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Biomorphological Characteristics of Helminths Parasitizing Poultry in the Western Region of Azerbaijan

Abstract

Studies were conducted in recent years in individual and farm poultry farms of Aghstafa, Dashkasan and Gadabay districts of the Western regions of Azerbaijan.

The species composition of helminths parasitic in poultry kept in the farms in the region was determined based on helminthological sputum examination of 280 domestic geese, 352 ducks and 668 chickens of different age groups. Also, in order to determine the level of spread of helminthosis in farms and the extensiveness of invasions, 870 cal samples were taken from geese, 946 cal samples from ducks and 1260 cal samples from chickens kept in the farms where the studies were conducted and helminthoscopic examination was performed.

Examinations were conducted using the helminthological sputum method of K.I. Skryabi. As a result of the sputum examinations, helminths were collected from 786 individuals from geese, 909 individuals from ducks and 1215 individuals from chickens. The species composition of the collected helminths was investigated and specified based on specific helminth determinants. According to the results of helminthological sputum and helmintoovoscopic examinations, it was determined that ducks and geese in farms were parasitized by cestodes - Fimbriaria fasciolaris and Drepanidotaenia lanceolata, trematodes - Echinostoma revolutum, Echinoparyphium recervatum and nematodes - Capillaria anseris, Amidostomum anseris, Ganguleterakis dispar, and chickens were parasitized by cestodes - Railletina tetragona, nematodes - Capillaria obsignata, Ascaridia galli and Heterakis gallinarum.

Keywords: *type, gender, goose, duck, trimatode, cestode*

Introduction

Primarily epizootiological studies have been conducted in Azerbaijan regarding certain helminths and helminthiases of domestic birds. However, this information does not fully reflect the current epizootiological situation in modern poultry farms (Aghayeva, 2018). One of the main objectives of the conducted research was to study the systematics and biomorphological characteristics of parasitic helminths prevalent among domestic birds in the western region of Azerbaijan. Moreover, the use of the most modern technologies in various types of farms and private households, which differ in terms of keeping, breeding, and feeding conditions, highlights the importance of applying more advanced, modern, and economically efficient methods for the treatment and prevention of possible diseases (Musayev, Hajiyev, Yolchuyev, Vahidova, Mustafayeva, 1991).

Research

In recent years, studies have been conducted in individual and farm-based poultry enterprises located in the western regions of Azerbaijan, specifically in the districts of Aghstafa, Dashkasan, and Gadabay. It should be noted that these areas are rich in freshwater bodies, including rivers and small lakes, which make it possible to keep domestic waterfowl in these regions (Bayramova, 2023).

The species composition of helminths parasitizing domestic birds in the farms of this region was determined based on helminthological dissection of 280 domestic geese, 352 ducks, and 668 chickens

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belonging to different age groups. Additionally, in order to determine the prevalence of helminthiases and the extent of invasions in these farms, 870 fecal samples from geese, 946 from ducks, and 1260 from chickens were collected and examined using helminthoovoscopic methods (Hajiyev, Aliyev, Aliyev, 1989). Examinations were carried out using K.I. Skryabin's helminthological dissection method (Mammadov, Hajiyev, Shirinov, Aghayev, 1986). As a result of the dissections, 786 helminths were collected from geese, 909 from ducks, and 1215 from chickens. The species composition of the collected helminths was analyzed and identified based on specific helminth identification keys (Nasirov, Gaziyev, Bunyadova, 2010).

When analyzing the results of helminthological examinations conducted in individual and farm poultry farms of Dashkasan, Aghstafa and Gadabay regions, it was found that various helminth species were parasitic (Bayramova, 2024). According to the results of helminthological examinations and helmintoovoscopic examinations, it was determined that ducks and geese in the farms were parasitized by cestodes - Fimbriaria fasciolaris and Drepanidotaenia lanceolata, trematodes - Echinostoma revolutum, Echinoparyphium recervatum and nematodes - Capillaria anseris, Amidostomum anseris, Ganguleterakis dispar, and chickens were parasitized by cestodes - Railletina tetragona, nematodes - Capillaria obsignata, Ascaridia galli and Heterakis gallinarum (Bayramov, 2010). It is a type of parasitic class that is widespread in the western region Cestoidea (Rudolphi, 1808) Drepanidotaenia lanceolata (Bloch, 1892) (Bayramova, 2014).

During helminthological examinations of the intestines, this cestode was found in the small intestine of geese and ducks up to 6 months of age. The prevalence of the cestode in the intestines of waterfowl was 3-9 individuals in geese (average intensity index 3.5 individuals) and 2-7 individuals in ducks (average intensity index 2.9 individuals). The length of the light yellow D.lanceolata cestode was 11-20 cm, and the width of the last, hermaphrodite joints reached 1-1.2 cm. The scolex of the helminth contained 4 suckers, and around them 8 hooks. The head, which is pear-shaped, has dimensions of 0.25-0.18 mm, and passes into the neck with the first joints. The growth of the cestode occurs due to the joints in the neck. In the 8-10 joints after the neck, the male and female genital organs are located, the ducts of which open together. Depending on the development of the joints, numerous follicles are located in the elongated ovipositors located in them. The last joints contain the brood, which is filled with eggs. The oval-shaped egg of the cestode is covered with a very delicate 4-layer membrane (Agaeva, 2014).

Drepanidotenia are biohelminths that develop with the participation of intermediate hosts - cyclops, water snails, crustaceans. The last segments filled with eggs are excreted from the intestines of waterfowl through the feces and are swallowed by crustaceans when they fall into the water. At an ambient temperature of 18-200C, invasive cysticercoids develop from eggs in the body of the intermediate host in 10-12 days. When waterfowl eat crustaceans, cysticercoids are released in their digestive system, attach to the intestinal wall, and develop there for 12-18 days, reaching the imaginal stage.

In the conducted helminthological examinations, the prevalence of the cestode, which was mostly found in the small intestines of ducks and geese up to 3-6 months of age, was 1-3 individuals in geese (average intensity index 1.5 individuals) and 3-9 individuals in ducks (average intensity index 3.6 individuals). Fimbriaria fasciolaris is a thread-shaped cestode with a strobila length of 22-35 cm and a width of 1-3 mm. The scolex contains 10 alternately arranged suckers and hooks, which serve to firmly fix the cestode to the intestinal wall of the bird. The diameter of the suckers reaches 0.04-0.5 mm. The hermaphrodite joints contain alternating gonads. Inside the last joints of the cestode, pear-shaped oncospheres are filled with eggs (Amirov, Mullayarov, 2015)

Intermediate hosts - cyclops, cephalopods, crustaceans - play a key role in the development of fambriaria. The last segments filled with eggs are excreted from the intestines of waterfowl through the feces and are swallowed by crustaceans when they fall into the water. When the water temperature is

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22-240C, the invasive cysticercoid larva develops from the egg in the body of the intermediate host in 6-17 days. At lower temperatures, the development of the larva in the body of the intermediate host can last up to 30-32 days. When waterfowl eat crustaceans, cysticercoids are released in their digestive system, attach to the intestinal wall, and develop there for 8-11 days, reaching the imaginal stage. Fambriaria can live in the intestines of birds for 8-10 months.

During the research, helminthological examinations of chickens revealed the cestode Railletina.tetragona in their small intestines. The distribution of the cestode, which was observed more intensively mainly in chickens aged 6 months to one year, was 3-14 individuals (average intensity indicator 4.6 individuals). The strobila of the cestode R.tetragona is 10-25 cm long and 1-5 mm wide. The oval scolex has a diameter of 0.25-0.45 mm, and on the proboscis there are up to 100 rows of suckers and hooks, which play a key role in the fixation of the helminth on the intestinal wall. The gonads are located unilaterally in the hermaphrodite joints. The adult larva, located inside the hermaphrodite joints, contains 6-12 eggs collected in a special capsule. The diameter of the eggs reaches 0.0025 - 0.0050 mm.

Enter the external environment with the feces of chickens. Ants eat the last joints of the cestode R. tetragona or carry them to their nests and feed their larvae. In the body of insects, cysticercoids emerging from the helminth larvae undergo a double phase. Depending on the temperature (24-260C), the development of cysticercoids in ants is completed in 43-46 days. When chickens eat ants with invasive cysticercoids inside, the cysticercoids released in the digestive system attach to the intestinal wall with their hooks and suckers and turn into adult helminths in 2-3 weeks. The life span of the cestode in the intestine of a bird lasts 2-3 months. Sometimes, the cestode loses its strobila, spends the whole winter in the intestine, and in the spring it can resume its development by forming joints again.

In the helminthological examinations conducted, the prevalence of the trematode E. revolutum, which was mostly found in the small intestines of ducks and geese up to 3-6 months of age, was 1-5 individuals in geese (average intensity index 2.8 individuals) and 1-9 individuals in ducks (average intensity index 5.1 individuals).

The length of adult individuals of the trematode E. revolutum is 6.8-12 mm, and the width is 0.9-2 mm. There are numerous teeth on the cuticle in the anterior part of the body. 35-40 such spines are arranged on the collar surrounding the oral sucker. The diameter of the oral sucker is 0.138-0.341 mm, and the diameter of the abdominal sucker reaches 0.68-1.32 mm. In the lower part of the body, next to each other, there is an oval-shaped genital bursa and a spherical ovary. The ventral part of the body of the helminth is occupied by a brood cavity filled with eggs. The oval-shaped eggs are capped and reach a diameter of 0.099-0.132 mm.

As a result of dissections, one of the trematodes found in the small intestine of ducks and geese was Echinoparyphium.recurvatum. The prevalence of the trematode in the intestines of waterfowl was 3-9 individuals in geese (average intensity index 3.5 individuals) and 2-7 individuals in ducks (average intensity index 2.9 individuals). The body of the helminth resembles a hook with a curvature in the neck region. The length of the trematode is 2-5 mm, and the width in the most expanded part, the ventral region, reaches 0.4-0.9 mm. There are large spines arranged in rows on the cuticle in the front part of the body. Up to 50 cone-like teeth are located on the bean-shaped neck surrounding the oral sucker. The diameter of the spherical oral sucker is 0.099-0.130 mm, and the diameter of the elongated, slightly protruding abdominal sucker is 0.035-0.090 mm. The oval-shaped genital bursa is located between the branched intestine and the abdominal sucker. Two elongated oval-shaped, 0.027-0.045 mm in diameter, ovate helminths are located in a row on the ventral side of the body. The relatively large, oval-shaped larva is located between the ovules and the abdominal sucker. The rest of the body is occupied by the larva, which contains numerous, oval-shaped, capped eggs. The diameter of the eggs reaches 0.09-0.11 mm.

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Since both types of trematodes are biohelminths, their development is completed with the participation of intermediate hosts, freshwater snails, fish, aquatic insects and crustaceans. Two intermediate hosts are involved in the development of their larval stage. Imaginal trematodes, which inhabit the intestines of birds, transmit their eggs to the external environment through the feces. Further development of the helminth can continue if the eggs fall into the aquatic environment. Miracids develop in the eggs that have fallen into the water. Then, breaking the egg cover, they fall into the water and actively move with the help of their cilia. Miracids can survive in water for 18-24 hours. If the larvae can fall into the body of the first intermediate host (aquatic snail and crustaceans), then the miracidis develop depending on the temperature (Gongadze, 1993).

Thus, when the water temperature is 20-220 C, E. revolutum miracidis develop in the body of the intermediate host for 9-10 days, and E. recurvatum miracidis for 11-13 days, losing their cilia and turning into inactive sporocysts. Oval-shaped sporocysts are enriched with cellular elements and pass into the redi stage. The redi, in turn, turn into cercariae. In tailed cercariae, all the embryonic beginnings of the adult helminth - gonads, suckers - are formed. All these stages of development are completed in the body of the first intermediate host for 49-80 days. Then the freed cercariae actively move and find their second intermediate hosts. Their survival period in water lasts 20-24 hours. If they do not find a second intermediate host during this time, they die. Cercariae that fall into the body of the second intermediate host lose their tails and turn into cysts, which is called metacercariae. The spherical, invasive larvae, metacercariae, can inhabit all the internal organs of the snail. When waterfowl eat intermediate hosts (water snails, fish, insects, etc.) containing invasive metacercariae, adult trematodes form in their digestive tract within 9-18 days.

Capillaria anseris nematodes were detected in the small intestine of geese subjected to slit examinations. The distribution of the nematode, which was observed more intensively mainly in geese up to 4 months of age, was 3-9 individuals (average intensity indicator 3.1 individuals). Along the length of the helminth, the cuticle has strip-shaped lines on the lateral and medial surfaces. The length of the male C. anseris nematode, which has sexual dimorphism, is 9.5-13.0 mm, and the length of the females is 14.5-17.0 mm. The size of the barrel-like egg of the helminth is 0.048-0.055 mm, and there are plug-shaped nodes at both ends (Aghayeva, 2014).

Since the C.anseris nematode is a geohelminth, its biological development occurs without an intermediate host. In the external environment, at a temperature of 20-250 C and appropriate humidity, larvae develop within 8-9 days inside the eggs that fall into the soil through the bird's droppings. When geese swallow these invasive eggs in walking areas and yards, imaginal helminths develop in their intestines for 3 weeks. C.anseris can live in the intestines of geese for up to 7 months. Appropriate temperature and humidity are essential for the development of the helminth. In cold weather, early spring, autumn and winter, invasive larvae cannot develop inside the eggs that fall into the environment and are destroyed (Allen, 1984).

In the helminthological examinations conducted, the nematode Capillaria obsignata was detected in the small intestines of chickens up to 3-6 months of age. The number of nematodes in the examined intestines was 1-11 individuals (average intensity indicator 4.8 individuals). The length of the male nematode is 7.5-10.5 mm, and the length of the female is 12.1-15.3 mm. The size of the barrel-like egg of the helminth is 0.045-0.060 mm, and there are clearly distinguishable, convex, plug-shaped nodes at both ends. The development of the C. obsignata helminth proceeds in the same way as the C. anseris nematode. If the eggs fall into the pastures and walking areas through the chickens' droppings, and there is a suitable temperature and humidity, invasive larvae develop within 8-10 days. When chickens eat helminth eggs, which contain invasive larvae, adult helminths develop in their intestines within 3 weeks..

Amidostomum anseris nematodes were detected under the cuticle of the muscular stomach of geese and ducks that underwent dissection examinations. The distribution of the nematode, which was

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observed more intensively mainly in waterfowl up to 3-4 months of age, under the cuticle of the muscular stomach was 5-14 individuals in geese (average intensity index 4.8 individuals) and 3-12 individuals in ducks (average intensity index 4.1 individuals).

The length of the male helminth is 9.8-14.5 mm, and the length of the female is 16.6-20.5 mm. On the front side of the body of the nematode there is an oral capsule and a little further there are 3 cone-shaped chitinous teeth. Around the capsule there are 3 pairs of suckers. Starting from the oral capsule to the end of the body, a food strip consisting of the pharynx, esophagus and intestines extends and ends with an anal opening (Cowan, 2005).

A. anseris is a geohelminth that develops without the participation of an intermediate host. The oval-shaped eggs of the helminth, with a diameter of 0.08-0.11 mm, fall into pastures and walking areas through the droppings of waterfowl. When the temperature and humidity in the environment are suitable (23-280 C), invasive larvae develop inside the eggs, which can move for 3-5 days. Geese and ducks become infected when they ingest these larvae with feed and water in waterfowl, pastures and walking areas. Larvae ingested by birds live in the glandular stomach for 4-5 days, then pass under the cuticle of the muscular stomach and reach the imaginal stage in 16-22 days. The nematode can live in the muscular stomach of geese and ducks for 12-15 days.

During helminthological examinations, the nematode Ascaridia galli was mostly found in the small intestines of chickens aged 3 months to one year. The number of nematodes in the examined intestines was 3-14 individuals (average intensity index 5.2 individuals). The length of the male nematode is 26-70 mm, and the length of the female is up to 65-100 mm. The mouth area of these yellowish-white nematodes is surrounded by three lips, each of which has a tooth-like layer. Males have up to 10 suckers in the tail. In females, the vulva is located in the middle of the body. The size of the oval, slightly flattened eggs is 0.070-0.086 mm. A. galli is a geohelminth that develops without the participation of an intermediate host. The female helminth lays a large number of fertilized eggs in the intestinal cavity of the host, and these eggs are shed into the external environment through the bird's droppings. At an environmental temperature of 20-250C and sufficient humidity, invasive larvae develop inside helminth eggs in 9 days. At low temperatures, the larval maturation period can be extended, or, conversely, at 29-350C, invasive larvae are formed in 5 days. Chickens become infected with helminthiasis when they eat helminth eggs containing invasive larvae in pastures and walking areas (Bayramov, Mammadova, 2018).

In the intestines of the host, larvae hatch from eggs, attach to the intestinal wall and develop. In the intestines of chickens, the larvae develop into imaginal nematodes within 27-52 days. A. galli can live in the intestines of chickens for 9-14 months (Gorokhov, 2003).

Conclusion

During helminthological examinations, the Heterakis gallinarum nematode was detected in the cecums of chickens aged 3 months to 1 year. The number of nematodes in the examined cecums was 5-16 individuals (average intensity index 6.3 individuals). Males and females of this white, milky nematode have almost the same size (5.8-11 mm). The mouth of the helminth is surrounded by three lips. The hole of the food pipe opens directly into the intestine. The H.gallinarum nematode has oval-shaped eggs with a diameter of 0.066-0.800 mm. These eggs fall into the external environment through the bird's hair, and at favorable temperatures and humidity, the invasive larvae inside them develop for 5-10 days. When chickens ingest such invasive larval eggs with feed and water, larvae hatch in their small intestine and migrate to the cecum in 2-3 days, where they develop into imaginal helminths in 20-24 days. H. gallinarum can survive in the intestines of birds for up to a year.

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