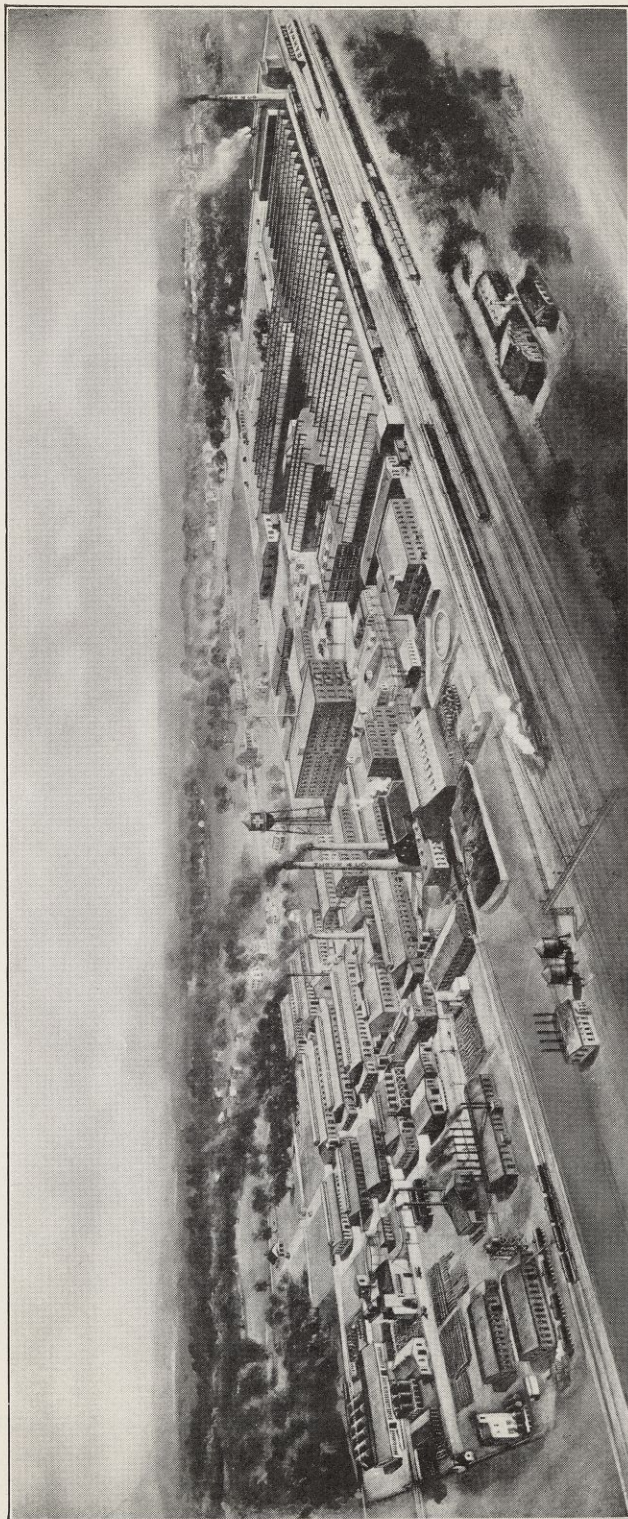


FACTS ABOUT IODINE

Dwelling particularly on the use of Iodine
Vermicide Merck and Iodine Sus-
pensoid Merck for the control of
certain intestinal parasites
of poultry and the func-
tion of iodine in
nutrition.



MERCK & CO. INC.
Manufacturing Chemists
Dept. of Animal Husbandry
RAHWAY, N. J.



Works of MERCK & CO. INC., at Rahway, N. J.

FACTS ABOUT IODINE

Iodine is an element. It is only slightly soluble in water. The crude iodine is purified (resublimed) and then used as a basis for various products, of which the most well known are potassium iodide, tincture of iodine and colloidal iodine.

Potassium Iodide is, as its name indicates, a combination of iodine and potash. In this form iodine has been widely used, both in this country and abroad, to add to the rations of live stock.

Tincture of Iodine is a solution of iodine and potassium iodide in alcohol. It is successfully used externally as a germicide. For internal administration tincture of iodine has to be greatly diluted due to its corrosive and highly irritant properties. For these reasons, tincture of iodine is seldom recommended for internal administration.

Colloidal Iodine, (Chandler) was discovered by Dr. W. L. Chandler of Michigan State College. It is a liquid consisting of extremely fine particles of free or uncombined iodine held in suspension in water by the aid of acacia. This product is marketed in two forms—as Iodine Vermicide Merck and Iodine Suspensoid Merck. They differ only in the percentages of iodine and acacia.

The Vermicide contains more acacia and slightly less iodine than the Suspensoid and is used for internal administration. The Suspensoid is the form of colloidal iodine used for disinfecting brooder house floors and equipment and for treating hatching eggs and for killing worm eggs and coccidial oocysts, but should not be used for dosing poultry.

Colloidal Iodine (Chandler) is the only known substance that can be used in a practical way to destroy worms, their eggs and larvae and coccidial oocysts. It acts very quickly in dilute water solutions containing very small amounts of iodine.

Due to the fact that free iodine combines with organic matter (dirt, feed, etc.), the directions for using Iodine Suspensoid Merck call for much stronger solutions than are necessary in the laboratory so as to allow an effective margin of safety when used under practical conditions.

THE THYROID GLAND

An extract from "Iodine in the Feeding of Poultry" by
FRANK EWART CORRIE, B.Sc., N.D.A., N.D.D.

"The iodine contained in food is received by the thyroid gland, elaborated into that gland's peculiar secretions—principally thyroxin—and distributed by the blood stream throughout the body. This thyroxin, 'the most powerful stimulant of body metabolism known,' contains some 65 per cent. of iodine. Research has revealed a number of interesting facts about the thyroid gland of the fowl. Body-weight for body-weight, the hen has a heavier thyroid, with a higher iodine content, than the larger classes of farm stock. The thyroid weight and iodine content increase with age in the growing bird, the maximum being reached at sexual maturity. The iodine content of the hen's thyroid is highest previous to the period of maximum egg production, and during this period the iodine content of the gland decreases. As the moulting period approaches there is a slight increase in the iodine content, followed by another fall corresponding with the progress of the moult.

"Weight for weight, therefore, the requirements of the fowl for iodine are greater than those of the larger farm animals. Further, the variations which have been noted in the iodine content of the thyroid have special significance in view of the increased rate of production now demanded from the hen and and of the importance of bringing birds rapidly through the moult in good condition.

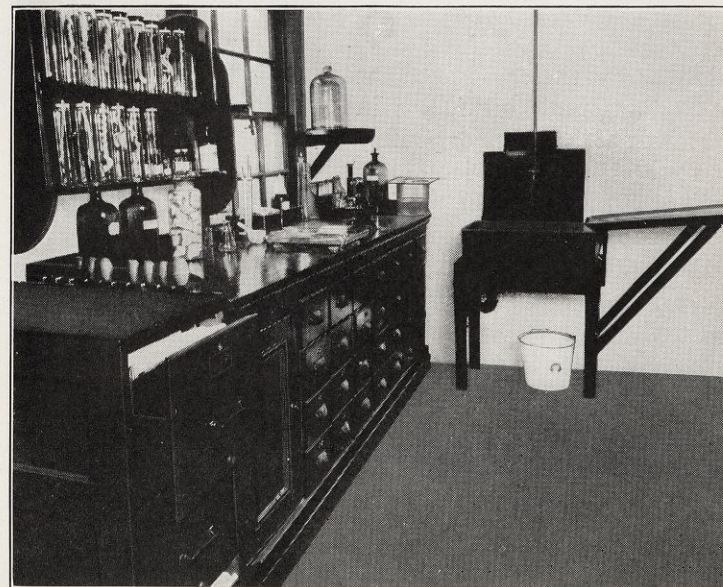
"Iodine plays an important part in every phase of animal metabolism. So far as poultry are concerned its functions may be defined as follows:

- (1) It is essential to physical growth. Associated with this function is the influence of the element on the assimilation by the bird of the three important constructional or growth factors—calcium (lime), phosphorus and nitrogen (protein).
- (2) It is essential to the health of the skin and to the development of feathers.
- (3) It is associated with sexual development and with all the processes of reproduction.
- (4) It is needed by the body to establish and maintain resistance to bacterial infections and toxins.

"In the performance of these functions iodine is expended and must therefore be renewed regularly.

"There are three food elements upon which a growing bird makes extraordinary demands—calcium (lime) and phosphorus for the construction of the mineral matter of the skeleton, and nitrogen for the manufacture of the flesh which is to be distributed over the skeleton framework. The work of Kelly, demonstrating that iodine exerts a beneficial influence on the assimilation and retention by the animal of these three elements (particularly phosphorus and nitrogen), establishes definitely the importance of the iodine supply to the chick and to the growing bird."

Some investigators have assumed that poultry obtain sufficient iodine from their ordinary food because there is little or no evidence of goiter among poultry flocks. Others are beginning to investigate the iodine requirements of poultry. They are finding that what may once have been considered abnormal amounts of iodine do not produce any harmful effect upon poultry and under certain conditions may prove bene-

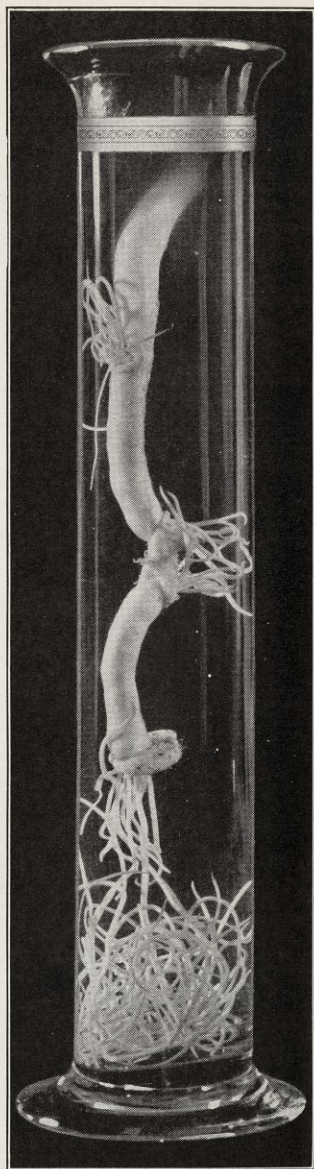


Corner of Merck's Research Laboratory of Animal Husbandry Dept.

ficial. Poultry raisers note certain definite favorable results when additional iodine is added to the rations. Just why and how these results are obtained is something which needs further investigation.

What is frequently referred to as organic iodine is really iodine in organic combination. In this form it is found in cod-liver oil, grain, fish meal, kelp and other products fed to live stock. The amount of iodine in these food-stuffs varies tremendously. Some fish meals contain more iodine than others depending upon the fish they are made from. Cod-liver oil may vary in iodine content. There is a considerable seasonal and regional variation in the iodine content of kelp or sea weed.

Obviously the most accurate method of furnishing iodine in the ration of live stock or poultry is to add colloidal iodine as Iodine Suspensoid or Iodine Vermicide Merck. The free iodine quickly combines with the organic matter or in the case of milk with the casein and fats providing iodine in organic combination.



Specimen of Large Roundworms

INTESTINAL WORMS OF POULTRY

Various species of intestinal worms are present on most poultry farms. Worm infested poultry do not develop as rap-

idly as they should and the pullets cannot produce eggs as economically as those free of parasites.

Prevention is always the best method of controlling worm infestation, but many badly infested pullets are housed in the Fall. As a precautionary measure progressive poultry raisers now worm their pullets before housing them. Increased egg production and lowered feed consumption pay good dividends on this investment.

Many of the Agricultural Colleges have issued bulletins describing the intestinal worms of poultry. Two excellent bulletins that have come to our attention are: Bulletin No. 89, Ohio State University, Columbus, Ohio, entitled "Control of Intestinal Worms of Chickens" and Bulletin No. 247, Kansas State Agricultural College, Manhattan, Kansas, entitled "Poultry Diseases, Their Prevention and Control." These bulletins may be obtained free of charge by writing to these stations.

Poultry raisers should examine their growing stock for worms or preferably send specimens to a competent veterinary laboratory, for examination and diagnosis.

Some of the Experiment Stations feel that they cannot advise the use of commercial products for worming poultry as they do not have appropriations for testing such products. Others having tested commercial products in the laboratory and in the field do not hesitate to advise their use.

Iodine Vermicide Merck is not a secret formula. It was discovered by Dr. W. L. Chandler of Michigan State College, further developed by the chemists of Merck & Co. Inc. in collaboration with Dr. W. L. Chandler.

In several of the official egg laying contests each entry is dosed with Iodine Vermicide Merck as a regular procedure and excellent results are reported. Iodine Vermicide is a highly concentrated suspension of colloidal iodine (Chandler) sold in one pound and one-half pound bottles only. Some of the most successful breeders have used it for years in preparing their pullets for egg laying contests.

Before choosing a vermicide, it is wise to first ascertain if duodenal coccidiosis is present in the flock. Some vermicides interfere with egg production and growth, and occasionally

cause considerable mortality when administered to poultry suffering from this very prevalent disease. Should duodenal coccidiosis or blackhead be present Iodine Vermicide Merck may be safely administered.

Each lot of Iodine Vermicide Merck is required to pass very exacting tests before being passed by our control laboratory. After the chemical tests are completed a sample is sent to the poultry laboratory. The suspension is made up twice as strong as we recommend and a full adult dose (1 oz.) of this double strength solution is administered to each of 10 cockerels weighing 2 to 3 lbs. If there is no evidence of toxicity in any of the cockerels the lot is released. Thus there is a 100% margin of safety in the dosage we recommend.

Caution: Do not mix Sodium Hypochlorite or any other chlorine solutions with Iodine Vermicide Merck or give such chemicals to poultry when dosing them with Iodine Vermicide Merck.

Do not use hot water when diluting.

TECHNIQUE OF DOSING

No anthelmintic exists which will accomplish the proper results when mixed with feed for flock treatment. Individual dosing is therefore required. It is absolutely necessary for the Iodine Vermicide Merck to be administered directly into the gizzard, which is easily accomplished when using the one-man method of dosing with our improved dosing appliances.

Do not fast the birds prior to dosing as this is not necessary. Grain in the crop makes dosing easier although the crop should not be too full.

The operator should place the bird's legs between his knees and cross his right leg over the left for the purpose of holding the bird. The bird's head and neck are then stretched in a horizontal position, which permits the crop to drop down and offers a clear passage to the gizzard. The head is held with the left hand, the beak being held open by squeezing the base of the beak with the thumb and forefinger. The other fingers should then be relaxed so they will not retard the passage of the dosing appliance.

The filled dosing appliance is inserted with the right hand

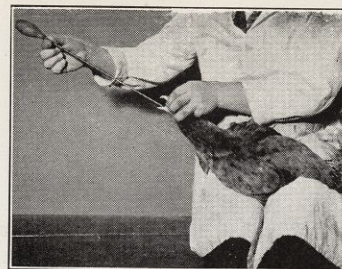


Fig. 1.

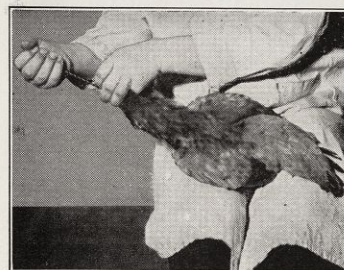


Fig. 2

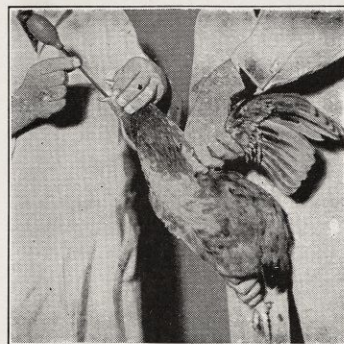


Fig. 3

and only enough pressure used to allow the tube to slide into the gizzard. (See fig. 1.) Hold the tube of the dosing appliance between the thumb and forefinger until the gizzard is reached. Compress bulb slowly, taking about 5 seconds to empty into the gizzard, which permits the dose to pass immediately into the intestines. (See fig. 2.) Too quick pressure on the bulb is liable to force the liquid back into the crop where the free iodine will be partially combined before reaching the intestines. Figure 3 shows the proper method of holding when using the two man method.

After administering a dose, withdraw the tube before releasing the pressure on the bulb, then place the tube in the liquid as far as possible, and express the air quickly into the iodine suspension. This procedure will be sufficient to keep the material thoroughly mixed during the time of use. While the technique of dosing might appear difficult it is

really very easy to acquire, so that 75 to 125 birds may be dosed per hour. For pullets in production, dose just after they go to roost. Use a dim light. This saves time catching the pullets and does not excite them. Any of the dilute solution that remains after dosing may be added to the daily ration in wet mash or in milk.

COST. It only costs 3 cents a dose for mature pullets and half as much for younger birds. The subsequent egg production and saving in feed indicates the relative cheapness of

Iodine Vermicide Merck as against other vermicides used for this purpose regardless of price. A 1 lb. bottle of Iodine Vermicide Merck properly diluted will dose 125 chickens 2 lbs. or over, or twice as many younger chicks.

Iodine Vermicide Merck has many advantages not possessed by other products.

- (1) It kills worm eggs and coccidial oocysts with which it comes in contact. No other vermicide does this.
- (2) It furnishes additional iodine for nutritional purposes.
- (3) Has no harmful effect upon the poultry even if duodenal coccidiosis is present.
- (4) It does not throw birds off egg production and retard development.

Due to the fact that Iodine Vermicide does not throw pullets into a moult or cause them to stop laying, poultrymen have found it much cheaper to use than many products that cost less. It is results that count.

Soft Shelled Eggs. Poultry raisers report that the feeding of Iodine Suspensoid or Vermicide Merck apparently increases the shell strength of the eggs from hens that have been in heavy production for some time. There is considerable evidence that it is advisable to feed iodine during the moulting period.

When either Iodine Suspensoid or Iodine Vermicide Merck is added to mash or milk, the free Iodine quickly combines with the food (organic matter) or with the casein in the milk, furnishing iodine in organic combination (often referred to as organic iodine), which is believed to be more readily utilized and retained by the system than the inorganic iodine salts such as potassium iodide.

DIRECTION FOR DILUTING FOR FEEDING

Thoroughly mix a one-pound bottle of Iodine Suspensoid Merck or Iodine Vermicide Merck with seven pints of water. (In Canada 128 fluid oz.) Use a glass bottle or jug when mixing. Always shake well before using.

One ounce of diluted Iodine *Suspensoid* Merck will feed 150 chickens or turkeys per day; or one ounce of diluted Iodine *Vermicide* Merck will feed 120 chickens or turkeys per day.

One pound of either of these solutions therefore, will feed respectively 600 and 500 birds daily for one month; or less than 1 cent per bird per month. The suspension should be mixed with damp mash or with milk. Use the 1 oz. dosing appliance for measuring. The solution may also be given in drinking water, but metal water fountains should not be used.

The Iodine suspensions as given above may be safely fed to chicks or poults regardless of size. We have received many reports from poultrymen located in all parts of the country telling us of the favorable results obtained from this treatment. However, it should be understood that *feeding* of Iodine Suspensoid Merck or Iodine Vermicide Merck has no vermicide effect in removing intestinal worms. If the flock is infested with worms they should be *individually dosed*.

COCCIDIOSIS CONTROL IN POULTRY

Coccidiosis is one of the most prevalent diseases of poultry. It is the cause of considerable mortality, and what is worse, is responsible for many unprofitable culls. The disease may appear among poultry of any age but is more frequently found among chicks up to 6 months of age.

Cause: The causative organism is a microscopic parasite which attacks the lining of the intestines. There are six or more species of coccidia found in chickens and several in turkeys, quail and pheasants.

Types of the Disease. Some species attack the upper and middle portions of the small intestine and this type of the disease is generally called duodenal or "chronic" coccidiosis. Others attack the caeca causing caecal coccidiosis which is generally accompanied by a bloody diarrhea. A mixed infection of both types frequently occurs.

How the Disease Spreads. Enormous numbers of oocysts (the egg stage) are passed in the droppings of infected chicks. These sporulate (reach the infective stage) in 24 to 48 hours, depending upon conditions and serve to infect others in the flock.

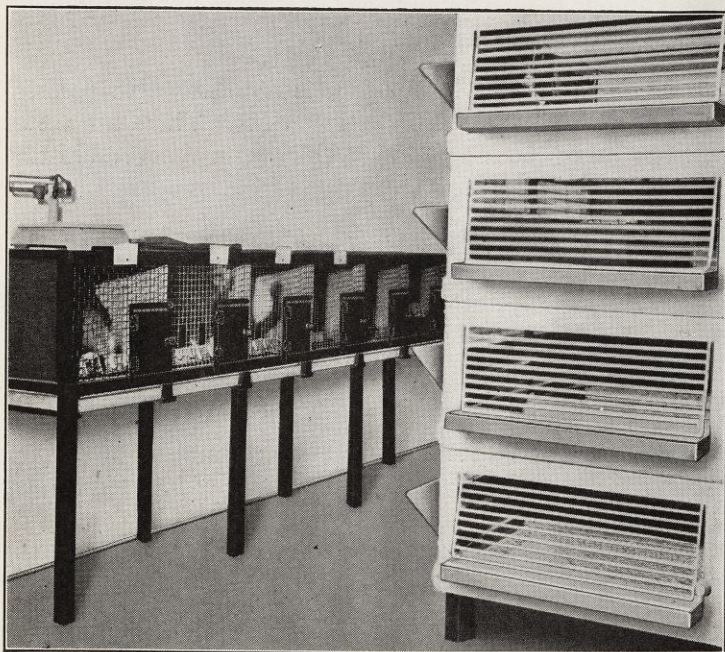
Disease is Self Limiting. Inasmuch as part of the life cycle of the coccidia has to take place outside the body of the bird,

the infection cannot continue unless more sporulated oocysts are consumed and the birds become reinfected. When reinfection is prevented the outbreak soon disappears.

Drugs and Chemicals. It is questionable whether drugs and chemicals given internally can penetrate into the intestinal wall to reach the parasites and destroy them without serious injury to the chicks. Carefully controlled experiments have shown that internal medication has not been successful. For the above reasons the logical method of control consists mainly in preventing infection and reinfection.

Why We Advise Feeding Iodine Suspenoid Merck.

Experiments at Michigan State College using chicks artificially infected with coccidiosis show that chicks receiving 4 to 5 milligrams of colloidal iodine (Chandler) daily in food or drinking water made a better growth than the controls on the same ration without the iodine. This would indicate that infected chicks have an increased requirement for iodine.



Section of Animal Room in Merck's Animal Husbandry Laboratory

Action of Iodine Suspenoid on Oocysts. Repeated experiments have shown that Iodine Suspenoid Merck is the only known product that is effective for destroying the oocysts when used under practical conditions. That it is capable of doing this on only two minutes contact, whereas other products tested required many hours. Many commonly used disinfectants proved worthless even upon 48 hours contact. It is questionable whether a disinfectant can be kept in contact with the oocysts longer than a half hour to an hour when used under practical conditions.

PREVENTION

1. **Chicks**—Buy chicks from a clean, sanitary hatchery. Before hatching, dip the hatching eggs in a solution of Iodine Suspenoid Merck before placing them in the incubator.

2. **Equipment**—Thoroughly clean the mash hoppers and water fountains to remove organic matter (dirt, manure, caked feed, etc.). Treat the wire frames upon which they are placed in a similar manner. Then swab them with a sponge or cloth fastened to a stick and wet with Iodine Suspenoid Merck, 1 lb. to 6 gallons of water. For this purpose pour out a small amount of the iodine solution into a non-metallic container and renew frequently as the introduction of organic matter destroys the free iodine. As long as the suspension is dark brown and has a muddy appearance it is of sufficient strength.

3. Repeat treatment of water fountains and wire frames every third day.

4. Place all water fountains and mash hoppers on frames made of one by sixes set on edge and covered with $\frac{3}{4}$ inch mesh wire. Supply all feed in hoppers so constructed that the chicks cannot get their feet in them. Use water fountains of the same type. Raise the water fountains as the chicks get larger, to keep the water from becoming contaminated with droppings.

5. **Litter**—Use a deep litter, 4 inches or more of peat, shavings or similar material. One-half inch of sand on the floor *under the litter* is being used by many poultrymen. The deep litter keeps the chicks away from the floor so they cannot reach any oocysts that may be there. Stir the litter daily with a pitch fork to keep the droppings buried. As long as this

deep litter stays dry it is not necessary to change it frequently unless there is an outbreak of coccidiosis.

6. Feeding Iodine—If additional iodine in the ration is desired give Iodine Suspensoid Merck twice a week. See feeding directions page 10.

7. Yards—Brood chicks on clean ground or cover the yard with 4 inches of soft coal cinders, or gravel or use a sun porch of $\frac{3}{4}$ -inch wire. One inch mesh wire may be used for chicks over 3 weeks of age.

TREATING OUTBREAKS

1. Increase the dose of Iodine Suspensoid Merck by feeding it every day until the chicks recover, then twice a week.

2. Give a milk flush. If a commercial coccidiosis control mash is used instead of a milk flush, follow the manufacturer's feeding directions.

3. After flushing, clean out the litter and bury or burn it. Floors and equipment should be thoroughly cleaned and scrubbed. Flood the floor with Iodine Suspensoid Merck, 1 lb. to 12 gallons of water, using 3 gallons of this suspension to each 100 square feet of floor space scrubbing it in with a broom. If lye was used on the floor add 1 pint of commercial hydrochloric (muriatic) acid to each 12 gallons of dilute Iodine Suspensoid Merck before flooding on the floor to neutralize the lye.

4. Iodize the water fountains and wire frames every other day until the outbreak ceases. Change litter every other day during the outbreak but do not use it as deep as previously described.

5. Keep the Chicks Warm and Dry. Do not overcrowd. Increasing the Vitamin D content of the ration during an outbreak of coccidiosis is generally considered advisable.

Treating Chicks $1\frac{1}{2}$ Lbs. or Larger. Chicks of this size may be individually dosed with Iodine Vermicide Merck and the same sanitation program should be followed.

Paralysis. There is less known about "range paralysis" than

any other common disease of poultry. Until the real cause and means of transmission is definitely known advice upon control is largely guess work.

TREATING TURKEYS

A great many turkey raisers have demonstrated the fact that dosing droopy poults with Iodine Vermicide Merck results in their recovery and subsequent development to marketable turkeys. Whatever the nature of its action, the fact remains that the popularity of Iodine Vermicide Merck among turkey breeders has increased by leaps and bounds during the last five years. Today its use is considered standard practice among the most successful turkey raisers in the United States.

Dosing Sick Droopy Poults. Two or three days after dosing the poults, pick out any that do not come up to eat promptly and dose them again. If there are any that do not respond to the second dose, give them a third dose two or three days later. It is really surprising how many droopy poults may be saved and marketed by following this method of treatment. Scrub water fountains frequently with Iodine Suspensoid Merck, 1 lb. to 6 gallons of water.

Dosing. See dosing directions for chickens, page 8.

In the case of adult turkeys it will probably be necessary to have the services of an assistant. The turkey is held by one man, who holds the turkey's legs between crossed knees, as in the case of chickens, so that the head is pointed to the right of the man holding the turkey. The assistant stretches the neck and inserts the dosing appliance.

Time of Administration. Many prominent turkey raisers administer Iodine Vermicide Merck three times to each poult before it becomes full grown. While this has proved worthwhile, this number of treatments is not essential under all conditions. The following suggestions may be considered as a basis for a dosing schedule:

The first dose should be given when poults weigh about 2 lbs. The second dose when they weigh about 6 lbs. The third dose just prior to fattening for market. The exact number and

and time of doses will, however, depend on the condition of the poults and other factors.

Iodine Vermicide Merck should always be diluted with clear water. Follow the directions on the bottle. When properly diluted a one pound bottle will treat—

250 poults—using $\frac{1}{2}$ oz. dose

125 poults—using 1 oz. dose

62 adult turkeys—using 2 oz. dose.

Dosing Appliances. There are three sizes of dosing appliances for the administration of Iodine Vermicide Merck. Use the correct size.

$\frac{1}{2}$ oz. dosing appliance is used for administering Iodine Vermicide Merck to poults and chicks weighing under 2 lbs.

1 oz. dosing appliance is used for larger poults and chickens weighing from 2 to 5 lbs.

2 oz. dosing appliance is used for turkeys weighing more than 5 lbs.

Feeding. After dosing the turkeys, any diluted Iodine Vermicide solution that remains may be fed to the flock. Using the dosing appliance to measure with, add 1 oz. of the dilute solution to the daily feeding of damp mash or milk for each 100 to 120 turkeys, depending upon the size. May be safely fed to poults of any age. If placed in the drinking water, metal fountains should not be used.

IODINE VERMICIDE	$\frac{1}{2}$ lb. bots.	\$2.05 ea.
	1 lb. bots.	3.75 ea.
IODINE SUSPENSOID	$\frac{1}{2}$ lb. bots.	2.15 ea.
	1 lb. bots.	4.00 ea.
DOSING APPLIANCES	$\frac{1}{2}$ and 1 oz.35 ea.
	2 oz. for adult turkeys...	1.00 ea.