Diseases of Farm-Raised Game Birds

BY J. E. SHILLINGER

ON A GOOD MANY FARMS today domestic game birds are raised for restocking. Diseases and parasites, of course, are among the major hazards of this business. Here is a brief discussion of some of the more common and destructive maladies the producer encounters.

DESTRUCTION of the natural environment of upland game birds and ever-increasing pressure for more birds for hunting have led to attempts by conservationists to utilize artificially propagated birds for restocking. Sportsmen and others concerned with the artificial or controlled production of these birds have learned through costly experience that losses from pathological factors are often tremendous. Corrections in the rations and in the methods of incubation, breeding, and sanitation have had beneficial effects, but various infectious and parasitic diseases continue to cause extensive mortality and to make game farming unduly hazardous.

Some of the maladies observed among artificially propagated stocks are apparently new to veterinary science, but others are familiar diseases acquired from poultry. Permitting domesticated birds to utilize the same range as the game birds and using domesticated hens to incubate game-bird eggs and brood the young are practices that favor the transfer of infections. In Stoddard's book (?) on the bobwhite quail, this situation is referred to as follows:

The danger of infecting bobwhites that range near human habitations with poultry diseases and parasites * * * is of importance, as these birds are known to be susceptible to several poultry diseases, and some of their worst intestinal parasites are shared with poultry.

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2 Italic numbers in parentheses refer to Literature Cited, p. 1231.
To avoid repetition, diseases and parasites affecting poultry are not described in detail in this article. Instead, cross references are made to other articles in the Yearbook.

**BACTERIAL DISEASES**

Although pullorum disease (see p. 931) apparently does not cause serious losses among game birds, it has been observed occasionally in pheasants (6) and in quail (3); but it is evident that the latter birds are more resistant to it than are domestic chickens.

One of the most striking examples of a disease transmitted from domestic chickens to game birds is tuberculosis (6; see also p. 237 of this Yearbook). It has been a common practice on the older game farms to use domestic hens for incubating pheasant eggs and for hovering the young, and numerous instances are known in which pheasants raised under tuberculous hens have been grossly affected with the disease. Since treatment is useless the remedy lies in preventing association of possibly infected birds with the young stock.

Ulcerative enteritis is the most destructive disease of quail and grouse known on game farms (6). Although there is still some question concerning the exact nature of the causative agent, it is known to be one that does not pass through even the most porous of porcelain filters. The disease is quite readily reproduced by feeding particles of the liver or intestinal tract of an affected bird or of the ingesta it contains. In nature the infection is spread by direct contamination through droppings or through the medium of flies.

The characteristic lesions of ulcerative enteritis are numerous crater-like ulcerations in the lining of the small intestine, in the center of each of which is frequently found a yellowish, caseous (cheeselike) mass. It is not uncommon for the ulcers to perforate the wall of the intestine, in which case the affected bird promptly dies. The organism responsible is evidently an active toxin producer, as subserous lesions (that is, lesions under a lining membrane) give evidence of toxic action.

Thus far, in stamping out an epizootic, or extensive outbreak, of this disease, only strict hygienic practices have been found of value. Dividing a flock into small, isolated groups in order to avoid possible spread to all the birds is recommended, and screening against flies and daily scrubbing of equipment to remove fecal contamination are necessary to reduce dissemination of infective material. Outbreaks allowed to proceed unchecked will frequently cause a mortality of 70 to 100 percent in affected groups.

Outbreaks on quail farms of a disease of obscure origin and character have repeatedly been studied. The most frequently found organisms identified as the causative agents have belonged to the *Salmonella* group. Such an organism of the *S. oranienburg* type has been described (2, 4) as pathogenic, or disease producing, and another similar to, if not identical with, *S. aertrycke* has also been identified. Intermediate coliform organisms (7)—that is, similar in form to colon bacilli—likewise have been found to be pathogenic in some outbreaks on game farms among quail and other upland game birds.
Figure 1.—Tuberculous lesions in the liver of a pheasant. This bird, which might have been raised on a game farm, was picked up dead in the wild. (Courtesy of E. K. LeDune.)

PROTOZOAN DISEASES

A familiar disease of turkeys, known as blackhead or enterohepatitic (see p. 1017), appear to attack birds from wild sources as well as strains that have been domesticated for centuries. On game farms where wild turkeys are propagated for restocking, destructive epizootics have
killed a high percentage of the poults when effective methods of protection have not been practiced.

Among quail and ruffed grouse, blackhead does not ordinarily assume the proportions of an epizootic infection (6) if reasonably hygienic precautions are observed. Under the unusual physical demand of continued egg production, however, many quail hens die from this disease; and during the midsummer period, when laying is at its height, losses are especially high. Death apparently comes suddenly, and egg production may be continued until the day of death.

Coccidiosis, well known as a plague of young chickens (see p. 1041), is equally destructive to young game birds. In general it may be said that the organisms of this group are host specific—that is, each affects only one kind of host—and are rarely cross-transmitted among different kinds of hosts. Most of the severe losses in quail are believed to be due to species of coccidia peculiar to this bird; but at least two species of coccidia parasitic in chickens have also been found in quail, and the two species common to domestic turkeys are pathogenic to wild turkeys (5).

Although severe losses among quail and wild turkeys raised on game farms are attributable to infestations with intestinal trichomonads (see p. 1019), knowledge of the occurrence of the causative parasites in game birds is very incomplete. The organisms found in these outbreaks appear to be identical with those observed in similar infestations among domestic poultry, although preliminary studies indicate that they require slightly different media for artificial cultivation. The symptoms and the rate and percentage of losses parallel those observed in domestic birds.

**CONTROL OF PROTOZOAN DISEASES**

The possibility of preventing the diseases caused by protozoans (see p. 1008) depends upon the efficacy of hygienic procedures, such as maintaining the stock on wire-mesh floors and providing range so extensive that opportunity for infection is reduced until it is negligible. Flies have been implicated in the spread of some of these organisms and should be screened out wherever practicable. Diligent scrubbing of pens and coops and drying them in direct sunlight are recommended for eliminating infections. Spraying the pens, coops, and other equipment with light oils, preferably fortified with 2 to 4 percent of compound solution of cresol is suggested.

**FUNGUS DISEASES**

In an effort to provide suitable yet cheap litter for young quail, the mistake has frequently been made of using substances that carry the spores of *Aspergillus fumigatus*, a fungus that produces fatal infections of wild waterfowl as well as of quail on game farms and that appears to be more highly pathogenic for these birds than for domestic chickens. Involvement of the lungs, heart, and anterior, or frontal, body cavity, including the air sacs, is very noticeable and in young quail causes losses often as high as 90 percent in the broods affected.
Control measures recommended are prompt removal of all possibly infected litter, such as straw, leaves, and pine needles, and the substitution of planing-mill shavings, sawdust, or even dry sand.

The fungus organism *Saccharomyces albicans*, which causes a disease called thrush (see p. 995), also has been observed as destructive to young quail and wild turkeys. In advanced cases, whitish ulcers in the mouth and crop, mucoid, or mucuslike, deposits in the proventriculus, or true stomach, and ulcers in the gizzard are notable characteristics of the disease, although the organism is sometimes so virulent as to kill before extensive lesions are formed. As control measures, the sick birds should be isolated, any visible fragments of pseudomembranes or of other deposits in the mouth should be removed, and the affected parts within reach should be treated with a mild antiseptic solution such as a one-fourth strength of tincture of iodine in glycerin or painting with a one-half percent solution of crystal violet.

**WORM PARASITES**

The well-known gapeworm (*Syngamus trachea*) infests many species of wild birds as well as domestic poultry (see p. 1035) and interferes with health in varying degrees. Among young bobwhites in ground-floored pens the losses due to gapeworms may be considerable. The loss of the blood withdrawn by the parasite and, more important, the occlusion, or stopping-up, of the trachea (windpipe), producing partial or complete suffocation, may cause a mortality of 40 to 60 percent of the exposed birds.

Practically all parts of the digestive system in game birds may be the habitat of worm parasites, as the feeding habits of the birds expose them to infestation by a great variety of worms. If the birds are allowed to pick their feed from the ground where insects and annelids, serving as intermediate hosts, are abundant or where the ground has been polluted by infested birds, massive parasitic invasions usually follow.

Imbedded in the mucous membranes of the esophagus, or gullet, are often found slender, threadlike worms (*Capillaria annulata*) that cause an inflammation in quail.

The common nematode (*Dispharynx spiralis*) burrows into the wall of the proventriculus in grouse, quail, pheasants, and other game birds. Thickening of the wall and ulceration cause an interference with the functioning of the secretory glands in these infestations.

The gizzard worm (*Cheilospiroir a spinosa*) produces an inflammation of the gizzard muscles which is followed by degenerative changes and loosening of the corneous, or hard, lining. Infested birds suffer from an interference with proper grinding of their food.

Several species of *Ascaridia*, including *A. lineata* and *A. compar* (?), have been recognized as parasitic in quail and other game-farm species. They frequent the small intestine of upland game birds. This organ is also the habitat of various species of tapeworms of the genera *Hymenolepis* and *Raillietina* (?), which do considerable damage to quail by preventing proper digestion and assimilation of food.

The ceca of practically all upland game birds are infested with the *Heterakis gallinae* and related species of nematodes. Although these
parasites do not appear to cause much actual damage, they do interfere with the passage of food.

Many of the parasites of game birds require an intermediate host for completing their life cycle, and those having a direct life cycle are spread mechanically by insects and annelids. The preferred method of control, therefore, is to maintain the stock on wire-mesh floors, where the opportunity for infestation is reduced to a minimum.

NUTRITIONAL DISEASES

Nutritional roup (6; see also p. 973 of this volume) is common on game farms where there is insufficiency of vitamin A in the ration, and it may bring about rather extensive losses before it is suspected and corrective measures can be applied. It is manifested by thick discharges from the nostrils and eyes, the eyes often becoming inflamed. On autopsy the mouth, esophagus, and visceral organs usually show whitish-gray accumulations. A deficiency of vitamin D likewise may prevail on game farms where game birds are on a restricted diet, and although the rachitic conditions it causes are not ordinarily responsible for extensive loss, they damage young growing stock considerably. Both these diseases are readily controlled by the use of adequate rations. Liberal quantities of fresh fruits and green leafy vegetables, with the addition of cod-liver oil when possible, are recommended. (See the article on Nutritional Diseases of Poultry, p. 1075.)

The tendency of quail, particularly young birds, to injure others by picking the feet as well as the flesh around the base of the beak and the vent has long been considered evidence of some nutritional irregularity. Only recently it has been shown 3 that this form of cannibalism is due to an insufficiency of salt; the addition of salt in the proportion of 2 or 3 percent of the ration stopped the vice within 24 hours.

LITERATURE CITED

(2) EDWARDS, PHILIP R. 1936. THE OCCURRENCE OF SALMONELLA, GRANDENBERG TYPE, IN AN INFECTION OF QUAIL. Jour. Bact. 32: 259-263.