in the early investigation of Texas fever Smith and Kilborne (1893) frequently observed mild secondary attacks, and these, he now regards as being cases of anaplasmosis. Sir Arnold Theiler (1910) described the occurrence of the disease in Africa and named the hematozoon which he believed to be the cause of the

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46 Don't Blame It All on the Bang Organism, by J. F. DeVine; The Practitioners Bulletin, Vol. 2, No. 11, November 1928.
disease *Anaplasma marginale*. Meyer (1913) recorded experimental evidence of the recognition of the affection in this country, but it remained for Kinsley (*Veterinary Medicine*, 1925) to first describe the occurrence, symptoms, course, outcome and treatment of the disease in the United States.

At that time the disease had been recognized by veterinarians in southern Kansas and western Missouri for several years, but it was not until 1927 that a wide spread occurrence of this disease in western Missouri, southern Kansas, Oklahoma and Florida brought it to the attention of veterinarians generally. The Florida outbreak was brought to the attention of the U. S. Bureau of Animal Industry by Dr. A. D. Knowles and by them diagnosed. The outbreak in Florida was investigated by the author, and numerous occurrences of the disease in Oklahoma and Kansas were investigated by G. W. Stiles of the B. A. I. Haring and Boynton have also described the occurrence of the disease in California.

The symptoms of the disease are given by Doctor Giltner as follows:

"Generality the first symptom noticed is a diminution in the milk secretion, but for several days the animal may have a nearly normal appetite. Then there is marked weakness; the gait is stiff and there is a tendency to lie down frequently. Coincidently there is almost complete suppression of the milk-flow with loss of appetite and cessation of rumination.

"There is a decided costiveness and more rarely a diarrhea with occasionally bloodtinged feces. The urine is normal never bloody. The temperature is usually high at the appearance of the first symptoms ranging from 104° to 107°F, and may remain thus for several days. In our experimental cases the thermic reaction was rather irregular, there being intermittent fever for a period of about two weeks. As the animal becomes weaker and remains recumbent, the temperature falls to about normal and shortly before death may be subnormal. Respiration is very short and rapid (60 per min.) and accompanied with grunting. The pulse is likewise greatly accelerated (120 per min.). There is lachrymation and often drooling of saliva. The visible mucosae of the head are very pale and occasionally slightly icteric. There is always a marked falling-off in weight, the animals having a very gaunt appearance with sunken eyes. In fatal cases death may ensue in from two days to a week or more from the onset of symptoms. In our experimental cases infected with the Florida virus no fatal cases have occurred after three passages. Many cases recover but the convalescence is remarkably slow, usually requiring several months before the animal regains its normal condition."

The most characteristic feature of the disease is severe anemia which persists for a long time. The mortality in some outbreaks ranges up to 90%, and animals that do recover suffer from a chronic form of the disease for months.

Considerable investigation as to the vector or vectors of the disease has been made, but as mentioned elsewhere in this issue, positive statements in the matter cannot yet be made. The postmortem findings are given by Giltner as follows:

"The chief pathological alterations found at autopsy are a marked flecking of the pericardium, epicardium and pleura, with petechiae and ecchymoses. There are often numerous light greyish areas in the heart muscle which histologically appear as degeneration of the muscle fibers. The lungs may be normal or present a few congested areas. We saw several cases of marked interstitial and vesicular emphysema. The liver is enlarged, congested and histologically shows very pronounced parenchymatous degeneration. The gall-bladder is distended with very thick, dark-green bile. The contents of all four stomachs are quite dry but otherwise these organs present few abnormalities. There may be a catarrhal enteritis with evidence of hemorrhage from the mucosa. The spleen is greatly enlarged and dark colored with jam-like pulp. There may be subcortical petechiae of the kidneys..."
which otherwise are normal. The blood and muscles are pale and the lymph-glands are usually enlarged and edematous. The skin may have an icteric cast. However, we did not see marked icterus of any of the tissues in the Florida cases.

Many lines of treatment have been tried. Various arsenical preparations have come to be accepted as the standard treatment where the disease has longest existed in southern Kansas, northern Oklahoma and western Missouri. The results have been satisfactory only when very large doses were given, up to 200 grains of sodium cacodylate for a 1,000 pound animal. So far, beneficial results following the administration of arsenic have been obtained only when it was given intravenously.

In Florida, Knowles has experimented to some extent with immunization by the use of "an incubation virus," which has been used with success in Algeria. It is perhaps too early to judge the value of this immunizing treatment. It possesses certain drawbacks.

In the middle west, intravenous injections of sodium cacodylate have been used on well animals in herds where the disease was present with apparently highly satisfactory results.

Of the symptoms and postmortem findings of this disease in Oklahoma, Dr. C. C. Hisel\(^\text{18}\) writes as follows:

"Symptoms: Gradual to sudden loss of appetite, rapid emaciation; in milk cows, a diminution in milk secretion over night; this being the first thing to attract the owner's attention; persistent jugular pulse; rapid tumultuous heart beat ranging from 80 to 140 per minute; temperature at the outset is usually elevated from one to three degrees, later normal and subnormal before death. In most cases the temperature has fallen to normal or subnormal when the veterinarian is called. The bowels may seem normal at first, later there is diarrhea and this is to be followed by constipation with mucous coated or blood stained feces. Respiration may be somewhat accelerated, often breathing with a grunt on expiration. All visible membranes are anemic and icteric in appearance; the skin is decidedly icteric. In most cases there is quivering of the muscles of the shoulder and flank regions; there is frequent urination, usually normal or slightly clouded and occasionally hemoglobinuria; in some cases there is a tendency to fight even up to a few minutes before death.

"Postmortem Finding: There are some ante-mortem clots; petechial to echymotic hemorrhages are often extensive; bile pigmentation is usually in evidence throughout the entire cadaver; the bile has a granular appearance; heart muscle showing degeneration; pericardial fluid sanguinous, serous infiltration in body cavities is common. The digestive tract shows considerable bile present and the last few feet of the intestine contains hard, mucous-coated and blood-stained feces."

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One Cow v. A Dozen

Analysis of more than 100,000 yearly individual records from cows on test in dairy herd improvement associations indicates that, on the average, cows that produced 100 pounds of butterfat a year returned $14 each over cost of feed; those that produced 200 pounds, $54 over cost of feed; 300 pounds, $96; 400 pounds, $138; and 500-pound cows returned $178 over cost of feed. Thus the man milking a 500-pound producer would have more return than if he milked a dozen 100-pound cows, and this would take no account of the added labor of milking and caring for the larger herd or of the much greater expense of providing stable room for a herd instead of a single animal. The figures from returns are based on farm prices from all parts of the country, including whole-milk districts.

The treatment for preventing hog cholera calls for professional skill and should be administered whenever possible by a trained veterinarian.—U. G. Houck.
Swine Practice

AILMENTS of swine, with the exception of hog cholera, have been more widespread than ever before. Pulmonary edema, a new ailment, enteritis, erysipelas and esophagastomiasis have been unusually prevalent. Swine diseases received more discussion at veterinary meetings than they have for the last half dozen years. Cholera has been about normal for years, not including an epizootic of this disease.

Beyond any question, the most important publication on swine diseases during the year, or for several years, was the Special Swine Practice Issue of VETERINARY MEDICINE for October. This issue contained a rounded discussion of the whole subject, including the following:

- Herd Management of Swine.
- Specimens for Laboratory Examination.
- History, Examination and Diagnosis.
- Swine Sanitation and Parasites.
- Medication of Swine.
- The Feeding of Orphan Pigs.
- Hairless Pigs—Goitre in Swine.
- Pyemic Arthritis of Swine.
- Pulmonary Ascariasis of Swine.
- Scour in Pigs.
- Malignant Edema in Swine.
- Interpretation of Postmortem Examinations.
- Infectious Rhinitis—Bull Nose of Pigs.
- Swine Erysipelas.
- Sarcoptic Mange in Hogs.
- Infectious Necrotic Enteritis of Swine.
- The Humane Killing of Pigs.
- Agalactia in Sows.
- Swine “Flu.”
- Castration of Pigs.
- Rickets of Swine.
- Tuberculosis in Swine.
- Stomatitis of Pigs.
- Swine Dysentery.
- Virus Breaks in Hogs.
- Swine Plague (Hemorrhagic Septicemia).
- Swine Obstetrics.
- Serum Breaks in Hogs.
- Hog Cholera with Special Reference to Differential Diagnosis.

Sterility an Important Swine Breeding Problem.

Polyarthritis of Swine.

Plants Poisonous to Swine.

Other articles on this subject appeared in every issue of VETERINARY MEDICINE during the year.

Baby Pig Immunization

Baby pig immunization against hog cholera by the simultaneous treatment has undeniably gained in popularity and extended in practice during the year, but the question as to whether the advantages (saving in cost of serum and handling) offsets the disadvantages (a percentage failure to confer permanent immunity) has not yet been answered to the satisfaction of all.

The permanence of baby pig immunization probably depends in a considerable measure on the degree of passive immunity possessed by pigs farrowed and suckled by immune sows. Reynolds, years ago, stated that such pigs possess a passive immunity that might be rendered permanent by the use of small doses of virus. This, of course, would constitute a very economic means of immunizing hogs against cholera if it worked, but in a varying percentage of cases it does not work and the loss of pigs offsets the saving in serum.

In a recent paper by Pickens and associates, a report of an investigation extending over a period of eight years to determine what if any immunity to cholera is possessed by pigs suckled by immune sows, it is shown that a large percentage of such pigs do possess an immunity and many authorities supporting this are given.

In the experiment 86 litters containing 650 pigs were used. The conclusions are:

"After a careful study of the current literature on the subject, together with the foregoing data, the following deductions seem warranted:

1. Many suckling pigs from the ages of 1 to 56 days, which were farrowed and suckled by immune mothers and kept under usual farm conditions, but not in garbage feeding or serum plants, withstand exposure to 1 c.c. of hog cholera virus.

2. Other pigs similar to the kind described in conclusion No. 1, fail to withstand exposure to 1 c.c. of hog cholera virus.

3. Since this immunity is not sufficient to protect in certain cases, it becomes unsafe to depend upon it in herds that have been exposed to cholera.

4. Likewise, this temporary immunity is not made comparatively permanent in all cases by inoculation with simple unmitigated virus if given during this early period. Such a procedure therefore becomes unsafe to depend upon.

5. At times pigs, when born dead, when they die in a few days, or when killed by injury shortly after birth, may show lesions which closely resemble those produced by hog cholera.

6. Material from pigs of the kind described in conclusion No. 5, when injected into susceptible hogs, failed to produce the disease in the susceptible animals.

The Serum Simultaneous Treatment

The advisability and economy of immunization of suckling pigs against hog cholera and the discrimination required in inoculation of young pigs form part of a discussion by Dorset and Houck. 59

Although it has been repeatedly shown that very young pigs can be given lasting immunity by the simultaneous inoculation with anti-hog-cholera serum and hog-cholera virus, it is probably also true that more careful discrimination is required than when the same treatment is applied to older hogs. This is because of the fact that young pigs are susceptible to many diseases and are more easily affected by adverse conditions than older hogs. In administering the simultaneous inoculation to young pigs it is, therefore, especially important to be sure that they are in good health at the time of inoculation. If pigs are unthrifty from parasitic infection, or, in fact, from any cause, if they show signs of thumps or other abnormal conditions, the simultaneous inoculation should be postponed until they are restored to complete health. In urgent cases in which pigs must be immunized immediately, it is better to use serum alone if the pigs are not in good condition at the time. They can be given the simultaneous inoculation at a later date.

The immunization of suckling pigs has much to recommend it in the way of decreased cost and increased protection. By immunizing early, less serum is required, and the pigs are protected sooner. Since the successful immunization of suckling pigs does not necessitate the reduction of feed, it is possible that the practice would enable farmers to market their pigs somewhat earlier than if the immunization were carried out after weaning.

Over a period of 40 years the losses from hog cholera have averaged not less than $30,000,000 a year. No breed of hog is immune to cholera.

Anemia in Young Pigs

There are many unanswered questions in connection with heavy pig losses such as have occurred during the past few years, is the opening statement of an article by Doyle, Mathews and Whiting, 61 with which there will be no disagreement. This article, which discusses the loss of pigs in Indiana from anemia, goes briefly into the literature on the subject.

In Europe, anemia in suckling pigs was discussed as far back as 1890. At that time it occurred in pigs that were housed and fed on dairy products in sections where swine husbandry was carried on in an intensive manner. Later investigators regarded the condition as the same as that which occurs in cottonseed-meal poisoning in swine, but the authors regard it as being different. A summary of the results of their experiment follows:

"During the studies reported here, anemia


in pigs occurred as a striking pathologic manifestation. The conspicuous gross lesions were grayish-yellow mottling of the liver, ascites, and marked dilatation of the heart. Microscopically, the most prominent changes were marked degenerative fatty infiltration of the liver; and the presence of hematopoietic centers in the liver, spleen and bone.

"In three experiments, in which the incidence of anemia under inside conditions (housed) was compared with the incidence of anemia under outside conditions (lots or pastures with shelter), there were 277 pigs which reached one week of age; 146 were kept under inside conditions; and 131 were under outside conditions. Anemia was almost four times as prevalent, and the death rate, between the ages of one and eight weeks, was nearly four times as high under inside conditions as under outside conditions. The death rate in anemic pigs between one and eight weeks of age was almost twenty times as high as the death rate in non-anemic pigs. Eighty-nine per cent of the pigs which died were anemic.

"In two experiments in which litters of pigs were divided and one portion was kept inside and another portion was put outside, the outside pigs showed a slightly higher average red-cell count and a considerably higher hemoglobin content of the blood than the inside pigs did.

"Pigs very rarely became anemic after six weeks of age. Usually a spontaneous recovery began when the affected pigs were about six to seven weeks of age.

"At 98 days of age, the non-anemic pigs averaged 15 pounds more per head than the pigs which have been anemic.

"The occurrence of anemia did not appear to be influenced appreciably by vitamins supplied in cod-liver oil, yeast and orange juice.

"The addition of iron lactate to the ration did not prevent anemia in pigs kept under inside conditions.

"There appears to be some factor in outside conditions which tends to prevent anemia."

The authors venture no opinion as to the cause of the anemia, but one infers that they agree with the earliest writer on the subject (Braasch) that the "anemia is caused by managing the breed in a way that does not meet their natural needs," rather than that it is due to an infection or a dietetic fault.

During the months of September, October and November hog cholera makes its greatest ravages, in recent years destroying from 20 to 65 million dollars' worth of hogs annually.—U. G. Houck.

CLEANLINESS AND CIVILIZED LIVING

The American fondness for bathtubs is sometimes held up to us by prowlers into history as an indication of decadence. We are reminded that in Rome, shortly before the fall of the Empire, bathing became a luxurious and esthetic pastime that expressed the mental and physical softness into which the Romans had sunk.

Our modern physicians, however, continue to recommend frequent bathing. They consider that cleanliness is an aid in the fight against preventable disease. Clean hands and finger nails keep countless germs from entering the body by way of the mouth as, for example, in the handling of food. Tuberculosis infection is often caused in childhood by transferring the tubercle bacillus to the mouth from toys that have lain about the floor or street and have been soiled by sputum from some careless spitter. Scrupulous cleanliness is also a mental and physical stimulant, as well as a disease preventive.

The best way to guard against dangerous germs making any headway is not to lower our physical resistance so that our bodies become a fertile ground for them to multiply in. Most of us can build up a strong resistance by eating nourishing foods, getting plenty of rest, fresh air, exercise and sunshine and, by being clean. The teaching of health habits is one of the chief activities in the work of the National Tuberculosis Association and its affiliated organizations, which will conduct the twenty-first annual sale of Christmas seals in December. Buy them. Helen L. Williams.
Enzootic Encephalo-Myelitis

A very valuable piece of research work on this little understood disease has been done under the direction of the Medical Research Council. The report\textsuperscript{63} comprises a book of 100 pages, with numerous half-tone illustrations, many of them in colors.

Borna's disease, as the author calls it in horses, or enzootic encephalo-myelitis as it is designated in cattle and sheep, the authors believe to be the same disease and of worldwide distribution. It was first described by Worz in 1813. The authors regard forage poisoning in horses as it occurs in this country, including the Kansas horse plague of 1912, as being the same disease. This, of course, has long been a matter of discussion in this country. The symptoms given by the authors are not typical of forage poisoning in horses as it occurs in this country. Otherwise the history, occurrence and course fit very well.

Corn stalk disease in cattle as it occurs in this country and mad itch, both generally regarded as being forms of hemorrhagic septicemia, appear to differ materially from the disease described as encephalo-myelitis, and like Borna's disease in horses and scrapie in sheep, due to a filtrable virus.

They think that some of the cases diagnosed as malignant catarrhal fever in cattle are in reality enzootic encephalo-myelitis.

The virus was found to be very sensitive to the effects of heat, desiccation, ultra violet light, chloroform and ether, but quite resistant to urotropin. In fact, it possesses many of the properties of the viruses of rabies and polio-myelitis.

Rabbits and monkeys are susceptible to the disease and these animals were used in the research work. Its pathogenicity for monkeys raises the question as to its relation to the virus of polio-myelitis in man, and the authors offer the suggestion that some of the nervous affections of man of unknown cause, for example neuritis, may be due to this virus or to a near relative of it.

Inoculation of a suitable attenuated virus into the brain of a rabbit occasionally produced a solid immunity, but the authors were not able to produce an immunity in the horse. No cross immunity existed in the rabbit between Borna's disease and rabies or polio-myelitis.

Attempts at treatment with chemo-therapy were unavailing. It was thought that the channel of infection in the horse and other large animals is either the respiratory or the digestive tract, or both.

Osteoporosis of Horses Inherited

Osteoporosis is a common disease of horses in the Philippines. Observation of the animals belonging to the Philippine College of Agriculture led Gonzalez and Villegas\textsuperscript{63} to suspect that heredity had something to do with the disease and breeding experiments were undertaken as follows:

1. Normal mares bred to osteoporotic stallions.
2. The same mares after foaling, bred to normal stallions.
3. Osteoporotic mares bred to normal stallions.
4. Osteoporotic mares bred to osteoporotic stallions.

The youngest age at which osteoporosis developed in any of the progeny in these tests was one year and four months and the oldest age at which it appeared was four years and four months. It is the observation of the authors that animals who do not develop osteoporosis before they are five years of age rarely if ever develop it later.

A summary of the experiments are:

1. The data here presented demonstrate beyond reasonable doubt that osteoporosis is a constitutional disease which is heritable.
2. A provisional hypothesis is put forth

\textsuperscript{63} Borna Disease and Enzootic Encephalo-Myelitis of Sheep and Cattle, by S. Nicholau and I. A. Galloway; Special Report Series No. 121; Medical Research Council, Published by His Majesty's Stationery Office, London, 1928. May be obtained from the British Library of Information, 5 East 45th St., New York, N. Y. Price $1.00.

\textsuperscript{63} Big Head of Horses a Heritable Disease, by B. M. Gonzalez and Valente Villegas; The Journal of Heredity, Vol. 19, No. 4, April 1928, pp. 159-167.
that it is a simple, dominant, non-sex-linked, mendelian character.

3. The theory is advanced that the disease is caused by the failure of an organ or organ system to function properly.

Control measures directed to the prevention of breeding of affected individuals are recommended.

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Treatment of Wounds Without Drainage

The following suggestions are offered by Musser for their practical value rather than with the idea of presenting anything new or radical in wound treatment.

The not infrequent occurrence of punctured wounds of the heavily muscled regions of the horse, at times presents troublesome clinical problems, especially the old surgical requirement of providing suitable drainage.

It was during the consideration of a case in which good drainage was indicated, and for which there seemed no practical solution, that the writer experimented with the following line of treatment. This case was that of a cavalry horse which had been injured in the lumbar region by an improperly adjusted cantle roll, while the regiment was in the field engaged in annual maneuvers. The original injury consisted of an abrasion and contusion of the tissues surrounding the tip of a spinous process, with subsequent infection and the formation of a moderate sized abscess, which under routine treatment, made an uneventful healing and the animal was restored to duty. Shortly after returning to the home station there was a recurrence of the abscess, with a profuse discharge, and it was discovered that a vertical cavity of moderate diameter extended down one side of a spinous process to a depth of about five inches.

The problem of attempting surgically to provide suitable drainage in this region was not an inviting one, and prior experience in treating infected cavities, improperly drained, by use of antiseptics in aqueous solution, had proven very unsatisfactory, so the following procedure was adopted.

The external wound was thoroughly cleansed, the opening suitably enlarged, the cavity explored for sequester, or other foreign body, flushed out with a half strength hydrogen peroxide solution, and then filled with 5% carbolized olive oil. The subsequent treatment consisted of thorough daily cleansing of the external wound and flushing of the cavity with the carbolized oil injected as deeply as possible with a dose syringe. After removal of the pus and debris, the cavity was filled with oil and not disturbed further until the following day. This case made a satisfactory recovery, and during the year in which this animal was subsequently under observation, there was no recurrence of the abscess condition.

Another case illustrating the apparent value of this line of treatment was a cavalry horse with an automatic pistol bullet wound, incurred while the troop was engaged in target practice. The animal was brought to the clinic shortly after the accident, and showed no particular discomfort. The bullet had entered the top of the neck at the collar seat, and apparently ranged downward and forward on the left side of the vertebrae. There was no apparent exit, and no effort was made to locate the bullet. This line of treatment was continued daily and the recovery was rapid, uneventful and complete, at least so far as six months' subsequent observation could determine.

This line of treatment has often proved satisfactory in the case of punctured wounds of the muscles of the extremities, where the tendency is for the wound secretion and infection to gravitate downward between the muscles, even where good drainage has apparently been provided. This is particularly true in cases

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where any amount of bruising of the tissues has occurred.

While injuries of this type sometimes undergo a normal and satisfactory healing, it frequently happens that following a partial subsidence of the primary swelling, a marked secondary swelling will appear suddenly, and examination will reveal an extension of the cavity downward, requiring further surgical interference. This is particularly the case where antiseptics in aqueous solution have been used, as any of the solution retained within the wound seems to act as an irritant and tends to aggravate the condition.

Apparently the tissues have a decided tolerance for carbolized oil, whether there be proper drainage or not, and the writer has never noted undesirable results following the use of this line of treatment in wounds of the muscular structures. It should be understood of course that every effort should be made to provide suitable drainage, whenever possible, and to remove any foreign material which may be present.

While the author has always used either olive or cottonseed oil in making up this preparation, it is believed that any other bland oil would prove suitable. This agent has the additional virtue of being somewhat of a fly repellent.

**Blood Transfusion in Equine Practice**

A report of cases treated in the U. S. Army by blood transfusion contains much of interesting and valuable information because of the accurate records kept.

Case No. 1.—A horse suffering from severe attack of purpura hemorrhagica. Little hopes were entertained of its recovery. The temperature was 101.4°F, pulse 48, and respiration 18. The nostrils and face were enormously swollen, and the hind legs were enlarged to a slight extent. The general condition was good. The treatment consisted of the transfusion of 1000cc of whole blood in a sodium citrate solution. The next day when the same treatment was continued, the temperature, pulse, and respiration were normal, and the swellings were reduced by half. Three days later the swellings had entirely disappeared and the animal was returned to duty.

Bottles of 500cc capacity are sterilized, and one gram of sodium citrate with 30cc distilled water, is placed in the bottom, following which the bottles are tightly corked. A supply of bottles prepared as outlined above is kept available at all times. The left jugular furrow of both patient and donor is shaved and disinfected. The blood from the donor is drawn into the prepared bottles that are kept at body heat by standing in water at the proper temperature. The jugular of the patient is punctured and the blood introduced by means of a salvarsan apparatus designed for human practice.

The operation of drawing 1000cc of blood from the donor and introducing it into the patient requires about forty minutes' time. No ill-effects have been noted. The respiration is usually slightly increased and the animal appears drowsy and frequently acts as though having trouble to keep awake.

Case No. 2.—Horse with influenza. The temperature was 101.8°F, pulse 48, and respiration 18. The animal was in poor condition with slight nasal discharge and passive congestion of the hind legs. A transfusion of 1000cc of blood from a donor lately recovered from influenza was made. The following day the general condition was improved, the temperature, pulse, and respiration were normal, and the swelling in the legs was considerably reduced. The case was terminated by return to duty one week later.

Case No. 3.—Mule with a diagnosis of pneumonia lobar, bilateral. The temperature was 103.8°F, pulse 58, and respiration 24. Both lungs were congested. The day following admission a transfusion of 1000cc of whole blood in sodium citrate was made. The temperature at this time was 103.6°F. Twenty-four hours after the
transfusion, the temperature was 102.2° F., pulse 48, and respiration 20. The congestion of the lungs was less pronounced. The improvement continued steadily and the animal was discharged as cured 10 days after admission to the hospital.

Case No. 4.—The two-year-old stallion, Lucky Pennant, was admitted to the hospital suffering with influenza. The temperature was 101.8° F., pulse 48, and respiration 24. The following day, at which time the temperature was 101.6° F., 1000cc of whole blood were given by transfusion. Six hours later, the temperature had increased to 103.6° F., with the pulse 48 and respiration 18. This was the only animal so treated that showed a reaction following transfusion. He started to improve shortly after the treatment and was returned to duty after a total of 5 days in the hospital.

Case No. 5.—Horse with a diagnosis of influenza. The temperature was 104° F., pulse 60, and respiration 26. Considerable congestion was noted in the right lung. The day following admission the temperature was 104.1° F., and at this time the usual blood transfusion was made. The temperature dropped steadily during the next four days and the animal was discharged as cured on the sixth day after admission to the hospital.

Case No. 6.—The 12-year-old stallion, Elkwood, with influenza. Temperature was 105° F., pulse 66, and respiration 20. The general condition was good, and the animal still had some appetite. The second day following admission to the hospital, at which time the temperature was 104.6° F., the animal was given 1000cc of whole blood in sodium citrate, by transfusion. During the next seven days the temperature steadily declined from 104.6° F., to normal and the animal went to duty after a total of 12 days' treatment.

Complete details of treatment, such as digitalis and spirits of nitrous ether in fever, mustard plasters in pneumonia, potassium iodid and Fowler's solution in tonic and alterative treatment, etc., have been omitted, and only the special treatment shown.

Results from blood transfusions have been very gratifying, and have been attended by beneficial results in all cases.

### The Treatment of Influenza in Horses with Neoarsphenamine Intravenously

Miner gives an accurate record of all cases of influenza without complications treated at the veterinary hospital at Front Royal during a period of twelve months. Of these cases 18 were given symptomatic treatment and 40 were given intravenous injections of neoarsphenamine. The following formula shows that the latter cases recovered in one-fourth of the time required under symptomatic treatment.

Total number of admissions from June 1st to August 10, in which there developed no complications, 18.  
Total number of days lost, 461.  
Average number of days lost per animal, 25.6. Various symptomatic treatments were administered.

Total number of admissions from August 10, to June 1, which developed no complications, 40.  
Total number of days lost, 245.  
Average number of days lost per animal, 6.25. Neoarsphenamine was used in the above 40 cases.

The following case reports show the symptoms, course, treatment and results in typical cases treated with neoarsphenamine.

Case No. 1.—Horse admitted to hospital with the usual symptoms, loss of appetite, staggering gait, injected mucous membranes, and a temperature of 105° F. Three gms. of neoarsphenamine dissolved in 30cc to 40cc boiled tap water, were administered intravenously. The temperature one and one-half hours after medication registered 104° F. The following morning the temperature was 103° F., on the third day 102° F., and on the morning of the fourth day, normal.
While the temperature continued normal and the appetite, excellent, the animal was not returned to duty until the seventh day in order to eliminate any possible transmission of the disease.

Case No. 2.—Horse admitted to hospital with temperature 105.6° F. The same treatment was given as in case No. 1. During the following day the temperature was 104° F., the third day 102.5° F., the fourth day 101.5° F., and the fifth day normal. The animal was returned to duty on the eighth day. The appetite was normal on the second day and continued so throughout, with only a slight loss in weight.

Case No. 3.—This case was practically the same as Case No. 2 when admitted to the hospital, and the animal was returned to duty on the eighth day.

Case No. 4.—Horse admitted to the hospital with temperature of 104° F. Same treatment. Temperature second day 102° F., third day normal, and the animal was returned to duty on the fifth day.

Case No. 5.—Horse admitted to hospital with temperature of 104.5° F. Same treatment. Temperature 4 p. m. same date, 103° F., 8 a. m. second day, 102° F., and third day normal. The animal was returned to duty on the fifth day.

Case No. 6.—Horse admitted to hospital with temperature of 104.6° F. Same treatment. Temperature at 8 a. m. second day 101° F., and on third day normal. Animal returned to duty on the fourth day.

Case No. 7.—Stallion "Pea Jacket" aged three years was admitted to the hospital with temperature of 105.4° F. Three gms. neoarsphenamine was administered intravenously in 35cc of boiled tap water. The second day the temperature was not reduced and the third day registered 105° F. A second dose of neoarsphenamine was administered at 8 a. m. At 4 p. m. the same day, the temperature was 103° F., on the fourth and fifth days, varied between 101.5° F. and 102.5° F., and on the sixth day was normal. The animal returned to duty on the eighth day. It is believed that the first vial of neoarsphenamine was defective as we have had only one other case in the past nine months that it has been necessary to administer more than 3 gms. of neoarsphenamine to reduce the temperature to normal.

The use of neoarsphenamine in the treatment of influenza in horses may not be the most successful line of procedure; neither did its use originate at Front Royal as the Germans used it during the World War with satisfactory results. However, the reduction in days lost from influenza with this treatment when compared to those lost with the symptomatic treatment would appear to warrant its use.

Since the institution of this treatment there has been no animal lost because of influenza, no secondary pneumonias have developed, and above all there have been no roarers.

Scarlet Red Ointment for Indolent Wounds

Neven, in a recent article, gives a short history of the use of scarlet red (amidoazotolul-azo-b-naphthol, CH₃C₆H₄N :NC₆H₃(CH₃) :N.C₆H₃) chiefly in human medicine. Of his own experience in the treatment of army horses, he says:

Recently at this station considerable difficulty has been experienced in promoting healing in certain types of wounds. This was noted particularly in a number of cases of fibroma of the elbow in horses, of which eight or nine were operated upon in this hospital during the summer and fall. These wounds would granulate rapidly up to the level of the skin surface, after which all healing processes apparently would suddenly cease, leaving a large denuded area over which it was nearly impossible under ordinary treatment to obtain healing of the skin. These cases ran for many weeks with-
out any apparent improvement, meanwhile being under constant treatment, using various applications.

The use of scarlet red in the form of an ointment was decided upon at this time. A large quantity was made up in the 10% ointment using hard petrolatum as a base. This preparation was then applied once daily, rubbing in gently all about the edges of the lesions. Minute care was observed in covering every part of the rim of the lesions, this being the only area to which it was applied. Within a week a change was noted in these lesions; in ten days a marked change was apparent. The long dormant processes of proliferation had awakened to new life, and a fringe of delicate young epithelial tissue began to make its appearance about the edges of the wounds. The healing process thus resumed, continued uneventfully until complete recovery ensued and the animals were returned to duty.

At about this time two horses were presented at the hospital, having been severely burned as a result of having run away and fallen into a blazing dump. One of these animals was so severely burned about the head that it was found necessary to amputate one ear completely. About the body there were denuded areas as large as ten inches in diameter from which the skin had fallen away in folds. The usual treatment was applied and healing was rapid up to a certain point, after which epithelial proliferation became retarded in some of the lesions and in others ceased altogether. The 10% ointment of scarlet red was used with remarkable success in these cases, both terminating in complete recovery.

This preparation is being used on many cases of a similar nature in this hospital. In extensive operative wounds that have reached the stage of epithelial healing, it is often applied without waiting for any evidence of cessation of proliferation; it seems to hasten the process in any case. While the use of this compound has not always been attended by as spectacular results as those mentioned above, we have yet to note any ill effects from its use. On the whole, we are well satisfied with the results obtained here.

A remarkable feature of the above experience is the fact that, while we are given to understand that this preparation will produce irritation when used in 8% strength, it was used here in 10% and in no single case were any symptoms of irritation or toxicity observed.

It is not the purpose here to attempt a revival of interest in a drug which has outlived its period of popularity. There is no doubt, however, that the general favor at one time enjoyed by this product, both in human and veterinary medicine in the treatment of certain types of lesions, was due to a very real and definite therapeutic value. Obviously it must still possess the same merit, if any, upon which its former reputation was based.

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BEZOARS OBJECTS OF SUPERSTITION FOR AGES

Curative properties ascribed to bezoars, concretions found in the stomach and intestines and also supposed to be petrified tears of a species of deer and stones growing in the heads of animals have had an astonishing acceptance in ancient and medieval times and even down to the present time.

In the latter part of the 18th century the chamois was almost exterminated by the zeal with which it was hunted for bezoars; the bezoars from this particular species being believed to possess superior curative properties for a great number of diseases, poisonings and wounds.

Bezoars seem to have had almost worldwide fame. The Spanish conquerors found them in use in Brazil; they are still held in popular esteem in Norway; and there are few localities even in this country that do not have their “mad stone.” These mad stones are frequently applied to the bites inflicted by rabid animals. As practically 100% of the victims of bites of rabid animals are given the Pasteur treatment, the mad stones are making some wonderful records now, in the alleged minds of the superstitious, as preventives of rabies.
THE great interest taken by veterinarians in poultry pathology and the unusual amount of discussion of subjects dealing with poultry disease and poultry culture that was remarked upon in the annual review of veterinary activities for 1927, continued without abatement during the year just closing, and without doubt the attention given by veterinarians to the troubles of the poultry flock owner was much greater than in preceding years. This applies to the veterinary practitioner.

Control of poultry diseases by the livestock sanitary officials probably made no gain over what was accomplished in the preceding year. If any change occurred the project for the official control of bacillary white diarrhea lost ground rather than gained; that is, in the public estimation. In the matter of standardizing the blood tests for B. W. D., progress was made, as this is a prerequisite for official control of the disease by means of these tests in that sense progress in the control of that disease was made.

However, the conclusion seems inescapable that neither the agglutination or the pullorin test for B. W. D. has reached a degree of reliability in its general application that justifies official undertakings for the eradication or even control of this disease, based upon its recognition solely by either of these tests or a combination of them. At the present time, selective breeding experiments to produce strains of chickens resistant to or tolerant of B. pullorum, together with good cultural methods, seem to hold the most promise of successful management of the problem of B. W. D. in chickens.

A new disease—Infectious Purulent Entero-Proventicularis—of poultry was described during the year. According to its discoverer, it is a filtrable-virus disease, widespread in occurrence and insidious in attack. It runs a chronic course and the mortality is high. It resists all treatment and holds the possibility of widespread distribution among poultry flocks.

The great interest taken by veterinarians in the, for them, new field of poultry practice, insistently called for a collection of the newest and most authentic information on the diagnosis, prevention and treatment of the commoner diseases and parasitisms of poultry into a single volume for study and reference. This need was met by issuing a special Poultry Practice Number of Veterinary Medicine for May, containing discussions by recognized authorities, of the following subjects:

- Poultry Disease Problems.
- Poultry Disease Control.
- Opportunities Afforded for Poultry Practice.
- Building a Poultry Practice.
- Establishing a Poultry Practice.
- Physical Examination and Diagnosis.
- Ultraviolet Irradiation Profitable for Poultry Raisers.
- Postmortem Examination.
- Infectious Bronchitis in Poultry.
- Value and Limitations of Laboratory Aids in Diagnosis.
- The Rational Medication of Birds.
- Poultry Hygiene and Sanitation.
- Use of Biologics in Poultry Practice.
- Care of Baby Chicks.
- Aspergillosis—Brooder Pneumonia.
- Baby Chick Ailments.
- Bacillary White Diarrhea.
- Bumblefoot.
- "Leg Weakness"—Rickets.
- Green Feed Deficiency in the Poultry Ration.
- Limberneck (Botulism) in Fowls.
- Fowl Paralysis.
- Butyn in Avian Surgery.
- Common Diarrhea of the Fowl.
- Sources of Avian Tuberculosis.

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58 Bacillary White Diarrhea, by B. A. Beach; Veterinary Medicine, Vol. XXIII, No. 8, August 1928, pp. 349-352.
59 Infectious Purulent Enteroproventriculitis of Fowls, by B. F. Knapp; Veterinary Medicine, Vol. 23, No. 11, November 1928, pp. 486-488.
Avian Tuberculosis Control.
European Fowl Pest.
Blackhead.
Medicinal Agents Used for Parasites of Poultry.
External Parasites.
The Veterinarian and Poultry Diseases.
Internal Parasites of Poultry.
Maintaining and Culling a Flock for Commercial Egg Production.
Capon and Caponizing.
Some Experiments with Introcid in Poultry Practice.
Colds and Pneumonia of Poultry.
Poultry Disease Problems.
Fowl Typhoid.
Sanitary Measures for Control of White Diarrhea in Chickens.
Fowl Cholera.
Coccidiosis of Poultry.

This special poultry issue met with instant acceptance and approval and became overnight the handbook of those engaged to any degree in poultry practice. That it encouraged some who had previously neglected this line to undertake poultry practice in a greater or less measure, is amply established by correspondence. This collection of discussions summarizes in a usable way the instruction on the subject at the veterinary short courses held at a number of institutions, and at a great many veterinary meetings for the last several years, and for veterinarians, constitutes the most important contribution to the subject of poultry diseases published up to the present time.

Absorption of the Yolk in Baby Chicks

One frequently sees instructions not to feed chicks for 48 to 72 to 96 hours after they are hatched to permit time for the yolk to be absorbed. In view of the reason given for delaying feeding baby chicks, a recent publication by Schilling and Bleecker recording an experiment to determine the rate of egg yolk absorption is of interest. The conclusions follow:

"White Leghorn chicks from a controlled source and from a given hatch were divided into three groups, to two of which was fed a liberal and to the third a restricted ration. At intervals individuals were chosen at random from each group and necropsied and the amount of residual yolk was determined.

"Wide differences were observed in the individual rates of utilization of the reserve yolk, unaccompanied by observed pathological changes or bacterial interferences. The level of intake of feed was not found to influence the rate of disappearance of yolk. Chicks making the better gains did not necessarily digest and absorb their reserve yolk more rapidly; the converse also was true: Up to the fifth day, considerable masses of unabsorbed yolk may usually be found and an infectious or other pathological state is not predicated even on the presence of yolk masses weighing up to four grams on the seventh to ninth days."

Range Paralysis of Poultry

Perhaps no other disease of animals has been the subject of such divergent and so opposing opinions during recent years as has paralysis of poultry. Nothing like an agreement on this subject has yet been reached among poultry pathologists. A recent publication from New Hampshire where the disease is prevalent sums up the results of one investigation of the subject as follows:

Range paralysis of poultry has occurred extensively throughout the New England states and generally over the country as a whole, and has come to be one of the most dreaded diseases of growing chickens throughout the summer and early fall months. Its cause is still a mystery. Following the clue that there is evidence of some relation between paralysis and coccidiosis, E. M. Gildow has continued an investigation during the past year of three special phases of this problem: first, the possibility of producing typical paralysis by infecting birds with coccidiosis; second, the...
possibility of curing or relieving paralysis in birds already showing symptoms by handling them so as to completely eliminate any coccidia in the system; and third, a study of range methods to determine whether preventing a heavy infestation of coccidiosis will also prevent paralysis.

Evidence of immunity development against coccidiosis on the part of birds that had recovered from paralysis was found. Out of four birds given a severe dose of embryonated coccidia the only bird to survive was one which had previously recovered from paralysis. Birds given a half dose amounting to 2,800 embryonated coccidia survived the test, and only one lost weight. Attempts to introduce "crazy chick symptoms" in chicks by doses of coccidia failed, but it is believed that the number of coccidia present in the suspension was not sufficient.

Of a total of 44 paralytic birds placed in batteries during the year without supplementary treatment, it is significant that 14 have recovered and have started laying without showing evidence of the disease in their external appearance and actions. Of the 30 pullets that died 20 showed evidence of coccidial forms in the intestinal tract, 5 showed no evidence of such forms, and 5 were not autopsied. No evidence of long round worms or tapeworms was detected; some few cecal worms were found in most of the specimens. Two of five birds which showed no evidence of coccidia were in batteries a long enough period to have eliminated the coccidia that they might have harbored.

It was found that the use of a clean range in itself is not enough to prevent paralysis. Approximately 1,200 pullets were reared during the year on land where chickens had not been grown before, which was of a low-lying type with some swampy areas; 37 cases of paralysis were reported from this flock. On the other hand, on an old piece of land, which had been used for the last four or five years for a poultry range but which was of a high type, 400 pullets were grown, with only 13 cases of paralysis.

Day Old Chicks Do Not Spread Tuberculosis

The importance of efficient control of avian tuberculosis is becoming more important as we note its spread in poultry and recognize its relation to tuberculosis of other animals. In as much as the control of any disease must be based upon an intimate knowledge of its dissemination, it becomes necessary to familiarize ourselves with specific channels of infection and elimination.

To obtain more definite information as to the part that eggs from infected hens play in the spread of avian tuberculosis and particularly to ascertain if the enormous trade in day old chicks was the factor in the spread of avian tuberculosis in recent years, Fitch and Lubbehusen undertook some very important and very extensive experiments.

Their work shows:
1. That only about 1% of the eggs produced by tuberculous birds are infected.
2. That natural infection of the eggs with avian tubercle bacilli does not effect their hatchability.
3. Chicks hatched from infected eggs are not tuberculous.

4. There appears to be no danger of spreading avian tuberculosis through the shipment of day old chicks.

While the foregoing conclusions answer the question that the experiment was designed to answer, a number of other interesting facts were developed incidentally in the experiment. For instance, it was found:

1. Artificial infection of eggs with avian tubercle bacilli decreases the hatchability of the eggs.
2. Chicks hatched from artificially infected eggs were tuberculous.
3. Eggs do rarely contain tubercle bacilli.
4. If such eggs are incubated and fail to hatch, the number of bacteria is greatly increased.
5. Birds or pigs allowed to eat such uncooked eggs become infected with avian tuberculosis.

Tularemia or Tick Paralysis

This disease, communicable from rabbits and perhaps other rodents to man, through the bite of ticks and deer flies, or from contact with infected animals or carcasses, attracted increasing attention throughout the year, particularly in the Northwest. The infection has been found in wild rabbits and has been communicated to a man in most of the states west of New York.

Tularemia occurs in nature in jack rabbits, snowshoe rabbits and cottontail rabbits, and is responsible for some of the periodic epizootics that kill them locally in great numbers. It is characterized in wild rabbits by a spotting of the liver and spleen with yellowish or whitish flecks. Stupor or evidence of sickness in a rabbit should be regarded with suspicion, especially if an epizootic disease is prevalent. Diagnosis is made by inoculating guinea pigs or other susceptible animals with spleen or liver of a suspected rabbit or other wild animal and then examining a culture isolated after the animals used in the experiment sicken or die.

In man tularemia is likely to manifest itself first by pain, tenderness and swelling of the lymph glands which drain the region where the infection occurs, as those of the elbow or armpit when infection has occurred on the finger. These symptoms probably will occur within two to five days after infection. An inflamed and painful ulcer may soon appear at a point where an insect bite occurred, or at an abrasion in the skin where the infection has gained entrance. This may be accompanied by sudden onsets of headache, aching pains, chills, prostration, general weakness and fever. In some cases there are no external lesions.

In many parts of the country there is much interest in liberating wild rabbits to restock hunting areas, and these animals have been obtained from states where tularemia is now known to have been prevalent periodically. Where such importation for restocking purposes appears desirable it is important that effective quarantine be maintained to prevent introduction of diseased animals into localities where tularemia is not present or in which there is no manifestation of the disease in epizootic form.

Ticks that have fed on animals infected with tularemia carry the infection through the winter and the females transmit it through their eggs to the next generation.

THE GENERAL PRACTITIONER

I may be sentimental, but I have a profound admiration for the earnest clinician, whose knowledge has been perfected by the friction of circumstances, and by the shock of facts in the wide and sometimes rude school of general practice. Many of these men may not come very much into the limelight, but they are doing excellent work, frequently under great difficulties, and often with few tools, but success does not always depend on elaborate equipment. They are real benefactors, and it is to this class of individual that the stock owner must look primarily for that measure of protection and advice which always has been, and must always remain, his first line of defense.

No other kind of practitioner, and not even a group of specialists, can adequately fulfill the functions of the able general practitioner.—J. W. McIntosh, President of the National Veterinary Medical Association of Great Britain and Ireland.
Small Animal Practice

SUBJECTS concerned with small animal practice, except for rabies, received less discussion at veterinary meetings and in veterinary publications this year than they did last year, when an unprecedented interest in this line of practice was shown. The increased prevalence of rabies centered a good deal of attention on that subject and the widespread demand for vaccination for the prevention of rabies was responsible for some income from this source to a considerable number of veterinarians.

The number of veterinarians devoting their time exclusively or principally to the treatment of dogs, cats and other small animals and household pets probably increased during the year and on the average, this line of practice was good and those engaged in it were the most prosperous group in the profession. The number engaged in this specialty will probably continue to increase so long as it offers the greatest rewards for veterinary effort. They are performing a useful service, and are acquainting a considerable portion of the public with veterinary service to whom it would otherwise remain unknown. The small animal practitioners are doing their full share in elevating the reputation of the profession in the estimation of the public.

There is another and for the profession, a more potent reason than increased income to the individual, for extending veterinary service into every field where it will be welcomed and profitable for those in the field. The more friends the profession has at court, i.e., among the public, the better it can withstand assault from the unfriendly or the envious and the more difficult it will be for the less qualified to supplant it in whole or in part, or for the progress of invention, or changing customs to dispense with it. A broad and varied field of usefulness is a substantial "anchor to the windward."

With too many the impression prevails that small animal practice is to be acquired only in city locations and that special skill and elaborate and expensive facilities are essential to handling it successfully. There is hardly any veterinarian located where some small animal practice may not be had if it is properly
encouraged. Even if it amounts to only $50.00 in a year, that is in excess of the annual net accretion to millions of savings accounts. The special skill required is not beyond acquisition of any with the basic training necessary for a general practitioner. Hospital facilities may be dispensed with, at any rate in the beginning. The greatest obstacle to treating dogs and cats, as the larger animals are treated, at the homes of the owners is the desire of the owners to have them taken away. Where performance they must be treated at home if treated at all, this obstacle can be overcome without difficulty.

The greatest hindrances to the almost universal acceptance of the dog as a pet, guardian or companion in the home is the fear of rabies and the loss from distemper. Rabies can be eradicated without any addition to the present knowledge of its nature or methods necessary for its control. Distemper is still an expensive disease for the owners of dogs, but important progress has been made in its prevention and the outlook for handling it with success is hopeful. The problem of the stray, ownerless and unwanted dog is involved in handling either rabies or distemper, and veterinarians should lend help and encouragement to all sane measures for the solution of the problem presented by these three evils.

There are many conditions, of course, in which complete physical examination is not required, when as, for example, the part obviously affected is an eye or an ear or a broken bone.

Milks, in a recent article, suggests the following plan of procedure:
1. How long have you had the dog?
2. How long has he been sick?
3. Has he had previous attacks?
4. Have you other dogs, and are they well?
5. Was the onset slow or rapid?
6. What do you feed him?
7. How does he act?
8. Is he clever?

When this history has been obtained, the veterinarian will have some idea of the age of the animal, whether the condition is acute or chronic, some indication of its contagiousness or otherwise, something about the course of the disease and the bearing of feed and care upon it, and is ready to begin the inspection of the animal.

To quote:
"To make a physical examination with any degree of accuracy requires more than a superficial knowledge of..."
anatomy, physiology and pathology. It is the veterinarian's familiarity with these basic subjects, and the laity's lack of it, that enables the former to diagnose quite accurately and renders the latter's opinion hazardous if not dangerous.

"We are now ready for the personal observations. First, look at the dog at a distance of a few feet, noting the condition of the nutrition, and shape of its body from above and the sides. These views give a good idea as to the shape of the body in general, i. e., whether there is swelling due to ascites or some other condition. Note whether the legs are straight or curved and the joints normal or swollen (rickets). Glance over the body for loss of hair. Have the animal moved. Watch for loss of coordination. If there is a loss of coordination or peculiar gait, is it due to paresis of some part or is the animal blind?

"We are now ready to approach the animal and make a more detailed examination. Examine the skin as to whether it is loose or tight, elastic or does it remain in folds when pinched up. Notice whether the hair is dry and harsh or soft and silky. Then, unless attention is specially drawn to this organ, make a hurried examination for skin disease, and if found and the animal is to remain with you, draw the owner's attention to it. This saves trouble upon the owner's discovering skin disease when or soon after the dog leaves your place.

"Examine the mucous membrane of the eye, nose, and mouth. In passing, notice whether the nose is hot and dry or cold and moist.

"The ears; observe their carriage. The dog will carry the sore ear down and the head twisted to that side. Scars or sores of the flaps, violent shaking of the head, itchiness and a brown discharge suggests parasitic otorrhea; while a purulent exudate, tender ears and careful shaking of the head indicates catarrhal otorrhea.

"As you work backward, palpate the thyroids and lymph glands in the cervical region.

"Temperature. — The temperature of dogs varies somewhat according to size and age. If the animal violently resists the insertion of the thermometer, there is usually trouble with the anal pouches. While holding the thermometer in place with the left hand I take the pulse with the right on the femoral artery.

"Respiratory System.—This is examined in the usual manner, observing the type, rhythm, number, etc. The frequency is given in the following table. There is one symptom of dyspnea often overlooked, and that is puffing the lips during expiration.

"Circulatory System. — In connection with the pulse, it is necessary to keep in mind that most dogs have an irregular pulse.

"The following table of pulse, respiration and temperature is taken from Jacob.

<table>
<thead>
<tr>
<th>Pulse</th>
<th>Respiration</th>
<th>Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small dogs up to 1 year old...120-140</td>
<td>22-32</td>
<td>101.4-102.7</td>
</tr>
<tr>
<td>Small dogs one year and over...110-125</td>
<td>18-26</td>
<td>101.3-102.2</td>
</tr>
<tr>
<td>Medium dogs up to 1 year old...115-125</td>
<td>18-26</td>
<td>100.9-102.4</td>
</tr>
<tr>
<td>Medium dogs one year and over...90-110</td>
<td>16-24</td>
<td>100.0-101.4</td>
</tr>
<tr>
<td>Large dogs up to 1 year old...95-115</td>
<td>14-22</td>
<td>100.7-102.2</td>
</tr>
<tr>
<td>Large dogs one year and over...70-95</td>
<td>10-18</td>
<td>99.3-100.9</td>
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"Digestive System. — First, examine the mouth for odor, exudate, lesions, and foreign bodies between the teeth. Glance under tongue for cysts (ranula). Check the teeth, tonsils, and pharynx. Palpate the pharynx externally for obstruction. Look at the abdomen from above and at the side. A distended abdomen with sunken flanks almost invariably means abnormal conditions and not fat.

"The examination of the abdomen is not complete without palpation. Some practitioners palpate with both hands direct from above downward. Others use one hand, reaching up from the underside of the body. The stomach cannot always be located unless dilated or distended. The spleen is located and may be distinguished on the left side, but it may be confused with the liver which may be made out from both sides. The intestines should be manipulated for obstruction, and although some form of obstruc-
tion is quite easily located its nature is not so readily determined. The results from palpation are rarely positive but simply indicate something abnormal in the abdomen. An exploratory laparotomy is necessary to clear up the diagnosis. It is needless, perhaps, to state that one should be prepared to remedy a condition whenever an exploratory operation is made.

"Genito-Urinary System. — Examine the external genitalia of each sex, particularly for the infectious genital tumors. The bladder and kidneys may be felt through the abdominal wall. In palpating cats, remember that their kidneys are floating and may have the appearance of foreign bodies. The prostate is examined per rectum and if sufficiently enlarged may be felt in the posterior part of the abdomen or it might be more correct to say the anterior part of the pelvic cavity.

"Nervous System.—It is not possible to make a physical examination of this system. Diagnosis of nervous disorders must be made from disturbed function. It is customary to consider the nervous disturbances under the following heads.

1. Psychic functions.
2. Sensibility.

"We cannot expect to clear up the entire diagnosis of all cases with a physical examination alone. Special examinations must be made of the skin, feces, urine and blood. Facies and skin examinations are so necessary that they should be made as a routine."

Control of Rabies

Hilty in a recent article,\(^4\) gives something of the history of rabies and goes into detail as to its symptoms and the various ways in which humans are infected by dogs. Perhaps the most valuable part of the article is the very sane and practical discussion on the control of this disease, and the weaknesses that are inherent in present methods.

The author holds that muzzling, quarantine, confining and preventive inoculation are all capable of successfully controlling any outbreak of rabies and that a combination of these methods will very speedily bring any outbreak under control if they are conscientiously carried out; but unfortunately, all of these reasonable methods for the control of a critical situation are subject to violent opposition on the part of a very considerable percentage of the public, and further, muzzling is objected to by the owners of dogs on the ground that it offers the muzzled dog no protection, because such an animal is at the mercy of unmuzzled dogs. In this lies one of the big advantages of vaccination. It is harmless to the dog vaccinated and causes it no pain or inconvenience, yet at the same time it offers protection regardless of whether the owner of other dogs take any precautions or whether not the strays are gathered up and confined or destroyed. To put it another way, the man who muzzles his dog or keeps it on a leash does something for the community and for other dogs. The man who has his dog vaccinated in addition does something beneficial to himself and his own dog.

Regulatory officials in the control of rabies are seldom given sufficient authority. The control is lodged too much in local health departments who are subject to pressure from local humane societies, kennel clubs and others. Doctor Hilty discusses in some detail the situation in Lucas County, Ohio, the county in which Toledo, where the author practices, is located.

In Lucas county there are approximately 40,000 dogs, three-fourths of them unlicensed. In that county the heads of 557 dogs were submitted to the health department for examination for negri bodies, in 1927. Of this number 374 were diagnosed as positive and of the remainder, the author is convinced that a considerable number were infected but the animals were killed in such early stages of the disease that the

\(^4\) Rabies and its Control, by Reuben Hilty; The Veterinary Alumni Quarterly, Vol. XVI, No. 2, September 1928, Ohio State University, Columbus, Ohio.
laboratory methods of diagnosis were not accurate. This belief is based upon observation in his own practice.

During the year, more than 1,000 persons out of a population of 314,000 were subjected to the inconvenience of the Pasteur treatment. The author cites experiences in Ottawa county, Ohio, where compulsory anti-rabic vaccination was enforced. In Ottawa county 1,600 dogs were immunized, and since that time only one case of rabies has appeared in the county and that case in one of the few dogs that escaped immunization. In Doctor Hilty's own practice he has immunized more than 500 dogs in Toledo during a time when an epizootic of rabies was in progress. Of the 500 dogs immunized, one developed rabies. The results from the treatment of infected dogs, however, were by no means so satisfactory. He has treated 37 cases of dogs bitten by animals known to be rabid. Of these two developed rabies, one after a five-dose treatment and the other after a 12-injection treatment.

In all cases treated the author advises the closest of observation for considerable time following treatment. The only dogs on which treatment is advised are valuable ones which the author feels sure will be properly confined and observed.

The article closes with this significant statement: "I am of the firm opinion that an outbreak of rabies can be successfully handled by a combination of quarantine and immunization. Enforce a ninety-day quarantine on all dogs, and before the end of that period destroy all stray and immunize all quarantined dogs."

By the nutrition of hundreds of generations the fate of the white races is indissolubly linked with their cattle.—Herbert Hoover.

The rat is responsible for the almost world-wide prevalence of bubonic plague, a disease that during the twenty-year period ending in 1923 killed over eleven million persons in India alone.

ACIDOSIS — PARTURIENT PARALYSIS OF EWES

The loss of pregnant ewes, occurring in February and on up to lambing time, has been attracting much attention among veterinarians practicing in the sheep producing regions of the North West for a number of years. A number of articles on the subject have appeared in Veterinary Medicine.

It has been noted that this loss of ewes, which in some flocks has equaled 25% and even more of the ewes in the flock, usually occurs after a period of very inclement weather, and in sheep kept penned up and fed in lots or barns. An effective preventive of the condition was early announced by Dr. E. T. Baker. It consists in forcing pregnant ewes to take adequate exercise regardless of the weather. Doctor Baker advises that the sheep be fed at least a mile, and better two miles from the corrals in which they are kept during the night, and that they be driven the distance between the corral and the feed and thus forced exercise provided.

The ailment has gone under many names, the commonest of which has been parturient paralysis and stercoremia. Dimmock and assistants have investigated the condition in Kentucky and state that it is the same disease known in Europe as acute, diffuse parenchymatous hepatitis.

The occurrence and course of the disease strongly indicate that it is not infectious, and Dimmock was not only unable to find an organism to account for the condition, but was unable to transmit the disease from sick to well animals. Analysis of the urine and of the blood show that the condition is one of acidosis.

Large doses of Epsom salt, rectal enemas, intravenous injections of calcium lactate, sodium bicarbonate, glucose, udder inflation, botulinus antitoxin and hemorrhagic septicemia bacterin and aggressin were all tried in the treatment of the condition without beneficial results.
Control of Parasites of Live Stock

H. ALL'S unqualified statement that in the United States we are losing the war on parasites of live stock centered interest on this subject, and numerous discussions, published chiefly in Veterinary Medicine, show that veterinary practitioners everywhere are giving more attention than ever before to the treatment of parasitic infestations. The work of eradication of parasites or their control over large areas can be successful only when prosecuted by adequate forces of public employees. And, according to Hall, such forces are hopelessly inadequate at the present time. Progress is being made in fever tick eradication; cattle scab and sheep scab are being held at a standstill; the McLean County System of swine sanitation for the control of parasites and filth borne diseases in pigs is slowly extending in the middle west, but despite its great economic advantages to the swine raiser, it is practically unknown in vast sections of the country.

On the other hand, the anaplasma, the coccidium, the ox warble, the stomach worms, lung worms, intestinal worms and flukes in cattle are all extending the area and increasing the density of infestation. The same is true for many parasites of the horse, while the menace of poultry parasites and of sheep parasites is even more ominous.

Such efforts as are being made by livestock sanitary officials to combat this condition cannot be said to be more than experimental and fact finding.

As mentioned elsewhere, additional Federal appropriations have been made for the purpose of investigating the life histories of parasites and methods of combating these enemies of mankind, and while we are at present losing the war on livestock parasites, it is not yet lost and there are prospects that it will not be lost.

(Continued Next Month)

To allow for the annual index in this issue, we are compelled to carry half a dozen pages of reviews of "Control of Parasites" over to the January issue in which they will appear.

A few years ago there were 1,200 horses owned and kept in Carthage, Missouri; now there are fewer than 100. If the average cost of feeding those horses was $10.00 a month (most of the feed was produced locally), the change means that about $130,000 a year that was formerly distributed among the farmers of Jasper County is now sent to Oklahoma oil companies for the power that has supplanted the horse—a market gone and a farm surplus created.
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