

## Using Brine Shrimps as Food and Premix for Domestic Birds, and Issues of the Prophylactics of Infectious and Parasitic Diseases

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### Abstract

The brine shrimps of the genus *Artemia* (Crustacea: Anostraca: Artemiidae) is widely used in the poultry farming as the food and premix of domestic birds. In salt lakes many wild bird species are vectors of infectious and parasitic diseases, and the feeding of farming birds with brine shrimp species of *Artemia* has potential danger of certain diseases. Using the brine shrimps of the genus *Artemia* in the poultry farming requires measures of disinfection of the raw materials and equipment. The brine shrimps, *Artemia* may be serving as potential intermediate hosts of the tapeworm, *Diphyllbothrium dendriticum*, and one of the sources of the infectious diseases of game birds.

**Key words:** *Artemia*, poultry farming, infectious diseases, parasites

### Introduction

The poultry farming as other types of animal breeding is now intensively developing in many countries, by selecting for high-productive breeds, lineages and hybrids of birds, and by rationalizing their feeding and caretaking. Among the foods and premixes of domestic birds, the preference was given to natural substrates with high content of proteins, vitamins, mineral elements and other biologically active substances.

The effective cost of feeding is an important part of making profit from poultry farming. In this concern, using salt-water small brine shrimps of the genus *Artemia* as the protein premix for domestic birds attracts the attention of farmers and agricultural specialists.

Because of the availability of salt lakes in the steppe ecosystems containing large biomass of brine shrimps, in most regions of Kazakhstan, the explorative works of the brine shrimps are important perspective for the poultry farming. Low production cost, simple methods for keeping and collecting of the brine shrimps are also additional advantages of their use for feeding domestic birds.

However, in using of these shrimps as food supply in the poultry farming, it is necessary to foresee the potential danger of infectious and parasitic diseases.

Until the present time, in the course of using brine shrimps and their eggs as the bird food, there have not been registered outbreaks of the infectious diseases connected with the crustacean premix. However, specialists should examine the potential epizootic dangers of the bacterial and viral infections, protozoan and helminth parasites for the domestic birds.

### Results

On the bases of our observations during the field survey in the Pavlodar region of Kazakhstan, we observed 45 bird species in the study area, which live in the basins of salt lakes with different degrees of occurrences.

Among them numerous species of the order Anseriformes are found, including the species of the same families and genera with domestic birds (e.g. quack-duck and wild grey goose are the same species with domestic duck and goose, respectively). Based on this fact, we must take into our consideration the analysis of the potential of transmission of specific parasites from wild aquatic birds to domestic ducks and geese (Beme & Kuznetsov, 1983; Kovshar, 1988; Solomatin & Shaimardanov, 2005).

For domestic galliform birds, the infectious dangers are the bird flu virus, which specific for certain bird species, and tuberculosis bacteria,

*Mycobacterium avis*, which have been registered in 65 species of domestic and wild birds in the former USSR (Kokurichev & Rotov, 1959). The domestic bird diseases, which may be transmitted through wild birds, are following.

**Viral infections.** Many agents of viral infections are highly specific for bird species. Viral infections in galliform birds (Hamboro disease, Newcastle disease etc.) may be transmitted to home hens and turkey-hens through relative wild galliform bird species. Especially, we must discuss about the bird flu, which causes the disease in a wide variety of wild and domestic bird species. During the keeping of the crawfish masses in frozen condition the virus loses its viability and virulence in low temperature.

**Bacterial infections.** Many domestic bird species have the certain danger with salmonellosis and pasteurellosis. The agents of these diseases have good keeping in the moist conditions, but in the water with high salt concentration (up to 300 g/liter) long-term viability of bacteria (not only vegetative forms, also spores) has a little probability. The certain danger may be caused by tuberculosis (*Mycobacterium avis*), which have been found in 65 species of domestic and wild birds in the former USSR area (Kokurichev & Rotov, 1959). Spores of *Mycobacterium* can stay viable for long time and survive in dry conditions, but most bacteria annihilates under straight sun radiation. Moreover, the spore concentration decreases to a great extent during the long-term keeping of brine shrimp eggs in dry conditions, as well as adult shrimps in refrigerators.

**Protozoan diseases.** Eimerias developing through a direct life cycle (without intermediate hosts) are highly specific parasites: every *Eimeria* species has strict host specificity and determined locations in the bird digestive tract (Svanbaev & Krylov, 1983). *Hystomonas meleagridis* is one of the widely distributed parasites among a wide variety of species of galliform birds. Eimerias of aquatic birds (*E. anseris*, *E. parvula* etc.) may be dangerous for home ducks and geese, because quack-duck and wild grey goose are the same species with domestic birds. The oocysts of *Eimeria* may be kept viable in very unfavorable conditions for a long time. Therefore, accounting the possible spread of *Eimeria* of domestic ducks and geese from the relative wild bird species, we recommend using the crustaceans as the food and premix for hens and turkey-hens.

**Trematodosis and cestodosis.** The distribution of cestode diseases in hens and turkey-hens after the aquatic invertebrates were excluded: the intermediate hosts for the cestodes from genera *Davainea* and *Raillietina* are the ants, but earthworms for *Amoebotaenia*. Aquatic birds are infected with trematodes and cestodes immediately on water bodies during their feeding upon intermediate hosts, mostly water invertebrates (Spassky, 1963). However, the brine shrimps cannot serve as intermediate hosts for the larval stages of flatworms, and the survival of the latter in the salt water is impossible.

**Nematodosis.** Round worms parasitizing in domestic hens complete their life cycle include representatives of genus the *Acuaria* (*Cheilospirura*) of the suborder Spirurata with the intermediate hosts of insects of the order Orthoptera and some beetles (Coleoptera), including barn weevil (Skryabin *et al.*, 1949; Skryabin & Petrov, 1964). Nematodes of home hens with simple cycle (e.g. *Ascaridia galli*, *Heterakis gallinarum*, *Capillaria bursata*, *C. caudinflata*) circulate mainly in the poultry premises and places where birds forage. The exchange of helminthes between domestic and wild galliform birds has small probably because of the absence of their indirect contacts, but *Heterakis gallinarum* and *Ascaridia galli* can live in many species of wild pheasants and heath-cocks (Fedyushin, 1949; Skryabin *et al.*, 1951, 1954).

Thus, from the potential infectious and parasitic bird diseases, which may be carried to the farming areas, the bird flu, tuberculosis, and eimeriosis of domestic birds have the most eminent potential danger. For the prophylaxis of eimeriosis in ducks and geese we recommend to use shrimps used mainly for the home hens and turkey-hens.

The prophylaxis of bacterial and viral infections can be realized at the expense of direct sun radiation and high concentrations of salt in salt lakes, and at the expense of the long-time keeping of dry eggs of brine shrimps. Therefore, food and premix for birds from the brine shrimps *Artemia* usually do not require additional measures of disinfection and annihilation of parasites. If brine shrimps are kept in the freezer for a long time, most pathological agents will become non-viable at the time of birds feeding.

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## Хураангуй

*Artemia* төрлийн заламгай хөлт хавчийг (Crustacea: Anostraca: Artemiidae) шувууны аж ахуйд нэмэлт гэжээл болгон өргөн хэрэглэдэг. Эдгээр хавчнууд байгалийн давстай усан санд өргөн тархсан энэ нь түүгээр хооллож, тэдгээр усан санд тогтмол ба түр орогнодог шувуудад шимэгч ба халдварт өвчнийг дамжуулах нөхцөл болдог. Иймд тэжээвэр шувуудын хоол тэжээлд *Artemia* төрлийн хавчийг нэмэлт тэжээл болгон ашиглахдаа халдваргүйжүүлэлтийг хийх зайлшгүй шаардлагатай. Учир нь *Artemia* төрлийн хавчнууд *Diphyllobothrium dendriticum* зүйлийн туузан хорхойны завсрын эзэн болохын зэрэгцээ агнуурын шувуудад зарим халдварт өвчнийг дамжуулах боломжтой.

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