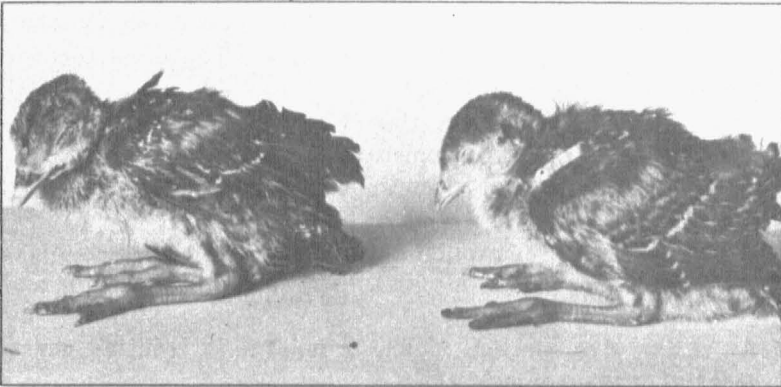


UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
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TRICHOMONIASIS OF TURKEYS

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Three-weeks-old poults affected with trichomoniasis. Note the position assumed by the birds by resting their weight on the hocks. This is especially noticeable in young poults.

COLUMBIA, MISSOURI

SUMMARY

1. Trichomoniasis of turkeys has been the cause of heavy losses in this state during the past few years. The cecal form of the disease is most prevalent.
2. Experiments have shown that birds affected with trichomoniasis have a marked depletion of vitamin A.
3. Turkeys fed on a high vitamin A diet are more resistant to the disease.
4. A diet consisting of ground oats, yeast, and cod liver oil, as outlined, is reasonably successful for controlling an outbreak of trichomoniasis.
5. An aniline dye, gentian violet, is helpful in treating severe cases of trichomoniasis.

Trichomoniasis of Turkeys

H. C. MCDUGLE and A. J. DURANT

Trichomoniasis of turkeys and chickens was observed in Missouri for several years prior to 1938. A survey showed that infection was present in 35 per cent of Missouri turkey flocks. The disease is present to an alarming extent in turkey flocks and in many cases is causing serious losses.

Nature of the Disease

Trichomoniasis as seen in Missouri is a protozoan disease primarily affecting turkeys. The parasite affects the ceca and occasionally the liver in young poults. Trichomoniasis may result in a heavy mortality, particularly so when the birds show a marked vitamin A deficiency. The trichomonads are confined to the ceca or lower digestive tract in poults. When the disease is diagnosed in adult birds the trichomonads are invariably found in the crop or upper digestive tract.

The cecal type or that found in the lower digestive tract appears to be perpetuated by birds which pass through an attack of the disease and become carriers. Young growing birds exposed directly to carriers or indirectly by flies or other means may quickly contract the disease, and unless control measures are promptly instituted heavy mortality may be expected. There are apparently several different species of the trichomonads, but the one causing greatest losses in Missouri is found in the lower digestive tract, particularly in the ceca.

Age of Birds Affected

Turkeys from 3 to 18 weeks of age are most susceptible. Heaviest mortality (50-70 per cent) may occur in birds 10 to 12 weeks of age if nothing is done to control or prevent its spread. Though older birds may become heavily infested, the loss will usually be low, but the resultant loss in weight and vigor is very often a serious handicap to the turkey producer.

Sick Birds Low in Vitamin A

Investigations show that birds affected with trichomoniasis were invariably deficient in vitamin A. This observation led to some experiments concerning artificial or laboratory growth of these para-

*A revision of Bulletin 456 (1942) by D. R. Knight, H. C. McDougale and A. J. Durant.

sites. A special culture media, containing a relatively high percentage of vitamin A, was found suitable for the multiplication and growth of the trichomonad. This observation, coupled with the knowledge of vitamin A deficiency, suggested the possibility of a nutritional factor being directly associated with trichomoniasis. A spectrophotographic analysis of the livers of healthy birds compared to those sick with trichomoniasis confirmed the observations that sick birds were actually suffering from a deficiency of vitamin A.

Experiments have also shown that birds on an extremely high vitamin A diet apparently tolerated great numbers of parasites without showing symptoms, conversely birds on a low vitamin A diet became sick and died. From these observations and experiments it was concluded that any diet reasonably high in vitamin A might be successful as a control measure. A successful diet is therefore reported for the control of this disease.

Symptoms

The outstanding symptoms of the disease in poults are loss of appetite, foamy brownish droppings, weakness, peculiar chirping sounds, and indications of being chilled. Very young birds are most



Fig. 2.—An advanced case of trichomoniasis in a nine-weeks old poult.

susceptible and may die within three or four days after an attack. Older birds may live for several weeks and well developed birds may show no mortality. The outstanding feature of the disease in poults which has an important bearing upon control is loss of appetite with definite evidence of vitamin A deficiency.

Diagnosis

Diagnosis in the field is difficult and uncertain, since there are other diseases which might be mistaken for trichomoniasis. It is much better to submit (by prepaid express) sick birds, for examination and diagnosis, to the veterinary department of the Missouri

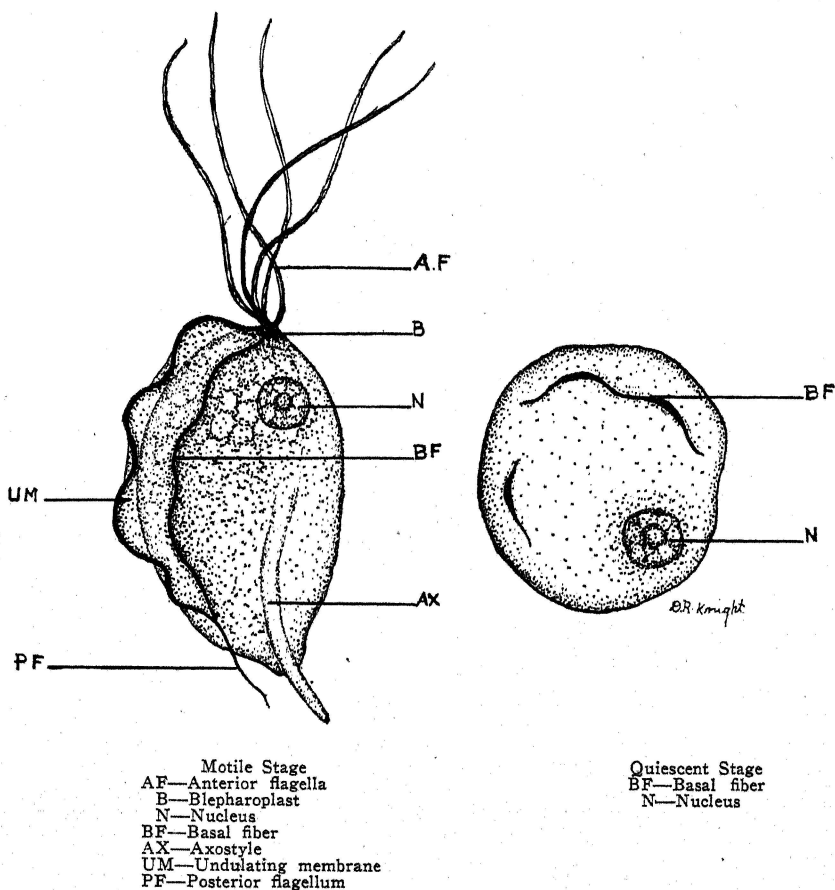


Fig. 3.—Drawings of live trichomonads (greatly enlarged). *Left.* The motile or active stage commonly seen in fresh preparations. *Right.* The quiescent stage of the parasite. (Although Allen reports one short and four long flagella, this anatomical feature was not observed in these studies. *Proceedings of the Helminthological Society of Washington*, Vol. 7, No. 2, July, 1940.)

Experiment Station. A diagnosis may be made by a microscopic examination of the fresh warm droppings. The trichomonads are seen as small, pearshaped motile bodies, showing a typical rolling movement (Fig. 3). The parasite loses its motility soon after the death of the bird. However, in the field if young birds become sick in ten days after they are hatched and show the symptoms described, this disease may be suspected. Nevertheless it is advisable to have a definite diagnosis made to distinguish it from coccidiosis, pullorum disease, and in older poults, blackhead. It is very important that live birds be submitted for examination.

Postmortem Examination

Postmortem examination is important, though gross examination and findings are not sufficient to be depended upon for a definite diagnosis. A slight inflammatory condition of the lower intestine and ceca may be found but is not conclusive evidence. In older birds there is no inflammation, and usually the only autopsy finding is the foamy cecal contents, unless the liver is involved. However, when liver changes are present they may be mistaken for blackhead. The typical abscesses of blackhead are sunken and are made up of concentric rings of varying colors; whereas the lesions in trichomoniasis are usually raised or level with the liver surface. They are also greyish and diffused and are not sharply differentiated from the healthy liver tissue. Few liver lesions have been observed in turkeys affected with trichomoniasis in Missouri. If birds are observed with changes in the liver, it would probably indicate either blackhead or trichomoniasis. A laboratory diagnosis is necessary to determine the disease or diseases present. It is not unusual for both diseases to occur at the same time in the same bird.

Adult Birds May be Carriers

The old saying, "An ounce of prevention is worth a pound of cure," can well be applied in the control of trichomoniasis. Birds recovering from the acute form of the disease may become carriers. Young poults readily become infected if they are exposed to these carrier birds or to grounds which have been recently occupied by the carrier birds. If breeders are kept from year to year, they should be widely isolated from any growing stock and a separate caretaker provided. Some growers prefer to keep their breeding stock on a separate farm.

When birds are kept for egg production, but not for a specific breeding plan it is best to dispose of these birds several weeks before placing poults on the same premises.

Since flies are one means of spreading trichomonads, fly control on the turkey farm is important. Flies can now be successfully controlled by the use of DDT spray, using a watery preparation. By spraying the inner surfaces of the houses with this preparation flies are controlled without endangering the health of the turkeys as far as poisoning is concerned. A thorough spraying every two months during the fly season will greatly control one of the ways by which this disease may be spread.

Care always should be exercised to select breeding stock free of trichomonads. The health of the birds can be determined by flock history and by microscopic examinations of the droppings before the birds are introduced into the uninfected flocks. All free-flying birds should be guarded against as much as is practical on a farm, since there is a possibility that they may be mechanical carriers.

Special Feeding Methods During an Outbreak

Birds on an extremely high vitamin A diet are resistant to the effect of large numbers of the parasites, while birds on a low vitamin A diet are readily susceptible and develop symptoms quite early. Therefore, it is reasonable to assume that a high vitamin A level in the feed would be successful in combatting trichomoniasis after it appears in a flock.

Flock treatment with a feed containing a high per cent of vitamin A is prepared as follows: two pounds of baker's yeast, or other forms of live yeast, is added to one hundred pounds of ground whole oats. This mixture is placed in a 50-gallon barrel (either wood or metal) and enough water added to form a paste having the consistency of molasses. This mixture is placed where it is warm, and allowed to ferment over night (12 to 15 hours). At the end of this time 5 pints of high grade cod liver oil, or 1 pint of high biological assayed fish oil (3000 international units of vitamin A per gram), is added to the fermented paste and mixed thoroughly. The mash is then fed in troughs to poults, all they will consume in 20 or 30 minutes. Rinse the troughs with clean water after each feeding to control flies. Feed this mash 3 or 4 times a day for a week or 10 days or until the poults show marked improvement. Keep the regular starting or growing mash before the poults at all times. Never ferment more mash than can be consumed by the poults in one day. If the poults do not relish the fermented mash, add enough dehydrated alfalfa leaf meal to make a crumbly mixture. The addition of the alfalfa leaf meal seems to increase the palatability of the mash for some birds in the affected flocks.

Individual treatment. Loss of appetite and refusal to eat ordinary mash is a serious problem in affected flocks and starvation often occurs. In practically all outbreaks the birds will eat with relish, the oats-yeast-cod liver oil diet when they will refuse ordinary mash. If the birds are too weak to eat they may be dosed (force fed) with a bulb syringe.



Fig. 4.—Two-ounce bulb syringe with an eight-inch hard rubber nozzle. It is used for administering the gentian violet solution, or the thin yeast food.

Add enough water or skimmilk to a portion of the fermented mash to form a thin mixture which easily can be drawn into the bulb syringe. (The bulb syringe, 1- or 2-ounce, should be of rubber and firmly attached to a hard rubber nozzle about 6 to 8 inches long, Fig. 4.) A sufficient quantity of the diluted mash is then administered to fill the crop firmly. Care should be taken to avoid overfilling and forcing the feed up the esophagus into the trachea. The poult may be force fed four to six times a day until recovery is sufficient for it to feed normally. Often, a single forced feeding will be sufficient for the bird to resume eating. Again it may take several days of forced feeding to bring about sufficient recovery.

A few birds may fail to respond to treatment if they have had the disease for some time and normal digestive functions are practically lost.

Gentian Violet as a Supplement to Special Feeding Methods

Some cases are advanced to the point where it may be advisable to use a drug to supplement the special feeding method. Gentian violet for medicinal purpose is useful in these few cases. Experiments have shown that gentian violet, which is an aniline dye, kills the trichomonads in the digestive tract. This dye stains the intestinal wall and fecal material a deep violet color. Gentian violet may be obtained from most drug and chemical supply houses. The dye is tolerated by the poults in rather large doses, but it has been found that smaller doses given every other day for a period of six days (3 doses) is most effective.

For the intestinal form of trichomoniasis the drug may be administered by either of two methods. First, by giving orally an enteric coated tablet containing the proper dose; and second, by giving orally a water solution of the dye with a rubber bulb syringe, expelling the solution directly into the crop. The correct dosage for the enteric coated tablet is as follows:

1 lb. poult	is given	$\frac{1}{16}$	grain of gentian violet*
3 " " " "		$\frac{1}{8}$	" " " "
5 " " " "		$\frac{1}{4}$	" " " "
8 " " " "		$\frac{1}{2}$	" " " "
10 " " " "		1	" " " "
12 " " " "		$1\frac{1}{4}$	" " " "

Give every other day until three doses have been administered.

If the water solution of gentian violet is to be used a stock solution may be prepared in concentration of one part of the dye in one thousand parts of water. (Caution should be observed because this dye stains clothing and tissues heavily.) To make up the stock solution weigh out one gram of gentian violet and add it to 1 quart of water. This stock solution should be kept in a tightly stoppered glass bottle. The proper dosage of this solution is measured best with a graduated cylinder or pipette and poured into a small glass container, such as a cup or a laboratory beaker. This measured quantity is then drawn up with a bulb syringe (Fig. 4) and administered orally to the poult. The dosage table for the solution of gentian violet is as follows:

Poult	weighing	1 lb.	should be given	5cc	of the solution
" " 3 " " " "				10 " " " "	
" " 5 " " " "				15 " " " "	
" " 8 " " " "				20 " " " "	
" " 10 " " " "				25 " " " "	
" " 12 " " " "				25 " " " "	

Give every other day until three doses have been administered.

Of the two methods of administering the gentian violet, it is more desirable to use the enteric coated tablet than the water solution, even though the cost of the enteric coated tablet is somewhat greater.

It should be emphasized, that even though gentian violet will kill the trichomonads by direct contact, this drug will be successful *only*

*At present the enteric coated gentian violet tablets can be obtained in $\frac{1}{2}$ grain tablets. The tablets may be divided to obtain the desired dosage. The cost is about $\frac{1}{2}$ cent per bird.

as an adjunct to the method of feeding outlined, and that it should be depended on only under the condition explained.

Hexamitiasis

Symptoms of hexamitiasis are quite similar to those caused by trichomonads of the lower digestive tract.

This disease is not as common in Missouri as is trichomoniasis but occasionally does occur either alone or in combination with trichomoniasis. A laboratory examination is necessary in order to definitely diagnose this disease. Field experiments have shown that the treatment recommended for trichomoniasis may be used for hexamitiasis.