

5000.

Bulletin No. 64.

December, 1900.

Department of Bacteriology.

# OREGON AGRICULTURAL EXPERIMENT STATION,

CORVALLIS, OREGON.

---

## Investigation of Diseases in Poultry.

---

By E. F. PERNOT.

---

The Bulletins of this Station are sent Free to all Residents of Oregon who request them.

---

Oregon Agricultural College Printing Office.  
GEO. B. KEADY, Printer.  
1900.

Withdrawn From  
Oregon State College  
Library

BOARD OF REGENTS  
OF THE  
OREGON AGRICULTURAL COLLEGE  
AND  
EXPERIMENT STATION.

OFFICERS.

HON. J. T. APPERSON, *President*.....Oregon City.  
HON. JOHN D. DALY, *Secretary*.....Corvallis.  
HON. B. F. IRVINE, *Treasurer*.....Corvallis.

EX-OFFICIO MEMBERS.

HON. T. T. GEER, *Governor of the State*.....Salem.  
HON. F. I. DUNBAR, *Secretary of State*.....Salem.  
HON. J. H. ACKERMAN, *Supt. of Public Instruction*.....Salem.  
HON. B. G. LEEDY, *Master of State Grange*.....Tigardville.

APPOINTED BY THE GOVERNOR.

	TERM EXPIRES
HON. J. T. APPERSON.....	Oregon City, 1901.
HON. W. P. KEADY.....	Portland, 1901.
HON. J. K. WEATHERFORD.....	Albany, 1901.
HON. BENTON KILLIN.....	Portland, 1903.
HON. J. M. CHURCH.....	La Grande, 1903.
HON. JOHN D. OLWELL.....	Central Point, 1903.
HON. WM. E. YATES.....	Corvallis, 1907.
HON. JOHN D. DALY.....	Corvallis, 1907.
HON. B. F. IRVINE.....	Corvallis, 1907.

OFFICERS OF THE STATION.

STATION COUNCIL.

Thos. M. Gatch, A. M., Ph. D..... President and Director.  
James Withycombe.....Vice-Director and Agriculturist.  
A. L. Knisely, A. M.....Chemist.  
A. B. Cordley, M. S.....Entomologist.  
E. R. Lake, M. S.....Horticulturist and Botanist.  
E. F. Pernot.....Bacteriologist.

OTHER MEMBERS OF STAFF.

George Coote.....Florist.  
F. L. Kent, B. S.....Dairying.  
J. F. Fulton, B. S.....Chemistry and Assaying.  
C. M. McKellips, Ph. C.....Chemistry.

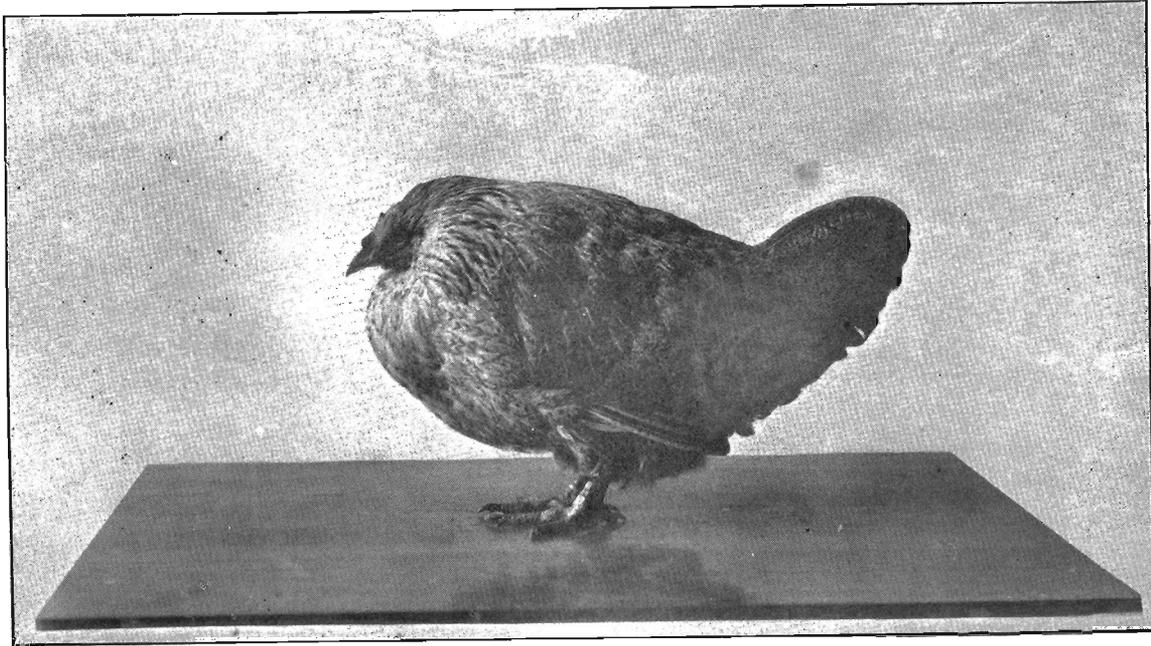


PLATE I.

## Investigation of Diseases in Poultry.

The poultry industry in the state of Oregon, although apparently insignificant, is equal if not greater in importance to that of wheat raising.

It is difficult to estimate the immense amount of money annually distributed among poultry raisers and farmers because it is divided into such numerous small amounts. Eggs and poultry play such an important part in providing fresh meat and groceries for the farmers, that the barnyard fowls are indispensable. On the other hand, those who are engaged in raising poultry for the market, by modern methods, find it to be remunerative and within the reach of even those possessing but small capital. The success of such enterprises depends largely upon the intelligent management of the fowls when disease manifests itself among them. The lack of proper understanding as to what should be done when mortality occurs among incubator chicks, has discouraged a great many who might otherwise have made a success of the enterprise.

Some of the conditions found in western Oregon during the past year are described in the following pages, in a popular form, in the hope that they may be of some benefit to poultry raisers.

### AVIAN TUBERCULOSIS.

Avian tuberculosis is a contagious disease, caused by the presence of the tubercle bacilli, which is to fowl as tuberculosis (consumption) is to man, or animals. The germs, while growing in the body of the fowl, appear to be identical with those in mammals with the exception of their being a trifle larger and more vigorous, but when artificially grown in bouillon, or glycerine agar, at a high temperature, their morphology differs materially from the others.

The pathogenesis of this germ to animals has not been satisfactorily demonstrated. My experiments of inoculating guinea pigs with different quantities of the fresh tubercles, taken from the intestines and liver of a hen and macerated with a small quantity of bouillon, have given negative results. This test was by no means satisfactory or conclusive on account of the impossibility to obtain a sufficient number of lower animals at a time when they were needed, and no positive conclusion can be deducted from inoculating such a small number, especially as guinea pigs are slightly, if at all, susceptible to the disease.

The first outbreak cited was that of a hen sent to the station from a flock in which six hens had already died of the same disease. In order to study the symptoms, the bird was kept three days, until its death. The day before its death it was photographed, and presented the appearance as seen in Plate 1, being very much emaciated.

Although the hen was a graded Plymouth Rock which would in normal health weigh about four pounds, it was reduced to only

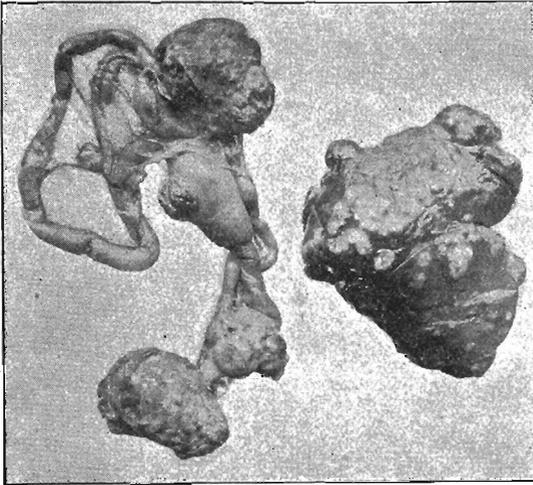


Fig. 1.

## PLATE II.

Fig. 2.

twenty-two ounces. At the post mortem examination the bird was found to have generalized avian tuberculosis, the digestive tract being the original seat of the disease; this was evident by the extreme growth of the tubercles on the intestines (see Plate II, Fig. 1). The mesentery was a net work of tubercles presenting the appearance of bead work. The liver was an infiltrated mass of yellowish colored tubercles so closely packed together that they enlarged that organ four times its normal size. See Plate II, Fig. 2, in which a portion of the liver is shown. The enlarged liver, together with the tubercles on the intestines, completely filled the abdominal cavity; the spleen contained a great many small tubercles; the heart had one tubercle, about the size of a wheat kernel, on the right auricle. The lungs were affected in one spot only, and that at a point where the liver came in contact with them. Nearly all over the body the connective tissue between the skin and the flesh, contained tubercles about the size of millet seed. No external growths were found on the legs, wings, head, or any other part of the body.

The first noticeable symptom of this disease is, generally, lameness; the bird becomes more or less mopy, and gradually loses flesh until at the time of death it is a mere framework with feathers.

The appetite is good throughout its sickness, at times it even becomes ravenous for food, and although it eats heartily this does not seem to appease the hunger.

Toward the latter stages of the disease there is nearly always a persistent diarrhoea and the evacuations are accompanied by a discharge of a white or yellowish viscid matter. In all the specimens received, this matter was carefully examined and in each case the tubercle bacilli were found in countless numbers.

When the tubercle on the intestine reaches a certain period of its growth, there is a breaking down of the intestinal wall, and the germs are passed out with the fæces, thus accounting for the rapid transmission of the germs from fowl to fowl, for in nine cases out of ten, the chickens' food is contaminated with their excrement.

To illustrate the danger of spreading this disease, the writer was called to visit a farm where it was found that fifty chickens had died of tuberculosis. In order to call the chickens together for our inspection, the owner scattered a handful of wheat on the ground of a run, where six choice blooded fowls had died some time previous; some of the wheat fell on the fresh excrement, and upon picking up several kernels with forceps, the under side of each was found to be soiled, but a chicken would not hesitate picking it up and swallowing. So if there were one sick bird passing germs, it would be only a matter of time that all would become infected. This offered an excellent opportunity to point out the danger of feeding in this manner.

There is still another dangerous and bad practice in vogue, that of leaving the carcasses of diseased fowls to decay or to be eaten by the hogs or chickens. *They should by all means be buried deeply or burned;* it will pay any poultry raiser to do this.

We are as far from solving the problem of a remedy for this disease as we are from curing consumption in man, therefore nothing can be said yet, except to urge the necessity of sanitary precautions, and the early removal and destruction of sick fowls from the flock, as well as thorough disinfection of the premises.

During the past year there were six outbreaks of avian tuberculosis discovered, ranging in a loss of from five to fifty chickens in a flock. The lesions were all practically the same as those already described, with the exception of one case, in which the hen had a tuberculous leg, as illustrated in Plate III.

The hen's leg in this case had evidently been inoculated with the tubercle bacilli by picking it with an infected beak at that point, or from some other external injury. Several hens from the same flock had previously died from generalized tuberculosis.

Microscopical examinations were made from time to time of the exudate from this hen's leg and the bacilli were always present. A hen in this condition should certainly be removed from the flock and destroyed to prevent further infection.

Reports show that the fatality amongst grown chickens, especially older ones, is greater from this disease than from any other.

There appears to be no record of the transmission of these germs from fowl to man, with fatal results, although the possibility may exist. The flesh of a fowl in an advanced stage of avian tuberculosis can not be wholesome as an article of food and should not be eaten.

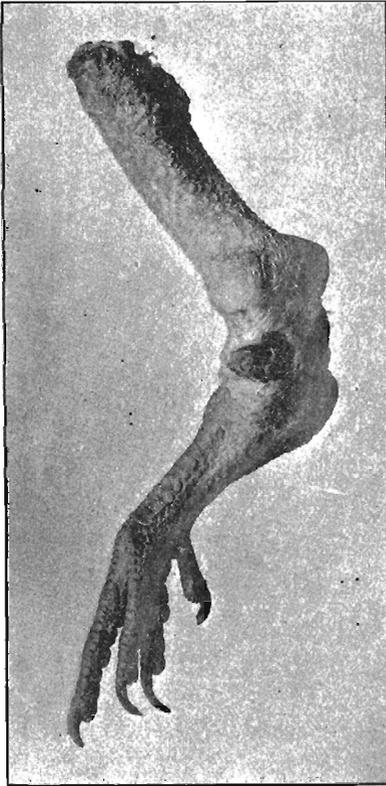


PLATE III.

#### CATARRH AND CATARRHAL ROUP.

There have been a great many specimens of chickens and turkeys sent to the station this year which were suffering from catarrh and catarrhal roup. This trouble seemed to have prevailed in many localities, with more or less fatal results. Among the young chickens it became epidemic, destroying an immense number. Experiments to find a remedy for this trouble were conducted with the specimens received, and the following has proven eminently successful:

A two per cent solution of permanganate of potash in water, or two ounces of permanganate to six and one-half pints of water, was used. The fowl is grasped by the body with one hand and by the neck with the other; the head is then plunged into this solution completely submerging it, and held there until the bird is nearly choked, then removed to allow it to breathe, this will cause it to sneeze, and in so doing, force the solution through the air passages, thus reaching the affected parts. Repeat this operation three times while the bird is still in hand, and at least twice a day, so long as there are any evidences of the disease left. Care should be taken not to strangle the bird by holding its head under the solution too long, and, on the other hand, if not held long enough, the solution will not reach the desired parts. If an incrustation or scab has formed over the nostrils it should be carefully removed by moistening with warm water and with the aid of a toothpick—this must be done before immersing the head in the solution.

The next step is to take a part of the solution, dilute it with four times its bulk of water, and give it to the fowls to drink. They should have nothing else but this to drink for three or four days, keeping it fresh each day. If the trouble reappears repeat the operation of dipping the head until a cure is permanently effected. A chicken or a turkey that is worth anything is worth this trouble to cure.

#### FAVUS.

One outbreak of favus was found during the past year. It is commonly known as "baldness" or "white comb," and is caused by a fungus named the *Achorion Schonleinii*. In mankind the disease is known as tinea favosa, or favus.

Favus is a disease of the skin which first manifests itself by small white or grayish spots on, or near, the comb. The spot is very small at first, gradually becoming larger until the whole surface is covered with a scaly crust. The feathers become dry, ruffled, and eventually fall off, leaving the skin bare, from whence it derives the popular name "baldness." It is a contagious disease which is transmitted from bird to bird, and whenever an abrasion of the skin receives the spores the fungus develops very rapidly. It is not fully known just how the fungus spreads all over the head and neck of the fowl unless it is by the rubbing of one part of the body against another, or by scratching. Artificially grown on slant nutrient agar the colonies remain isolated until they grow sufficiently large to touch

each other and form a white scab along the line of inoculation, but when a spore is accidentally deposited near the edge of the test tube, the colony developed from it remains isolated throughout its existence. If there be too much condensation water in the tube, the whole surface of the slant will become covered, especially if the tube is handled after being inoculated.

A wise precaution in the treatment of skin diseases in fowls is to remove the bird for that purpose. For instance, in the treatment of favus, if the scales are rubbed off and allowed to drop on the floor of the coop or their runs, other fowls will become infected, because the scales contain innumerable spores. Any scales removed from an affected bird should be burned, for "an ounce of prevention is worth a pound of cure."

In the treatment of this disease it must be borne in mind that we are dealing with a fungus whose mycelium penetrates beneath

the surface of the epidermis where external applications cannot reach without some preliminary treatment to remove the crusts which should be accomplished by the aid of some blunt instrument, or by such means as would remove dandruff from the head, care being taken not to cause an abrasion of the skin; then apply an ointment made from vaseline and two per cent carbolic acid, which may be bought ready prepared at almost any drug store. Carbolic acid one part, soft soap twenty parts, well mixed, has been recommended.

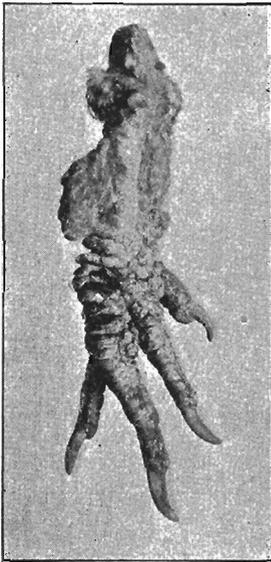


PLATE IV.

#### SCABIES.

Plate IV is from a photograph taken of the leg of a hen afflicted with "scabies" or "scaly legs," and is introduced here to illustrate the difference between scab-

ies and tuberculosis of the legs. Scabies is caused by the presence of a mite known as *Sarcoptes Mutans* which penetrates beneath the epidermic scales. Dr. Salmon writes, that by burrowing, these mites set up an irritation which leads to a multiplication of the cells of the part and an exudation of serum. It is by the union of these

two conditions that the white powdery crusts are formed, which raises the epidermic scales from their normal position. If the crusts are removed and the under surface examined with a lens, they are found to contain a large number of depressions, in each of which a female egg, containing sarcopt, is lodged. The larvæ, males, and younger females are found wandering beneath the crust. The latter contains so many cavities that it has very much the appearance of dried bread. As the crust thickens by deposits on the inner surface, the cavities first formed become smaller by the drying of the walls surrounding them, and the sarcopt abandons this location for a position nearer the flesh, where there is more moisture. The mites are therefore found only on the inner surface of the crust although the cavities, or honey combed appearance, exist throughout the whole substance. The treatment, briefly stated, is to remove the affected birds to prevent the spread of the contagion. The houses they occupy should be thoroughly cleaned, the roosts and other woodwork should be scalded with boiling water, or covered with carbolated lime wash.

The treatment of the afflicted birds is to remove the loosened scales in order to bring the remedy in contact with the mites. To accomplish this, the legs should be soaked for a sufficient time in warm water to which some soap has been added. When thoroughly softened, the loose scales may be removed without causing the leg to bleed. After this has been done the legs are dried and treated with a good coat of ointment made with balsam of Peru, one or two drachms to one ounce of vaseline. The disease is not a difficult one to cure if the preliminary treatment is thorough and the loose scales and crusts are all removed. There are cases of tuberculosis, however, which affect the birds' legs by forming an external growth which very much resembles scaly legs, but by treating as above described, the diseases may readily be differentiated. The crusts in scaly leg are easily removed, while in tuberculosis it is impossible to do so.

#### LUNG DISEASES.

During the spring months the writer was called to examine many broods of incubator chicks which were dying in great numbers, and there were also many specimens sent through the mails to the station for examination from different parts of the state. In all the specimens examined there were but three troubles found, one was pneumonia, another congestion of the lungs, and the third will be mentioned

later on. The two former were the results of the little chicks' having become chilled.

There is but one step between the two diseases, and the environments which are responsible for the chick's taking cold and producing a congestion of the lungs, are factors in conjunction with the pneumococcus in producing pneumonia.

For the benefit of the Oregon poultry raisers who desire to examine their diseased fowls suspected of having pneumonia or congestion of the lungs, a few plain directions may be serviceable.

In congestion of the lungs the chick, after being chilled, becomes mopy and stupid, the respiration is rapid and difficult. It "looks cold," and if possible will attempt to gather warmth from a ray of sunshine which may find its way into the brooder house. The symptoms appear quickly, and the disease runs its course in a short time.

Upon examination the lungs are found to be very dark in color and filled with blood. If a blood vessel has been ruptured the bronchi and air sacs will be filled, a thick mucous will likely be found in the windpipe and mouth, and suffocation is the cause of death. In pneumonia the symptoms are similar to those described in congestion of the lungs, the discharge from the mouth or nostrils may be colored with blood or have the color of prune juice; the bird becomes mopy, with head drawn in, drooping wings, and ruffled feathers. The appetite is poor but thirst increases.

The lung, or lungs, after death are found to have a dark color and are solidified, owing to the engorgement of an exudate. If a portion of the lung were dropped into water it would sink, whereas the healthy lung tissue would float. This form of pneumonia is known as croupous pneumonia. There is another form known as bronchopneumonia, in which the bronchial tubes are affected with inflammation and the lung does not become so solidified.

The pneumococcus, the germ which is conceded to be the cause of pneumonia and which is so closely associated with it, is also found in the mouth during health, awaiting a favorable opportunity to develop. When a bird becomes chilled from exposure or draughts, dampness, or sudden changes of temperature, the blood is forced from the surface of the body into the lungs and other organs, the circulation is checked and congestion follows.

Such a condition of the lungs, aided by the germ, no doubt changes congestion into inflammation, and the blood vessels throw

out a liquid which coagulates after filling the air cells, thus accounting for the firmness and solidity of the lungs in croupous pneumonia. Some of the brooders and brooding houses in use are altogether wrong for this climate where there is such a great difference in temperature between night and day, especially in the humid spring months.

Some of the brooder houses visited were constructed of rough lumber; they were cold and draughty, and were but mere shells without ceilings or means of maintaining an even temperature. The brooders were placed on the floor and heated with kerosene lamps which continually gave off irritating fumes; some were heated from above and others from below. The continued breathing of these vapors, gases, or impure air, depletes the system of the young chick, making it more susceptible to taking cold. There were large numbers of chicks in each brooder and in the early part of the night they would huddle closely together, raising the temperature by the radiation from their bodies; those in the center of the group, although too warm, were compelled to remain where they were and breathe that foul smoky air all night long. Early in the morning they would emerge from their stifling sweat-box into the run in search of food where they would stand and peep in an atmosphere thirty degrees, or more, colder than their brooder. The result was that they became thoroughly chilled before their attendant arrived, and died by the hundreds from the colds which they contracted.

Unless some means are found to maintain an even temperature during the night and day in the brooder house, and dispense with the foul oil lamps in the brooder, chicken raising with the incubator will not be a success in this section during the early spring months.

A very ingenious device, in use by a young lady in Salem, as a substitute for the oil-heated brooder was found and is worthy of mention here. It consisted of a square wooden box or frame, with sides about six inches high. Across the top of this frame were arranged laths at intervals of one inch; from these laths were suspended strips of woolen goods about the width of carpet rags, tacked closely together, and reaching nearly to the floor of the frame. A cover provided with holes for ventilation was placed a few inches above the slats, and the whole structure was covered with an awning similar to a tent. The temperature was maintained at night with a lamp situated outside, from which pipes conveyed the heat to the enclosure. An opening at one end of the frame, protected with cloth strips, communicated with the run outside.

The advantage of such a device is, that it prevents the chicks from huddling too closely together and becoming overheated, the strips keeping them separated and there is perfect ventilation. The radiated heat from their bodies is retained by the strips of wool. The laths, with strips attached, may be removed at any time and scalded to prevent lice or germs from accumulating.

Devices of this kind, placed in evenly heated brooder houses, would be worth more than all the remedies known for incubator chicks, because it would be removing the cause of the disease.

Ninety-nine per cent of the chicks were raised in this manner, while those raised by the ordinary brooder, in the same neighborhood, did not average sixty per cent.

To be successful with them, the strictest sanitary precautions must be observed to prevent contagious and infectious diseases among fowls. Even then, germ diseases will occasionally manifest themselves from unknown sources, but they are much easier controlled when they attack robust, healthy fowls in cleanly premises.

Great care should be taken not to allow any other than perfectly healthy fowls to enter fairs, nor any place where they are collected for exhibition. It seems needless to add that children should be forbidden to handle or to be with diseased fowls, especially those affected with diphtheria or diphtheretic roup, as these diseases are transmissible to human beings.

The treatment for lung disease in fowls is very unsatisfactory because the seat of the disease is inaccessible, and its progress so rapid that but little can be done to check it. In the event of a valuable bird being affected, it is well to remove it to a warm room, and administer a soothing drink, such as linseed tea. One grain of nitrate of potash dissolved in the drink and administered three times a day has been highly recommended. Too much cannot be said in urging the necessity of keeping the delicate chicks from taking cold. They are poorly clad, especially along the back under which the lungs are situated, and the small amount of food which they take before going to roost for the long night is insufficient fuel to maintain the body heat until they are fed again in the morning; hence the necessity of providing a brooder house that will be as warm in the frosty morning as it was the evening before. Not too much heat, and good ventilation, without draughts, are also very essential points.

## INDIGESTION.

The third mentioned case was that of some incubator chicks which had died, the owner finding a yellow substance in the abdomen to which he attributed the cause of their death.

There appears to be a heavy loss of incubator chicks through the lack of understanding their requirements while quite young. At that period of their life they must have rest, warmth, and no food. Nature has provided that a portion of the yolk from the egg should be inclosed in the abdomen, which furnishes the young chick with food by absorption, for from two to four days after hatching. During this period their digestive organs mature and become capable of digesting and assimilating light food; gradually they become stronger and their appetites increase according to their needs.

Some of the chicks dissected were found to have their craws partially filled with food and a fair quantity of unabsorbed yolk in their abdomen. All the conditions gave evidence that they had died of an acute indigestion. Particles of undigested food were found in all parts of the digestive tract.

By closely observing the habits of the mother hen, the loss of so many chicks could be easily averted, for she is seldom in a hurry to begin feeding her young.

Fowls are subject to a great many other diseases not mentioned in this bulletin, but the results of investigations and experiments will be published as new cases arise. Ordinarily it is difficult to distinguish the different diseases by the appearance of the fowl, because the symptoms are so nearly alike with different ailments. Moping is one of the most common symptoms, and, unless a careful examination is made, the nature of the disease will probably not be discovered, and if it is of a contagious or infectious nature, serious losses may follow.

The administering of medicines to fowls is unnecessary if proper food is given them and sanitary precautions are observed.

The station is always ready to investigate unusual outbreaks and tender such information and assistance as lies within its power.

## LIST OF BULLETINS

(In print) published by the Oregon Agricultural Experiment Station to November, 1900.

Circular No. 1—Dairying in Oregon .....	Shaw, French and Kent
No. 6, 1890—Chemistry, Zoölogy .....	Washburn
No. 7, 1890—Small Fruits and Vegetables .....	Cooté
No. 8, 1891—Varieties of Wheat and Flax .....	French
No. 10, 1891—Entomology .....	Washburn
No. 28, 1894—Pig Feeding, continued .....	French
No. 29, 1894—Horticulture, Pruning, etc. ....	Cooté
No. 30, 1894—Potatoes and Roots, continued ..	French
No. 31, 1894—Codlin Moth, Hop Louse .....	Washburn
No. 32, 1894—Five Farmers' Foes .....	Craig
No. 33, 1894—Tent Caterpillar .....	Washburn
No. 34, 1895—Fruits and Vegetables .....	Cooté
No. 35, 1895—Pig Feeding, continued .....	French
No. 36, 1895—Composition and Use of Fertilizers	Shaw
No. 37, 1895—Experiments in Cattle Feeding ..	French
No. 38, 1895—Fruit Pests .....	Washburn
No. 39, 1895—Grasses, Chemistry .....	Shaw
No. 40, 1896—Prunes, Apples and Pears .....	Hedrick
No. 42, 1896—Feeding Sheaf Wheat .....	French
No. 43, 1897—Flax Culture .....	French
No. 44, 1897—Review of Oregon Sugar Beets ..	Shaw
No. 47, 1897—Cheat and Clover .....	Shaw and French
No. 48, 1898—Spraying .....	Cordley
No. 50, 1898—The Fertility of Oregon Soils ..	Shaw
No. 51, 1898—Marketing Fruit .....	Craig
No. 52, 1898—Nut Culture .....	Cooté
No. 53, 1898—Sugar Beets .....	Shaw
No. 54, 1898—Flax, Hemp, Dairy, etc. ....	French and Kent
No. 55, 1898—Chemistry of Cherries .....	Shaw
No. 56, 1899—Notes on Prune Dipping and Strength of Concentrated Lyes	Shaw
No. 57, 1899—Brown Rot .....	Cordley
No. 58, 1899—Rose Culture in Oregon .....	Cooté
No. 59, 1899—Sugar Beet Experiments of 1898	Shaw
No. 60, 1900—Apple Tree Anthracnose .....	Cordley
No. 61, 1900—The Oregon Prune .....	Shaw
No. 62, 1900—Miscellaneous Investigations ..	Shaw
No. 63, 1900—Prevention of Smut on Oats—Preliminary Bulletin .....	Pernot
No. 64, 1900—Investigation of Diseases in Poultry	Pernot
Circular Bulletin concerning Acid Soils in Oregon—1900 .....	Knisely

Copies will be sent to applicants so long as the supply lasts.

Address THOS. M. GAT'CH,  
Director of Experiment Station, Corvallis, Oregon.