Some Hygienic Aspects of Risk and Prevention of Occupational Respiratory Diseases in Animal Workers

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Abstract: The article examines the main occupational risk factors for the development of respiratory diseases in livestock workers (cattle breeding, pig farming), analyzes the dynamics and structure of occupational morbidity, scientifically substantiates the hygienic principles of managing occupational health risks for this category of workers and recommendations for primary and secondary prevention of occupational respiratory diseases.

Keywords: livestock workers, occupational health risk factors

1. INTRODUCTION

Respiratory diseases (RD), caused by exposure to environmental factors, including industrial ones, have become increasingly relevant and of medical and social significance throughout the world in recent decades. According to WHO experts, in 2020, out of 68 million deaths, 11.9 million (17.5%) will be caused by respiratory diseases (4.7 million - chronic obstructive pulmonary disease, 2.5 million - pneumonia; 2 .4 million – tuberculosis; 2.3 million – lung cancer) [3, 20].

In the structure of primary occupational morbidity registered in Russia, ABI consistently occupies one of the first ranking places (25−30%), being the main cause of disability in the working population. According to different years of observation, up to 70% of deaths from chronic occupational diseases were caused by severe respiratory pathology [11,12]

The largest share of types of economic activities whose workers had professional UBI registered for the first time in 2014 is represented by mining, manufacturing and agriculture enterprises. Workers in the livestock industry are the most vulnerable professional group with regard to the risk of developing occupational diseases (ODs) of the respiratory system.

Despite the diversity of industries (meat and dairy cattle breeding, pig farming, sheep breeding, horse breeding, poultry farming, etc.), working conditions in livestock farming have much in common and are associated with close contact with a large number of animals, causing air pollution in the working area and, as a consequence, the formation BAUD. Thus, domestic and foreign studies on some sectors of livestock farming have revealed that in economically developed regions up to 25% of livestock workers suffer from one or another nosological form of diseases of the respiratory system associated with working conditions [2, 4, 6, 17].

Currently, the technology for obtaining livestock products involves mechanization and partial automation of the main technological processes - feeding and watering animals, manure removal, milking, veterinary treatment, cleaning and disinfection of premises and equipment. Feed preparation, as a rule, is carried out in feed workshops, and their distribution is carried out using pipelines, belt conveyors or mobile distributors. To remove manure when animals are kept without bedding, hydraulic systems (gravity flow, water flush, etc.) or mechanical conveyors are used.

Most farms use machine milking using milking machines of various types. To maintain favorable parameters of the air environment and microclimate, pig breeding premises are equipped with supply and exhaust ventilation, ventilation and heating devices and constant air exhaust from manure channels. In premises for keeping cattle, only natural ventilation (exhaust shafts) is used [15,16].

2. ANALYSIS OF OWN RESEARCH

The results of our many years of research into the working conditions of livestock workers have shown that the labor process in livestock farming is highly intense. The operational workload when performing main types of work is 93−95% of the shift time, which often leads to irrational work and rest schedules without observing regulated breaks. The work of livestock breeders is characterized by significant nervous and emotional stress associated with the danger of injury, the constant need to strictly adhere to the routine of caring for animals (watering, feeding, milking, etc.), and high responsibility for their health and productivity [6,10].

The severity of the labor process in livestock farming is characterized by a high overall dynamic load when moving loads over various distances (up to 40,000 or more kg•m), load when lifting and moving loads manually weighing from 5 to 30 kg and the application of static forces when holding them. A significant part of work operations (caring for animals, cleaning premises) will be performed in uncomfortable and forced body positions with deep body bends. Characterized by prolonged (more than 80% of the shift) standing position and significant transitions due to the technological process. To a large extent, high physical activity is determined by the irrational organization of workplaces and ergonomic imperfections of equipment and workplaces. According to Guideline R2.2.2006-05, the severity of work of livestock workers according to current hygienic criteria is classified as hazardous working conditions of degrees 2 and 3 (classes 3.2 and 3.3) [13, 17].

The specific microclimatic conditions in livestock buildings are determined by zoohygienic standards for keeping animals and the features of the technological process. Under stall conditions, the optimal temperature for animals should range from 18-25°C, humidity should not exceed 75%, and air speed should not exceed 0.25 m/sec. However, their actual values can fluctuate within fairly wide limits, not corresponding to the permissible values. Thus, according to the results of our own research, the air temperature in the premises of pig-breeding complexes due to the operation of supply and exhaust ventilation was 16−20ºC, relative humidity 70−75%, air speed 0.15−0.3 m/s. In premises for keeping and fattening cattle, microclimatic conditions are subject to even greater fluctuations: in the warm season, the air temperature can rise to 35ºC, and in the cold season it cannot exceed 8ºC with a relative humidity of 80-90%, which is significantly lower than sanitary standards. We have found that the air humidity in animal housing facilities depends on the efficiency of the ventilation systems, the type of building, ambient air parameters, the number of animals kept, as well as the production operations performed. In the cold and transitional periods of the year, hydrodrilling and distribution of liquid feed was accompanied by an increase in air humidity to levels exceeding hygienic standards by 5−10%. According to microclimate parameters, the working conditions of livestock breeders in the warm season were assessed as harmful degrees 2 and 3 (classes 3.2 and 3.3); in cold - as harmful 4 degrees (class 3.4) [10, 13].

The air environment of livestock buildings is polluted with gaseous impurities, the presence of which is caused by the vital activity of animals, decomposition products of excrement and feed residues. The concentration of harmful gaseous impurities (ammonia, hydrogen sulfide, mercaptans, aldehydes) depends on planning decisions, methods of keeping animals and manure removal, type of feeding, ventilation system and other reasons. If the ventilation regime is violated and manure is not removed in a timely manner, the ammonia content can exceed the maximum permissible concentration by 1-3 times, hydrogen sulfide by 2-2.5 times, which corresponds to harmful working conditions of the 2nd degree (class 3.2) [13, 19].

The air in the work area may contain chemical compounds used for disinfection and disinsection of premises (formalin, chlorine, chlor-betta-naphthol, Lysol, chlorophos, etc.). For example, in the first hours after treatment of premises, formaldehyde is found in concentrations exceeding the maximum permissible concentration from 2 to 10 times, forming hazardous working conditions of degree 4 (class 3.4) [7, 19].

Gaseous impurities contained in the air of the working area have an irritating effect. With their increased concentrations or prolonged exposure to concentrations not exceeding the MPC, workers may experience catarrhal symptoms in the upper respiratory tract, irritation of the mucous membranes of the pharynx and larynx, headaches, nausea, and subsequently, subtropical and atrophic lesions of the upper respiratory tract. Formaldehyde, in addition, is a substance dangerous to human reproductive health and a moderately dangerous allergen with a sensitizing effect.

When studying microbiological air pollution in a working area, a large number of bacteria, myxomycetes (fungi), actinomycetes, and viruses are found that are part of dust aerosols that enter the breathing zone of working personnel and cause a fairly high biological hazard to their health [7].

The aerogenic bacterial flora is mainly represented by saprophytic and opportunistic microorganisms, mainly white and golden staphylococci, hemolytic streptococcus, as well as representatives of the intestinal group: salmonella, E. coli, Proteus, the sources of which are animals and their waste products. Of the myxomycetes, pp. is most often identified. Aspergillus, Penicillium, Mucor, Rhizopus, Alternaria, Fusarium, as well as yeast-like fungi p. Candida, the main source of which is dry feed. The level of microbial contamination of the air in the working area of livestock buildings can vary from 6.0 × 104 to 2.56 × 105 colony-forming units (CFU) per 1 m^3 in the warm season and from 4.2 × 104 to 2.3 × 105 CFU/m3 - in the cold. The highest microbial contamination of the air, reaching 2.5 × 106 CFU/m^3, is typical for large pig-breeding complexes [18]

Microbial pollution of the air environment of production premises of livestock farms and complexes, which represents a biological hazard, is one of the leading hygienic risk factors for the formation of general and occupational morbidity among livestock farmers (brucellosis). Micromycetes play a major role in the allergic alteration of the body and the development of exogenous alveolitis. Saprophytic microflora is one of the factors contributing to the development of polyvalent sensitization and the formation of allergic diseases (allergic rhinitis, asthmatic bronchitis, bronchial asthma) [1, 17].

Industrial premises are characterized by air pollution with antibacterial drugs (levomecitin, tetracycline, streptomycin, penicillin, gentamicin, grisin, bacitrocin, etc.), the use of which in animal feed is based on their antibacterial effect and biological effect, expressed in increasing the body weight of animals . The content of antibiotics in 1 kg of compound feed can reach, according to different recipes, up to 100 mg and enter the breathing zone of livestock farmers when preparing feed and feeding animals. Long-term industrial contact with antibiotics, even at low working concentrations, can lead to general sensitization of the body of livestock workers and alteration of various organs and systems, as well as the development of mycoses[5]

Dusty air in the working area is the leading pathogenetic risk factor for the development of occupational AML in livestock workers. The dust contained in the air of livestock buildings has a complex composition and consists of mineral and organic components. The predominant is the organic component, which includes animal waste products (wool, bristles, skin flakes, dried feces), plant matter and animal feed residues. The mineral component is represented by soil dust brought in with feed and mobile equipment, particles of concrete floors, and dry lime, which is sprinkled on passages [19].

Dust present in the air of the working area of livestock breeders belongs to weakly fibrogenic aerosols (the content of free silicon dioxide, as a rule, does not exceed 7−8%). The highest concentrations of dust in the breathing zone of livestock farmers are determined during loading and distribution of dry feed (up to 700 mg/m^2, exceeding the MAC by 40 times or more) and during dry cleaning of premises (up to 40−45 mg/m^2, exceeding the MAC by up to 10 times) . Excesses of the average shift concentration of dust in the air of the working area of livestock breeders, taking into account the exposure time, range from 3 to 10 times, which corresponds to harmful working conditions of 2-3 degrees (classes 3.2-3.3) [13].

Dust of plant and animal origin is a pronounced allergen, and its chronic inhalation exposure can lead to dystrophic and allergic diseases of the upper and lower respiratory tract. In addition, it is an ideal reservoir and substrate for the development of a wide range of microorganisms. When contaminated dust is inhaled, a synergistic effect of the chemical and biological agents contained in it is possible.

Thus, the analysis of the hygienic characteristics of working conditions in animal husbandry (cattle breeding, pig farming) allows us to identify, in accordance with the current regulations, the following harmful production factors that affect the state of the respiratory system of workers and can lead to the development of occupational diseases (Table 1).

In the etiology of AMD of livestock farmers, which develops as a result of exposure to the dust factor, the complex composition of the air in the working area and microclimatic discomfort, the individual sensitivity of the worker’s body,

allergic reactions to organic dust and microflora, as well as the irritating chemical and mechanical components of dust and its fibrogenic effect are of great importance.

In the structure of general morbidity with temporary loss of ability to work (TL), the share of TLD detected among livestock breeders is subject to significant fluctuations, depending on working conditions and professional experience of workers. For workers at various agricultural enterprises (dairy farm, cattle breeding, pig breeding complex, etc.), respiratory diseases with VUT account for from 26.3% to 52.4% of all cases and 15.7 - 35.6% of days disability.

Tabel 1. Harmful production factors leading to the development of occupational pathology of the respiratory system in livestock workers

No	Name of harmful production factor	Mechanism of action on organism*
	1. Chemical factors	
1.2.	Chemicals and compounds containing:	
1.2.32.2.	dihydrosulfide (hydrogen sulfide)	O, P
1.2.32.4.	mercaptan	O, P
	ammonia	P
1.2.2.	formaldehyde	O, A, Pз
1.2.8.1.	chlorine	O, P
1.2.43.	chlor-betta-naphthol	A, P
1.3	Complex chemical mixtures, compositions, chemical substances for specific purposes:	
1.3.2.1.	chlorophos	P, A, O
1.3.9.1.	antibiotics	A
	2. Biological factors	
2.1.	Producing mushrooms, protein-vitamin concentrates, feed yeast, compound feed	A F
2.2.	Enzymatic preparations, biostimulants	A
2.7.	Dust of animal and plant origin (with an admixture of silicon dioxide, grain, etc.) including bacterial contamination	A, F
	3. Physical factors	
3.8.	Reduced air temperature in open production areas помещениях и на (during the cold season)	
3.9.	Increased air temperature in production premises and open areas (during the hot season)	
	4. Factors of the labor process	
4.1.	Physical overload	

*Notes: * Substances marked "O" are substances with a highly targeted mechanism of action, "P" are irritating, "A" are allergens, "F" are have a fibrogenic effect, "Pz" are dangerous for human reproductive health *according to R 2.2.2006-05].*

For people with little experience, working in animal husbandry for less than 5 years, catarrhal inflammatory processes in the nasopharyngeal mucosa are characteristic, which subsequently pass into a sub- and atrophic state. Currently, occupational diseases of the upper respiratory tract (allergic rhinitis, pharyngitis, laryngitis, sinusitis) are diagnosed quite rarely *4+.

Occupational pathology of the bronchopulmonary system in livestock workers develops mainly with work experience in the profession of 10 years or more and can be represented by occupational bronchial asthma, chronic dust non-obstructive bronchitis, chronic obstructive pulmonary disease, and much less often - exogenous allergic alveolitis (Table 2).

Tabel 2. List of occupational respiratory diseases of livestock workers

No	List of diseases associated with exposure to harmful and (or) hazardous industrial conditions factors	Disease code by ICD-10	Name of harmful and (or) dangerous production factor
1.61.2.	Chronic dust non-obstructive bronchitis	J41.0	Chemical substances that have a toxic effect, with the exception of the substances specified in paragraphs 1.1-1.51
1.61.4.	Chronic obstructive pulmonary disease	J44.8	
1.67.2.	Hypersensitivity pneumonitis (exogenous allergic alveolitis)	J67.0 J67.2	Organic dust
3.6.	Occupational allergic bronchial asthma	J45.0	Biological factors Having an allergenic effect (allergens)
3.7.	Diseases of the upper respiratory tract associated with exposure to biological factors, Having an allergenic effect (manifestations: allergic rhinitis and sinusitis, pharyngitis, laryngitis, edema Quincke)	J68.2	Biological factors that have an allergenic effect (allergens)

During the period from 2000 to 2014, in the Bukhara region, professional AML were diagnosed in 36 livestock workers, the majority (71%) of whom served cattle (milkmaids, machine milking operators, calf workers).

An analysis of occupational morbidity among workers, taking into account the duration of work in hazardous working conditions, showed that respiratory diseases caused by production factors were recorded mainly in persons aged 30 - 45 years with an average work experience in the profession of 15.3 ± 2.6 years . In 14.2% of cases, occupational respiratory pathology developed in livestock farmers when working in contact with animals for no more than 5 years. In the nosological spectrum of occupational respiratory diseases, the first ranking places were occupied by allergic bronchial asthma (BA) - 85.7%, chronic obstructive pulmonary disease (COPD) - 28.6%, chronic dust non-constructive bronchitis (NDB) - 14.3%. Moreover, in a number of observations (28.6%), atopic bronchial asthma was combined with COPD or POPD (Fig. 1).

As concomitant diseases, diseases associated with physical overload and functional overstrain of individual organs and systems were diagnosed - lumbosacral radiculopathy (SCR) and scapulohumeral periarthrosis (PHPA).

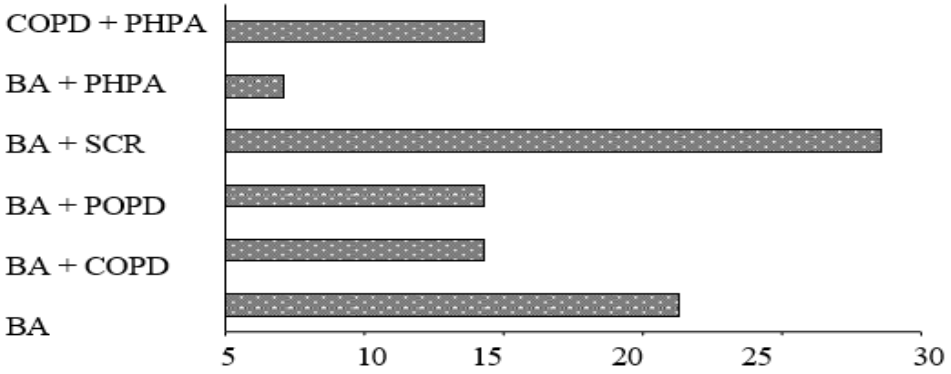

Figure 1. Frequency of detection of diseases depending on the nosological form.

A significant decrease in comparison with the 80-90 years of the last century in the frequency of detection of occupational respiratory pathology among livestock workers, in our opinion, was associated both with a reduction in

production (mainly) and its modernization (in some cases), which led to a decrease in the number of livestock breeders working in harmful and dangerous working conditions [6].

Based on the sanitary and hygienic assessment of working conditions in livestock farming, sanitary, hygienic and epidemic measures aimed at reducing air pollution in the working area, ensuring favorable microclimatic working conditions, optimizing workplaces and labor processes.

Priority measures are taken to mechanize and automate such production processes as the preparation and distribution of feed, watering animals, pneumatic cleaning, mechanized and automated cleaning, and manure removal. The process of preparing feed is preferable from raw materials in the form of granules and briquettes. Conveyors, dispensers, crushing and grinding devices used for preparing feed must be sealed, and workplaces in feed preparation rooms are equipped with local exhaust devices. It is advisable to transport dust-forming materials (feed, premixes) using vacuum-pneumatic systems or using closed-type conveyors equipped with local exhaust ventilation.

Ventilation and air conditioning systems for livestock buildings must ensure effective air exchange and regulated microclimate and air parameters. In accordance with technical requirements, supply and exhaust ventilation must provide air exchange at a level of 50−60 m3 per hour per 100 kg of live weight of animals in the room. The use of air recirculation in ventilation and air heating systems of livestock buildings is not allowed. When removing air from the lower zone of the premises, it is necessary to provide for the removal of air from underground manure channels, which helps prevent the spread of desiccants, microorganisms and unpleasant odors. Along with automated ventilation systems, it is possible to use natural air exchange.

The creation of special remote posts (control panels) equipped with monitoring and remote control devices for the technological process can reduce the time spent by personnel in areas with increased dust generation and reduce physical stress.

Walls, equipment elements and window surfaces, lighting fixtures of livestock buildings are subject to wet cleaning. Moistening the floors along the entire route for moving livestock helps reduce dust in the air in the working area. To minimize unpleasant odors, it is recommended to use electrical and chemical air ozonizers, as well as bleach, ammonium sulfate and other means.

Reducing microbial contamination of the air must be ensured, first of all, by complying with regulated requirements for the sanitary and hygienic keeping of animals. This is achieved by using good-quality litter, good condition and trouble-free operation of sewer and ventilation systems, timely removal of manure, the use of bactericidal lamps and chemicals, incl. electrochemical activated sodium chloride solutions with bacteriostatic and bactericidal properties. Comprehensive plans for health measures must necessarily include work on preventive and focal disinfection, disinfestation and deratization.

To prevent negative effects on workers of toxic substances used for sanitary treatment of livestock premises and the territory of a livestock facility, it is necessary to strictly observe the exposure and frequency of treatment, consumption rates and concentrations of working disinfectant solutions and waiting periods. To prevent the toxic-allergic effect of antibacterial agents, it is necessary to establish strict control over the dosage and methods of using antibiotics in animals. When carrying out disinfection and vaccination using aerosol generators, it is necessary to use personal protective equipment.

In order to prevent acute respiratory diseases in livestock buildings where workers work, it is necessary to maintain acceptable microclimate parameters, avoiding high and low temperatures, drafts, and high air humidity. To maintain acceptable microclimate parameters during the cold season, it is recommended to equip the supply and exhaust ventilation with devices for heating the supply air, and the entrances to the premises with vestibules and air-thermal curtains. When designing the heating system of livestock buildings, heating installations should be used that do not cause air pollution by fuel combustion products. The most promising is the use of infrared irradiators for heating rooms.

For those working outdoors and in damp environments, premises and devices for drying work clothes and shoes must be provided. To prevent hypothermia of the hands during work (washing frozen root vegetables, washing the udder, etc.), it is necessary to use warm water.

Livestock breeders working in the cold season outdoors or in unheated premises must be provided with special regulated breaks for heating and rest, included in working hours.

Livestock workers must be provided with personal protective equipment (protective masks, respirators, gas masks, etc.), special clothing and safety shoes in accordance with established standards and taking into account the climatic region (zone).

An important role in the prevention of occupational diseases among livestock breeders should be given to sanitary and educational work, implemented through preventive conversations, health bulletins, lectures, and the dissemination of individual reminders about existing production and additional risks. Course training for livestock breeders within the framework of the sanitary minimum must be carried out according to the program established by labor safety requirements, drawn up taking into account local conditions.

Among medical measures for the primary prevention of respiratory diseases in livestock workers, the leading place should be occupied by differentiated professional selection among those entering the workforce, taking into account the individual characteristics of potential workers, the presence of general and additional contraindications for working in the profession.

Preliminary medical examination (as well as periodic medical examinations) of livestock workers should be carried out by medical organizations of any form of ownership that have a license for the specified type of activity (in normal practice, the central district hospital) in accordance with Order of the Ministry of Health of the Russian Federation No. 200 dated 08.15.11.

The employer is obliged to provide the medical organization with which the contract for mandatory medical examinations has been concluded with a complete list of jobs and professions associated with the employee's exposure to harmful production factors, and an indication, based on the results of certification of workplaces and a special assessment of working conditions, of the entire complex of these hazards for each profession . Also, when assessing production factors and working conditions, laboratory research and testing data obtained as part of control and surveillance activities, production laboratory control, as well as operational, technological and other documentation used in the implementation of production activities can be used.

When analyzing the actual working conditions in livestock enterprises, special attention should be paid to allergens, carcinogens and substances that affect the respiratory system and reproductive function of workers, the characteristics of the microclimate and the severity of work.

When conducting preliminary and periodic medical examinations (PME) of livestock workers, the medical commission, in addition to a general practitioner, a psychiatrist and a narcologist, must include: otorhinolaryngology, a neurologist, a dermatovenerologist, and a surgeon. According to indications (recommendations of the specialists listed above) - allergist, oncologist, ophthalmologist, dentist.

All potential employees and persons serving animals must undergo the following laboratory and functional tests during mandatory medical examinations:

-Clinical blood test (hemoglobin, color index, red blood cells, platelets, leukocytes, leukocyte formula, ESR);

- clinical urine analysis (specific gravity, protein, sugar, sediment microscopy);

- biochemical screening: blood serum levels of glucose, cholesterol;

- thermometry;

- electrocardiography;

- chest x-ray in 2 projections (direct and right lateral);

- spirometry;

- biomicroscopy of the eye.

According to indications (recommendations of medical specialists) - sputum microscopy, mycological studies, determination of bilirubin levels, AST, ALT, GGTP,

“cold” test, rheovasography (or ultrasound examination) of peripheral vessels, examination of the anterior segment of the eye. All female workers must be examined by an obstetrician-gynecologist with bacteriological (for flora) and cytological (for atypical cells) examinations at least once a year. Women over the age of 40 are required to undergo mammography or ultrasound of the mammary glands once every 2 years.

A medical organization conducting mandatory medical examinations must have complete information about the health status of the future employee (an outpatient medical record or an extract from it with the results of periodic examinations at the place of previous work).

Taking into account the peculiarities of working conditions in animal husbandry, the multicomponent nature and synergy of industrial hazards that can, with prolonged exposure, lead to the formation of persistent, including occupational, pathology of the respiratory system, when conducting preliminary medical examinations, it is necessary to pay attention to the presence of additional factors in those entering work that increase risk of developing respiratory diseases:

- congenital malformations or acquired deformations of the respiratory system, complicating external air exchange;

- presence, frequency and duration of temporary disability due to acute and chronic diseases of the respiratory system (acute respiratory diseases, chronic bronchitis, COPD, chronic pneumonia, bronchial asthma), accompanied by a decrease in external respiratory function;

- unfavorable heredity (chronic diseases of the respiratory system in parents, brothers and sisters), genetic factors (alpha1-trypsin deficiency);

- smoking tobacco;

- household pollutants and susceptibility to them;

- malnutrition, low body weight.

If there are additional risk factors for the development of respiratory diseases that are not direct contraindications to working in livestock enterprises, it is necessary to conduct an explanatory conversation about the possibility of the risk of developing respiratory diseases in the proposed workplace. If such a significant additional risk factor for the development of dust pathology of the lungs as smoking is identified, a preventive conversation must be held to encourage giving up this bad habit. Also, the occupational pathologist participating in the preliminary (or periodic) medical examination is obliged to inform the potential employee about the nature of long-term occupational health risks when working in contact with animals, familiarize him with the early manifestations of occupational ABD, measures of individual protection against the negative effects on health of harmful production factors.

Thus, the main task of primary medical prevention of the risk of developing occupational ADD in livestock workers is strict selection into the profession, carried out in the process of preliminary medical examinations.

At the stage of secondary medical prevention of occupational respiratory diseases among livestock workers, the main role is given to PMO.

Based on the results of the PME, data on the employee’s membership in one of the dispensary groups, determined based on the employee’s health status in accordance with Order of the Ministry of Health of the Republic of Uzbekistan dated 02/04/2010 No. 55n (as amended on 03/03/2011), must be entered into the medical record.

When forming a dispensary group at risk of developing occupational AML, we recommend using the following criteria:

- work experience under conditions of combined exposure to toxic, dust factors and unfavorable microclimatic conditions with heavy physical activity for over 10 years;

- frequent (at least 3 cases of temporary disability due to acute respiratory diseases per calendar year) and long-term (40 or more days of disability due to diseases of the bronchopulmonary system) sick, convalescents due to acute pneumonia (during the year);

- acute poisoning with irritating gases in the past;

- smoking index ≥ 160 packs/year

- persistent complaints of cough (of varying intensity), shortness of breath over the past year;

- the presence of clinical and functional lesions of the upper respiratory tract (rhinitis, pharyngitis), initial manifestations of emphysema, changes in certain indicators of external respiration function, radiological signs of pulmonary fibrosis in the absence of clinical and functional changes, disturbances in hemodynamic parameters.

Depending on the functional state of the respiratory system and the severity of the disease among individuals at risk of developing respiratory system diseases, we recommend distinguishing three functional subgroups:

A - persons with a compensated course of the disease and rare exacerbations leading to minor loss of ability to work;

B - persons with a compensated course of the disease, frequent exacerbations and prolonged disability;

C - persons with a decompensated course of the disease, irreversible processes in the bronchopulmonary system leading to permanent disability.

Regardless of their profession and work experience in animal husbandry, all workers included in the risk group are subject to examination at least once a year, and if their health deteriorates and symptoms of occupational pathology of the respiratory system appear - 2-3 times a year (depending on their state of health) . For all persons under dispensary observation, individual plans of treatment and preventive measures must be developed, an important place among which should be occupied by individual smoking cessation programs, especially with a high probability of risk of developing chronic bronchitis and chronic obstructive pulmonary disease.

Trained livestock breeders engaged in work with harmful and (or) dangerous working conditions for 10 years or more must undergo PME in the conditions of pathology centers (CP) at least once every five years.

At the same time, information about low levels of harmful production factors based on the results of the latest workplace certification carried out by the employer cannot be a basis for refusing to conduct mandatory medical examinations in a family clinic, because in modern conditions, as a rule, they have a complex, combined effect on the body, increasing the risk of the worker's health. In addition, it is necessary to take into account that recently occupational diseases have been identified in steeled workers, the duration of development of which is estimated in decades, and the formation of occupational pathology is due to the hygienic characteristics of previous harmful working conditions, which cannot be covered by the current results of workplace certification.

Workers with symptoms of an occupational disease identified during PME must, in the prescribed manner, be sent by the medical organization that carried out the PME, upon self-referral - by the attending physician (occupational pathologist), to the occupational pathology center for consultation, in-depth examination and treatment in a hospital setting, as well as expert assessing the relationship of the disease with the profession.

Thus, the labor activity of livestock workers takes place under conditions of uncomfortable temperature conditions, elevated levels of relative humidity and air speed, with constant contact with opportunistic and pathogenic microflora. The air of the working area is constantly polluted with gaseous impurities - products of animal waste, decomposition of plant residues of feed and excrement, organic dust of animal and plant origin, which may include antibacterial, enzyme and protein preparations, growth stimulants, microorganisms and disinfectants.

The work activity of livestock breeders is characterized by emotional stress, excessive physical and static stress when performing manual work, performing work operations in uncomfortable forced body positions with prolonged orthostasis and transitions.

In this regard, timely comprehensive prevention (organizational, technical, administrative, legal, medical and preventive measures) of occupational respiratory diseases and adequate medical and social rehabilitation of livestock workers, based on the principles of continuity, continuity and phasing of medical supervision and provision of primary and specialized occupational pathological care.

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