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HYGIENIC ASSESSMENT OF FACTORS AFFECTING WORKING CONDITIONS AT MEAT PRODUCTION ENTERPRISES

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Abstract: The development of livestock, poultry, and equestrian industries has become a priority of state policy, aiming to provide the population with high-quality meat, dairy, and other livestock products in the Republic of Uzbekistan. These industries are essential for ensuring food security, creating jobs in agriculture, and improving rural livelihoods. Expanding these sectors supports increased production volumes, enhanced export potential, and bolstered competitiveness in global markets.

This study focuses on improving working conditions and protecting the health of workers in meat production enterprises. It analyzes the working environment in livestock, poultry, and equestrian industries, highlighting health risks and proposing optimization measures to protect workers.

Key words: Meat production, working conditions, health protection, livestock, poultry, equestrian industry, worker health, risk factors, optimization.

INTRODUCTION

The meat processing industry in Uzbekistan is one of the important sectors of the economy and plays a significant role in ensuring food safety for the population. However, this sector also faces the risk of production-related injuries and occupational diseases. Particularly, improving working conditions for workers in small and medium-sized meat processing enterprises is one of the urgent issues.

In meat processing workshops, high noise levels in the workplace are a significant harmful factor, which is a pressing issue for Uzbekistan as well. Noise can negatively impact the cardiovascular system, gastrointestinal function, and central nervous system. Additionally, long-term exposure to noise reduces labor productivity and negatively affects economic efficiency.

Improving labor conditions and reducing noise levels in meat processing enterprises in Uzbekistan is essential not only for protecting workers' health but also for enhancing the efficiency of the production process. To achieve this, it is necessary to introduce modern technologies, use protective equipment, and train workers on safe working practices. This approach is not only socially important but also contributes to economic development.

Agriculture is the most crucial sector that defines the standard of living, well-being, and food security of the country. Optimizing labor conditions in agricultural production and ensuring their implementation is of great importance. This allows workers to maintain high productivity levels, which is achieved while considering the worker's psychophysiological health. Furthermore, it helps increase labor productivity in

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agricultural enterprises, which influences the overall economic efficiency of agricultural production [3,4].

Working in poultry farms is characterized by high physical and emotional stress and unfavorable microclimatic conditions. The air in the working zones contains chemical compounds, mixed dust from plant and animal origin, biologically active substances, and various microorganisms. Furthermore, low lighting levels and high noise levels are also observed in production technological areas [7,8].

Operators and workers in feed preparation departments of poultry enterprises experience high physical strain. Numerous studies show that workers in livestock farms are at high risk of developing various inflammatory diseases. The presence of saprophytic microorganisms in the air at the workplace is currently considered as an independent harmful biological factor in the work environment. Additionally, in the structure of occupational diseases, the impact of various aerosols and chemical allergens predominates, while the negative effect of biological factors is almost negligible [9,10].

In meat processing and meat food storage enterprises, labor conditions, specific characteristics of the sector, the complexity and diversity of technological processes, and the peculiarities of equipment operation pose certain risks to workers.

The hygienic nature of labor in livestock farming lies in the potential emergence of diseases that can be transmitted from animals to humans. The industrialization of animal husbandry and the use of biological products (antibiotics, feed yeasts, protein-vitamin concentrates, amino acids, vitamins) have led to the emergence of new types of occupational diseases associated with the impact of biological preparations and microorganisms, including certain thermophilic actinomycetes' spores, used in feed additives [11,12].

Research indicates that the working conditions in equine industries correspond to class 3.2 based on the general evaluation. In the structure of chronic non-infectious diseases, diseases of the musculoskeletal system occupy a leading position. This is related to the heavy nature of the work and relatively high injury risks. Lipid and carbohydrate metabolism disorders have also been identified, confirming the need for laboratory tests to detect vascular diseases early [10,13].

Poultry complexes are mechanized. The technological process includes operations such as feeding birds, veterinary treatment, removing bird droppings, and sorting eggs. In poultry farms, cattle feeders and conveyors are used for egg collection and room cleaning. During work with poultry, the main harmful factors of production include negative microclimatic conditions, dust levels, air contamination with ammonia, hydrogen sulfide, carbonic acid gases, high noise levels in certain technological areas, and bacterial contamination of the air in the working zone [5,6].

Research by Shirokov Y.A (2017) shows that the most toxic and continuously present substance in poultry housing is ammonia. Clinical and experimental observations have revealed that even small concentrations of ammonia lead to the development of pathologies in various organs and systems of the human body. If ammonia is present at concentrations at the permissible limit (20 mg/m^3) in the workplace, it can lead to a decrease in brain bioelectrical activity, anosmia (loss of smell), a reduction in the level of ascorbic acid in the blood, and a slowdown in the excretion of uric acid.

Purpose of the Study

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To identify the main factors influencing the working conditions of employees in meat processing enterprises, particularly in the fields of livestock breeding, poultry farming, and horse breeding, and to provide a hygienic assessment of these factors. The study will examine how negative factors in these sectors (such as microclimate, noise, chemical substances, and biological hazards) affect the health of workers. Additionally, the research will analyze the specific characteristics of optimizing workplaces, improving labor productivity, and maintaining workers' health. In order to achieve this objective, the study will develop recommendations for reducing risks and improving working conditions in these workplaces.

METHODS

In the study, the following materials and methods are used to hygienically assess the main factors influencing the working conditions of employees in meat production enterprises: In particular, in the analysis of working conditions in meat production enterprises, especially in the livestock, poultry, and horse breeding sectors, necessary equipment and materials for measuring microbial, chemical, and physical factors (noise measurement devices, laboratory test materials for microorganisms, gas analyzers for measuring chemical substances in the air, etc.) were used.

Medical records and statistical materials are collected to study the health of workers, occupational diseases, and morbidity indicators.

Through the hygienic assessment method, the microclimate in the workplace (air temperature, humidity, gases, dust, and the amount of other substances in the air) is measured and evaluated. In addition, statistical analysis, sociological surveys, and laboratory research methods are widely applied.

RESULTS AND DISCUSSION

Agriculture comprises two main branches: crop production and livestock farming, with livestock further divided into sub-sectors such as cattle breeding, equestrian activities, and poultry farming. Employees in livestock complexes often face challenging physical working conditions.

In Uzbekistan, the livestock sector operates in various fields, including dairy, beef, poultry, egg production, and equestrian industries. By July 1, 2024, the total number of horses in all types of farms in Uzbekistan reached 274,118, an increase of 2.5% compared to the same period in 2023. The growing trends include productive horse breeding, sports equestrian activities, and therapeutic applications like hippotherapy.

As of January 1, 2024, the total number of cattle in Uzbekistan reached 14.1 million heads, a 2.1% increase from 2023. Poultry numbers grew to 103 million, up 5.8% year-over-year.

Preliminary analyses indicate that harmful factors such as production noise, aerosols with fibrogenic effects, and chemical substances like ammonia, methyl mercaptan, and hydrogen sulfide significantly impact workers' health in livestock complexes. Adverse microclimatic conditions, as well as the physical strain and intensity of work, are also identified as major contributors to occupational diseases.

Efforts to study the working environment and processes in each livestock sub-sector are vital for safeguarding worker health and improving workplace conditions. This research thoroughly examines the effects of suboptimal factors in horse breeding, cattle farming, and poultry industries, offering critical insights and recommendations for improvement.

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In horse breeding, most of the work is carried out during daylight hours, which can span from 5 AM to 11 PM during the summer. The primary harmful factor in this occupation is the physical labor intensity. The weight of the loads being lifted and moved can reach up to 40-50 kg. There are also static loads, such as the need to walk horses in a special "track" for extended periods after running. One of the labor-intensive processes in horse breeding is manual milking of mares, which is done every two hours [4,5,6].

As shown in Table 1, in the conditions of horse breeding complexes, lifting and moving loads exceed the permissible limits by 1.2 times for men and 1.4 times for women, which leads to high labor intensity, categorized as class 3.2. Movement distances also exceed the norm by 1.4 times, increasing the level of fatigue among workers. The noise levels were found to be 1.05 times higher than the permissible norm, and dust concentrations were 2-2.5 times higher than allowed, further indicating the challenging working conditions [1,2,12].

Table 1

Hygienic Assessment of Working Conditions for Employees in Horse Breeding

№	Work Environment and Labor Process Factor	Maximum Permissible Indicator	Actual Indicator	Labor Condition Class
1	Labor Intensity			3.2
2	Load lifting and moving (with rotation of other tasks):	Men < 30 kg, Women < 10 kg	Men < 36 kg, Women < 14 kg	
3	Movement in Relation to the Process, Horizontal Distance, km	10 km	14 km	3.2
4	Noise, Equivalent Level, dB(A)	80	80-84	2
5	Microclimate Parameters of Production Rooms	40-60	70-79	2
6	Dust Concentration, mg/m³	4	8-10	2
7	Overall Labor Conditions Assessment			3.2

Air contamination in the workplace with dust and aerosols originating from plant and animal sources is considered an important hygienic issue. This situation is mainly observed during the feed distribution and horse cleaning processes. Other factors in the work environment and labor processes, such as noise and microclimate conditions in production rooms, are also commonly encountered in workplaces. However, in typical situations, their indicators remain within the established hygienic standards, which reduces the likelihood of negative effects.

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The analysis of the chemical composition of the air in production facilities shows that, if strict adherence to animal care technology is maintained (such as proper functioning and calibration of ventilation systems, timely cleaning of sewage channels, etc.), the ammonia levels often fluctuate between 0.5 and 18.0 mg/m^3, where the standard permissible concentration (SPC) is 20 mg/m^3. However, during animal care operations or when veterinary service staff work in the zones, the ammonia concentration was found to reach 23-25 mg/m^3, above the standard. The hydrogen sulfide level was found to be between 3-5 mg/m^3, which does not exceed the established SPC of 10 mg/m^3.

The production cycle in poultry factories consists of the following stages: obtaining incubation eggs from parent (breeding) flocks, incubating the eggs and hatching day-old chicks, growing the chicks, and producing the main products (eggs, commercial, and breeding poultry).

The condition of production facilities is largely dependent on the method of poultry maintenance. The most common methods of poultry keeping are as follows:

The storage of poultry in poultry factories can involve methods such as keeping them on bedding, in cages, or on slatted floors. In the cage system, although there are significant opportunities for mechanizing service operations and increasing labor productivity, the dense housing of poultry in confined spaces increases the risk of zoonotic diseases.

The development of poultry farming relies on the construction of buildings such as poultry houses, incubation rooms, and engineering service units, including: automobile transport shop, technological equipment repair shop, heating and water supply shop, electricity supply shop, cooling equipment section, biological waste treatment facilities section, and others.

In some production facilities, the microclimate parameters do not meet hygienic standards. Based on laboratory results, the relative humidity in breeding units reached 100%, while the temperature in incubator rooms was found to be 30°C and in the feed preparation rooms during the cold season, 7°C below the norm.

In the work zone air, the amount of dust originating from plant and animal sources in the feed preparation areas exceeded hygienic norms, reaching 8.0–10.0 mg/m^3. The dust composition in animal husbandry complexes may be broader due to the use of plant and animal products as raw materials in compound feed production, such as grains, bone and fish meal, antibiotics, vitamins, and other components.

In poultry farms, the significant harmful factors in labor processes for poultry keepers are the intensity and weight of the work. This is because keeping poultry, especially on bedding or slatted floors, involves numerous manual tasks. Additionally, an increase in noise levels has been noted in buildings designed for raising young chicks and for the maintenance and repair of industrial poultry flocks. The main source of noise is often the birds themselves, especially in cage systems (as shown in Table 2).

In many cases, zoo veterinary and veterinary service workers perform their tasks under similar working conditions as the main production workers. However, there may be instances where the intensity of the labor increases, and certain elements of their tasks may differ due to their profession-specific characteristics.

When performing a hygienic assessment of the working conditions in poultry factories based on labor intensity, it was found that

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workers, during their horizontal movements related to the technological process, cover a distance of 12 km, which is greater than the permissible norm of 8 km. This means that workers must cover large distances related to technological processes, which increases the labor intensity and results in additional physical strain. As a result, the working conditions class is rated as 3.1.

The permissible noise level is 80 dB, while the actual indicator is 87 dB. The noise level exceeds the norm and can have harmful effects on workers. Prolonged exposure to high noise levels, in particular, can pose a risk to hearing health, which is why the working conditions class is rated as 3.2.

Table 2

Hygienic assessment of working conditions for main occupational workers in poultry farms

№	Environmental Factors & Labor Process	Permissible Normative Indicators	Actual Indicators	Working Conditions Class
1	Labor Intensity	Horizontal movement related to the technological process, km	< 8	< 12
2	Noise, equivalent level, dB(A)	80	87	3.2
3	Microclimate of production buildings	According to permissible parameters	Cooler in winter	3.2
4	Harmful chemicals	Ammonia, mg/m³	20.0	21.4
		Hydrogen sulfide, mg/m³	10.0	6.0
5	Dust with plant and animal origin (silicon dioxide 2–10%; grain dust), mg/m³	4.0	10.0	3.1
6	General Assessment of Working Conditions			3.3

The permissible noise level is 80 dB, while the actual indicator is 87 dB. The noise level exceeds the norm and can have harmful effects on workers. Prolonged exposure to high noise levels, in particular, can pose a risk to hearing health, which is why the working conditions class is rated as 3.2.

Compliance with permissible microclimate parameters: In this case, the microclimate norms indicate that a cooling system should

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be in place during the cold season. A cold microclimate can have an uncomfortable effect on workers, which raises the overall working conditions class to 3.2.

Permissible norm: 20 mg/m^3, Actual indicator: 21.4 mg/m^3. The ammonia concentration in the air exceeds the allowable level. High ammonia levels can be harmful to the respiratory system, which lowers the working conditions class to 3.1.

Permissible norm: 10 mg/m^3, Actual indicator: 6.0 mg/m^3. The hydrogen sulfide level is within permissible norms, and this chemical has a relatively lower impact on working conditions.

Dust from plant and animal origin (with 2-10% silicon dioxide content, grain dust). Permissible norm: 4 mg/m^3, Actual indicator: 10 mg/m^3. The dust level exceeds the norm and can contribute to respiratory diseases, raising the working conditions class to 3.1.

The overall assessment of the working conditions for workers in poultry farms results in a classification of 3.3, indicating relatively heavy working conditions. Several factors, such as high noise levels, harmful chemicals, and dust, exceed the permissible limits and pose health risks.

Summary of working conditions in animal production: across all types of animal production, the main occupations are characterized by similar harmful factors. These factors include labor intensity, unfavorable microclimate parameters, dust from plant and animal origin, organic harmful substances in the air, and production noise.

In general, the working conditions for the main occupational groups in all meat production enterprises are similar. However, in poultry production, the harmful factors and labor process are rated with an overall assessment of 3.3, while in other productions, the rating does not exceed 3.2 (Table 3).

As seen in the table, when evaluating the working conditions indicators by production type, it is determined that in the horse breeding complexes, the noise level is rated 2.0, plant and animal-origin dust is rated 3.1, harmful substances (ammonia and/or others) are rated 2.0, work intensity is rated 3.2, and the microclimate in production facilities is rated 2.0. The overall working conditions rating is 3.2.

In the case of cattle breeding complexes, the noise level is rated 3.1, plant and animal-origin dust is rated 2.0, harmful substances (ammonia and/or others) are rated 2.0, work intensity is rated 3.1, and the microclimate in production facilities is rated 3.2. The overall working conditions rating is 3.2.

Table 3

Harmful factors and working conditions classification in meat production enterprises

№	Production Type	Noise	Plant and Animal-Origin Dust	Harmful Substances (Ammonia	Work Intensity	Microclimate in Production Facilities	Overall Working Conditions Rating

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				and/or Others)			
1	Horse Breeding	2.0	3.1	2.0	3.2	2.0	3.2
2	Cattle Breeding	3.1	2.0	2.0	3.1	3.2	3.2
3	Industrial Poultry	3.2	3.1	3.1	3.1	3.2	3.3

In the case of cattle breeding complexes, the noise level is rated 3.1, plant and animal-origin dust are rated 2.0, harmful substances (ammonia and/or others) are rated 2.0, work intensity is rated 3.1, and the microclimate in production facilities is rated 3.2. The overall working conditions rating is 3.2.

In industrial poultry, the noise level is rated 3.2, plant and animal-origin dust is rated 3.1, harmful substances (ammonia and/or others) are rated 3.1, work intensity is rated 3.1, and the microclimate in production facilities is rated 3.2. The overall working conditions rating is 3.3.

In all the meat production enterprises studied, in addition to the main professions, auxiliary professions are also widespread. Among them, workers involved in cleaning the production buildings and maintaining technological equipment take a leading position. Additionally, the auxiliary professions group includes those involved in producing koumiss in horse breeding, workers responsible for the hallways, as well as staff in the processing departments of poultry production.

The employees mentioned often work in similar or identical production facilities or need to be in these areas periodically as part of their duties. However, they have less direct contact with animals during their work processes, which results in a relatively lower exposure to harmful factors from the working environment and the load on their bodies. Additionally, the level of exposure to microorganisms that contaminate the air in the working area and surfaces tends to be somewhat lower.

Another group of employees within these organizations interacts with harmful production factors, including microbiological factors, only on an episodic basis, meaning their exposure occurs temporarily when they need to be on the company premises. This group mainly includes administrative staff located on the enterprise grounds. In practice, their working conditions are considered acceptable in terms of most hygienic parameters.

CONCLUSION

1. In meat production enterprises, the primary harmful factors at workers' workplaces are plant and animal-origin dust (accounting for 24% of the total harmful factors) and biological agents (21.4%). Following these are the workload, harmful substances, and noise (each accounting for 14.3%), with the microclimate being observed at 11.4%. The most hazardous working conditions are noted for workers engaged in poultry (3.3 class) and pig farming (3.2 class). Workers involved in horse and cattle breeding have working conditions classified as 3.1 class. The technologies used in modern livestock complexes do not ensure safe working conditions, taking into account the impact of environmental factors in the workplace and

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contamination of the air with conditionally pathogenic microorganisms.

2. Among the livestock complex workers, a high prevalence of non-contagious diseases was identified (each worker has between 3 and 7 diseases), confirmed by the results of in-depth medical examinations. The most common diseases among workers involved in horse, cattle, and pig breeding are musculoskeletal system diseases (affecting 67.5 to 72.9 per 100 workers examined). For workers in poultry farming, digestive system diseases are the leading health issues, affecting 83 per 100 workers examined. The prevalence of diseases affecting the nervous system, circulatory system, and respiratory organs varies between 12.5 to 42.8 per 100 workers examined.

REFERENCES

1. Alekseeva N. A. et al. Methodological support for analytical work in dairy farming enterprises //Economics of the 21st Century: Analysis of World Practices. – 2015. – Pp. 170-209.
2. Davydova R. Features of safety requirements for meat processing enterprise equipment in Germany //Meat Technologies. – 2014. – No. 4. – Pp. 18-22.
3. Kalimov R. M. Features, factors, and directions of development in livestock industries under modern economic conditions //Herald of Economics, Law, and Sociology. – 2011. – No. 4. – Pp. 68-72.
4. Kazambaev A., Aisheva G. Factors influencing the reduction of meat and meat product cost, considering industry and regional specifics //Problems and Challenges of Regional Economy in the Context of Globalization. – 2019. – Pp. 254-260.
5. Khadjaeva U., Rashidov V. Features of the hygienic conditions of work for poultry farm workers // Society and Innovations. – 2023. – Vol. 4. – No. 9/S. – P. 59-61.
6. Khudyakov A. N., Shulga L. V. Some aspects of optimizing the working conditions of milk machine operators on dairy farms //Actual Problems of Ecology and Labor Protection. – 2016. – Pp. 163-170.
7. Kublin I. M., Yeremeev M. A., Plekhanov S. V. Qualitative changes in labor in the context of production digitization //Industry: Economics, Management, Technologies. – 2019. – No. 1 (75). – Pp. 65-69.
8. Kuzlyakina Y. A., Yurchak Z. A., Bashamzhieva B. D. Legislative requirements for ensuring labor safety at meat processing enterprises //All About Meat. – 2019. – No. 1. – Pp. 12-17.
9. Malgin E. L., Shemetova E. G. Features of ensuring labor protection in meat processing enterprises //Ecology. Risk. Safety. – 2020. – Pp. 258-260.
10. Masyagutova L. M. et al. Working conditions and health status indicators of horse breeding workers // Labor Medicine and Human Ecology. – 2018. – No. 4 (16). – P. 83-88.
11. Smirnova E. A., Postnova M. V. Approaches to evaluating labor productivity in municipal districts of the Ulyanovsk region //Agricultural Bulletin of the Upper Volga Region. – 2018. – No. 1. – Pp. 71-78.
12. Talieva G. N. et al. Hygienic assessment of air pollution in the production rooms of food enterprises //Acta Biomedica Scientifica. – 2009. – No. 1. – Pp. 299-301.
13. Zakrevskaya T. V. et al. Industrial sanitation and hygiene in the meat industry. – 2020.