

Organization of veterinary services for industrial duck farming: problems and solutions

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Abstract. Proper organization of veterinary services is one of the key elements of economic efficiency of duck farming. It has been established that there are a number of problems in the organization of veterinary services for duck breeding in the country that require scientific analysis. This is insufficient elaboration of the issues of normative-legal regulation of veterinary requirements for duck keeping. However, the state plans to solve this issue in 2025 by adopting new Veterinary Rules, but the draft of this document does not contain any specifics of keeping waterfowl (ducks and geese), taking into account their physiological need for water. The second problem is the lack of unified approaches in planning and organization of veterinary preventive measures against contagious and other diseases of ducks. The authors recommended scientifically based technological cards of veterinary treatment of ducks, which will contribute to the organization of an effective system to control the risks of occurrence and spread of contagious and other diseases of ducks. The third problem is the lack of the scientifically based planning of staffing veterinary specialists for duck breeding farms (enterprises). Here the authors recommend 42 developed norms of time for carrying out veterinary and preventive measures, works performed by veterinary specialists in hatcheries, and registration of veterinary documentation. Also 5 norms of time for laboratory tests for the most significant for industrial duck farming infections have been developed. A systematic approach to the organization of veterinary services for industrial duck farming on the basis of the developed recommendations will ensure stable epizootic well-being of the industry, which will positively affect its economic efficiency.

1 Introduction

Proper organization of veterinary services is one of the key elements of economic efficiency of poultry farms. In the current conditions of Russian poultry farming, the issue of effective veterinary services is becoming more and more acute [1]. Ducks occupy the second place after chickens in the structure of poultry industries in the Russian Federation, with geese overtaking them by the rate of growth of meat production [2]. Despite this, the attention of scientists, both in Russia and abroad, is mainly given to chickens. Only some scientists are engaged in research in the field of organization of measures for prevention and control of infectious and other diseases of ducks. They are Novikova O. B., Trefilov B.B., Fleming-Canepa X., Hussain I., Pan Yu., Putri N., Shi Sh., Uddin Md. N., et al. [3 - 10]. Practically no one deals with the organization of veterinary services of duck farming in a comprehensive manner, and therefore a situation is formed when this issue is not fully studied. In particular, until now in Russia, no attempts have been made to analyze the morbidity of ducks in industrial conditions of their cultivation. And, based on its results, there is the scientifically based planning of veterinary preventive measures, in the service of breeding flocks and young

stock on fattening. Also, there was no labor rationing of veterinary specialists with the development of time standards, which could be the basis for calculations to establish the optimal scientifically-based staffing of veterinary specialists of duck farms. All the above-mentioned points to the relevance of the topic chosen by the authors. Despite the solid experience of Russian scientists in the issues of improving the organization of veterinary services in poultry farming, studies in the industrial sector of duck farming are conducted for the first time.

2 Materials and methods

The data on the epizootic situation, poultry disease incidence, plans of preventive veterinary measures of 4 industrial Russian duck farms served as the material for the research. They are LLC "Ramaevskoe Farm" of the Republic of Tatarstan, LLC "Centralnaya Poultry farm" of the Vladimir region, LLC "Agrofirma of "Sibirskaya Ptitsa" of the Altai region, and LLC "Kimovskaya Poultry farm" of the Republic of Mari El.

The research was carried out on the basis of the Kazan State Academy of Veterinary Medicine named after N. E. Bauman. The following methods of scientific research were used: experimental-analytical, calculation-

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analytical, abstract-logical, monographic and system analysis.

3 Research results

The developed recommendations are based on the requirements of the current regulatory and legal framework in the field of prevention of contagious and other diseases of ducks, as well as the best practices of research facilities on reproduction and breeding of ducks in industrial conditions. Recommendations include general recommendations on the organization of veterinary services, scientifically based technological maps of veterinary and preventive treatments of breeding stock and young ducks, as well as the norms of time for veterinary work in duck breeding.

The target audience for the recommendations are veterinary specialists of farms and state veterinary service, who provide veterinary services in duck breeding.

Current Russian veterinary legislation in poultry farming, including duck farming, distinguishes between open-type farms and closed-type enterprises. At the same time, there is no clear differentiation between them in terms of the number of poultry kept, which significantly complicates the practical application of the requirements defined by the legislation. Many large duck farms position themselves as open-type farms.

There is no need to dwell on the requirements themselves, as they are set out in detail in the Veterinary Rules for keeping poultry on private farmsteads and open-type poultry farms and the Veterinary Rules for keeping poultry on closed-type poultry farms (poultry farms). They were approved by Orders of the Ministry of Agriculture of the Russian Federation No. 103 and No. 104 of April 3, 2006, respectively.

In 2024, the Department of Veterinary Medicine of the Ministry of Agriculture of the Russian Federation has prepared a draft and started consideration of new Veterinary Rules for keeping birds for breeding, rearing and marketing purposes, eliminating the above-mentioned deficiency.

Organization of veterinary service of duck farms (enterprises) is carried out according to plans, technological maps and schemes of veterinary preventive measures.

The executor and the responsible person in open-type farms, depending on the position according to the staff schedule, are the chief veterinary specialist or veterinary surgeon of the farm, or under the contract for veterinary service (specialists of the state veterinary service).

Table 1. The technological map of veterinary and prophylactic treatments of parent stock in duck breeding farms (enterprises)

Dead-line	Type of treatment	Method of execution	Name of preparation	Single dose
January	Preventive treatment against coccidiosis	Giving with water	Baycox 2.5%	1 ml/ 1 l water
January, one month before oviposition	Vaccination against viral hepatitis	Intramuscularly into the thigh muscle	Vaccine against viral hepatitis of ducklings from the strain "VGNKI-K" embryonic	1 ml
During vaccination	Prophylactic vitaminization	Giving with water	Tetrahydrovit	2 ml/ 1 l water
Between vaccinations	Prophylactic vitaminization	Intramuscularly	Tetrahydrovit	2 ml
February, two weeks before egg-laying	Revaccination against viral hepatitis	Intramuscularly into the thigh muscle	Vaccine against viral hepatitis of ducklings from the strain "VGNKI-K" embryonic	1 ml
Before oviposition	Preventive treatment	Air sanitation for 30 minutes	Iodine checkers	1 per 400 m ³ of room
2 times a month during oviposition period	Preventive vitaminization	Giving with feed	Multitonic	1 l per 2 ton of water
April, November	Deworming	Giving with water or feed	Amprolium	120 mg/ 1 l water or 120 mg/ 1 kg feed
Spring, summer, winter	Prophylactic treatment against arachnontomosis	Giving with feed	Alvet	10 mg/ 1 kg
Every month	Preventive treatment	Giving with water	Monclavit 1	10 ml/ 1 l water

Table 2. The technological map of veterinary and prophylactic treatments of young animals in duck farms (enterprises)

Deadline (age of young stock)	Type of treatment	Method of execution	Name of preparation	Single dose
Day 0	Preventive treatment	Giving with water	Vitrocil	1 l per 20 l of water with Aviblu (50 g)
Days 1 - 4	Preventive treatment	Giving with water	Vitrocil	1 l per 20 l of water
Days 5 - 7	Preventive treatment	Giving with water	Hepatobuster	1 l per 20 l of water
Day 8	Preventive treatment	Giving with water	Citric acid	300 g per 20 l of water
Day 9	-	-	-	-
Days 10 - 12	Preventive treatment	Giving with water	Lovit VA-SE	0.5 l per 20 l of water
Day 13	Preventive treatment	Giving with water	Citric acid	300 g per 20 l of water
Day 14	-	-	-	-
Days 15 - 17	Preventive treatment	Giving with water	Hepatobuster	1 l per 20 l of water
Day 18	Preventive treatment	Giving with water	Citric acid	300 g per 20 l of water
Days 19 - 20	Preventive treatment	Giving with water	Lovit VA-SE	0.5 l per 20 l of water
Days 21 - 22	Preventive treatment	Giving with water	Proctiv Acid SE	0.3 l per 20 l of water
Day 23	-	-	-	-
Days 24 - 26	Preventive treatment	Giving with water	Lovit VA-SE	0.5 l per 20 l of water
Days 27 - 28	Preventive treatment	Giving with water	Proctiv Acid SE	0.3 l per 20 l of water
Days 29 - 30	Preventive treatment	Giving with water	Ecocid	100 g per 20 l of water
Days 31 - 32	Preventive treatment	Giving with water	Proctiv Acid SE	0.3 l per 20 l of water
Days 33 - 34	Preventive treatment	Giving with water	Ecocid	100 g per 20 l of water
Days 35 - 36	Preventive treatment	Giving with water	Proctiv Acid SE	0.3 l per 20 l of water
Day 37	Preventive treatment	Giving with water	Citric acid	300 g per 20 l of water
Days 38 - 41	-	-	-	-

The executor and the responsible person at duck farming enterprises of closed type, depending on the position on the staff schedule, are the chief veterinary specialist or veterinary surgeon of the poultry farm.

In both cases, a set of preventive measures was aimed at preventing the spread of infections and infestations, therapeutic and prophylactic measures against non-communicable diseases of ducks and veterinary and sanitary work, which is an important part of the general prevention of diseases in poultry farming.

Implementation of veterinary measures to prevent contagious and other diseases of ducks is impossible without their scientifically based planning. We have developed science-based technological maps of veterinary preventive measures for duck farms (enterprises), presented in Tables 1 and 2. There for each veterinary measure, the timing, methods of carrying out, as well as the names and dosages of recommended veterinary drugs approved for use in the Russian Federation are indicated.

The list of veterinary measures carried out in duck farming depends on the region of location, the level of technological efficiency at the poultry farm, the epizootic situation in the region and in the farm itself, availability of necessary biological preparations. It is necessary to regularly improve the schemes of veterinary and prophylactic measures, taking into account the spread of diseases in duck farming and the effectiveness of veterinary drugs used. Our recommendations can be supplemented with specific veterinary measures necessary for each particular duck farm (enterprise).

Application of the proposed integrated approach to planning and implementation of measures to prevent contagious and other diseases of ducks in accordance with the developed technological maps of veterinary and preventive measures for duck farms (enterprises) will allow effectively controlling the risks of occurrence and spread of such diseases.

Table 3. Time standards for veterinary work in duck incubators

Name of veterinary measures	Unit of measurement	Time standard, min. (M±m)
Quality assessment of incubation egg acceptance in the storage department	1 egg tray – 120 eggs	1.75±0.07
Disinfection of incubation eggs	1 cart – 3360 eggs	19.63±0.42
Candling of incubation eggs	1 cart – 3360 eggs	46.78±0.46
Incubation (hatching) cabinet disinfection	1 cabinets	41.91±1.78
Control of egg laying in the incubation cabinet	1 cart - 28 egg trays	30.93±1.27
Control of egg transfer from the incubation cabinet to the hatching cabinet	1 cart - 28 egg trays	9.94±0.33
Control of the hatching of ducklings from the hatching cabinet after the incubation period has expired	1 cart - 28 egg trays	55.94±0.31

Effective veterinary service of duck farming is impossible without the necessary staff of veterinary

specialists. The planning of the number of such personnel is based on time standards for veterinary activities. We have developed time standards for veterinary activities in the service of duck farms (enterprises) presented in Tables 3-5 guided by the Recommendations on labor rationing of veterinary specialists. They were approved by the Scientific and Technical Council of the Ministry of Agriculture of the Russian Federation on December 26, 2014, based on the results of timekeeping observations.

Table 4. Time standards for veterinary and preventive measures in duck farming

Name of veterinary measures	Unit of measurement	Time standard, min. (M±m)
Clinical inspection, identification of sick and dead birds in the poultry house	1 poultry house	27.9±1.3
Vaccination of ducks against viral hepatitis	1000 birds	166.0±1.9
	1 bird	0.17
Duck deworming	1 poultry house	33.1±1.2
Vitaminization of ducks	1 poultry house	31.5±0.6
Giving antimicrobials to duck with water	1 poultry house	39.6±1.2
Pathological autopsy of dead duck	1 dead bird	42.6±0.3
Poultry house disinfection	1 poultry house	1595.0±4.1
Sanitizing mat filling	1 sanitizing mat	9.2±0.2
Treatment of ducks with disinfectant (drinking)	1 poultry house	36.4±0.4
Disinfection of vehicle	1 vehicle	134.4±3.7
Feeder disinfection	1 feeder	77.6±1.6
Clinical examination of the duck before slaughtering	1 party	32.7±1.1
Sampling of feed for laboratory examination	1 sample	14.1±0.6
Sampling of pathological material from ducks for laboratory tests	1 sample	13.2±0.5

The work of industrial duck farms (enterprises) is impossible without high-quality laboratory and diagnostic support of their activities. It is necessary for monitoring studies of especially dangerous diseases and for reliable diagnosis of contagious and other diseases of ducks. In the Russian Federation, laboratory diagnostic tests are carried out by a network of accredited regional and federal state veterinary laboratories. Work has been started to develop time standards for laboratory tests carried out on material sampled from ducks, currently 5 time standards have been established, as shown in Table 6.

Table 5. Time standards for veterinary documentation in duck breeding farms

Name of veterinary measures	Unit of measurement	Time standard, min. (M±m)
Compilation of the act:		
- immunization	1 act	9.4±0.45
- preventive treatment	1 act	8.1±0.2
- poultry house disinfection	1 act	12.1±0.57
- vehicle disinfection	1 act	9.7±0.4
- disinfection of incubation (hatching) cabinets	1 act	8.8±0.37
- sampling for laboratory examination	1 act	6.9±0.25
- pathological anatomical autopsy	1 act	13.5±0.59
Keeping a log book:		
- anti-epizootic measures	1 record	3.7±0.13
- diagnostic studies of poultry	1 record	2.9±0.14
- pathologoanatomical autopsy of poultry	1 record	3.4±0.14
- epizootic condition of the poultry farm	1 record	6.7±0.25
- prophylactic and forced inoculations of birds	1 record	4.5±0.17
- therapeutic treatments of poultry	1 record	2.2±0.06
- veterinary and sanitary examination results	1 record	3.9±0.15
- disinfection, dissection and deratization	1 record	4.2±0.15
- medicines	1 record	1.6±0.07
- biological waste	1 record	2.5±0.1
Formalization of an application for a veterinary certificate of form No. 1 in electronic form	1 application	18.3±0.9
Formalization of the veterinary certificate of form No. 2 in electronic form	1 certificate	17.1±0.8
Formalization of application for the veterinary certificate of form No. 3 in electronic form	1 application	19.7±0.9
Formalization of the veterinary certificate (application for the veterinary certificate) of form No. 4 in electronic form	1 certificate (application)	6.7±0.25

The time standards presented in the tables are recommended to be used as scientifically based time standards in the analysis of staffing, planning the number of veterinary specialists and assessing the efficiency of labor resources of duck farms (enterprises). Time standards for laboratory tests are accredited by state veterinary laboratories. Calculations should be based on the annual effective working time of veterinary specialists in each specific region of the country, as well as on the actual costs of preparatory and final work, rest and personal needs of workers.

Table 6. Time standards for laboratory tests for selected duck infections

Name of veterinary measures	Unit of measurement	Time standard, min. (M±m)
Detection of antibodies to avian influenza virus in the hemagglutination inhibition reaction	1 test (20 samples)	66.1±2.6 6
Detection of antibodies to Newcastle disease virus in the hemagglutination inhibition reaction	1 test (20 samples)	67.2±1.3 4
Examination of blood serum samples for avian influenza by the enzyme-linked immunosorbent assay method	1 test (50 samples)	67.95±1. 7
Detection and differentiation of avian influenza virus by the polymerase chain reaction in flushes	1 test	150.1±2. 66
Examination of blood serum samples for viral hepatitis of ducks by the enzyme-linked immunosorbent assay method	1 test (50 samples)	67.95±1. 7

4 Conclusion

When organizing veterinary services for duck farming in the Russian Federation, a number of problems require scientific analysis. One of them is insufficient elaboration of the issues of normative-legal regulation of veterinary requirements for duck keeping in farms (enterprises). However, the government plans to solve this issue in 2025 by adopting new Veterinary Rules for keeping birds for breeding, rearing and marketing, but the draft of this document does not contain any specifics of keeping waterfowl (ducks and geese), taking into account their physiological need for water. The draft rules allow walking waterfowl with the device on the paddocks dome grooves, but this applies only to farms with livestock of up to 1000 birds. At duck-breeding enterprises with large livestock, walking is prohibited. And the device of dome grooves in poultry houses significantly complicates the control of microclimate parameters.

The second equally important problem is the lack of unified approaches in planning and organization of veterinary and prophylactic measures against contagious and other diseases of ducks. We recommend scientifically based technological cards of veterinary treatments of parent stock and young ducks on fattening, tested under the conditions of the research sites. They will contribute to the organization of an effective system of control of risks of occurrence and spread of infectious, invasive and other diseases of ducks in industrial conditions of their reproduction and cultivation.

The third problem is the lack of scientifically based planning of the staff number of veterinary specialists of duck breeding farms (enterprises), which is necessary to ensure, on the one hand, high efficiency of veterinary services, on the other hand, the rational use of available

labor resources. To solve this problem, we recommend 14 norms of time for veterinary preventive measures, 7 norms of time for work performed by veterinary specialists in hatcheries, and 21 norms of time for registration of veterinary documentation in duck farms (enterprises). In addition, 5 norms of time for laboratory tests for the most important infections for industrial duck farming have been developed. All of them are reliable and can be used not only in planning the staff number of veterinary specialists, but also in assessing the efficiency of labor resources in duck farming. The establishment of the staff of veterinary specialists of a farm (enterprise) should be approached with due consideration of the actual annual effective working time fund, costs for preparatory and temporary work, rest and personal needs of veterinary specialists.

A systematic approach to the organization of veterinary services for industrial duck farming on the basis of the recommendations developed by us will ensure stable epizootic well-being of the industry. This will have a positive impact on its economic efficiency not only on the scale of individual subjects, but also on the Russian Federation scale. The results of these studies can be used as a basis for the development of a national system for the organization of veterinary services for industrial duck farming in other countries of the world, taking into account the economic and other specifics of veterinary services in these countries.

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