

ASSESSMENT OF WORKING CONDITIONS IN FOOD INDUSTRY COMPANIES – CASE STUDY

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Purpose: The aim of this publication is to present an analysis and assessment of working conditions in selected food industry enterprises.

Design/methodology/approach: The research was conducted in three stages: (a) surveys with employees of individual production departments, (b) focus interviews with management staff and occupational health and safety specialists, (c) observations combined with video recording and photographic recording of production processes.

Findings: This article presents an assessment of working conditions in meat processing enterprises. Working conditions are a key element in every organization, regardless of its nature, scale of operations or location. Their quality has a significant impact on the level of employee satisfaction and may determine their motivation and commitment. Improper working conditions, such as excessive noise, poor lighting or ineffective work organization, can negatively impact employees, leading to stress, fatigue, loss of productivity and an increased risk of accidents and occupational diseases. Further research in this field is necessary to further improve working conditions in the food industry and to increase the competitiveness of enterprises in this sector.

Originality/value: The results obtained may be a valuable source of information for other manufacturing companies that are looking for solutions to their own problems.

Keywords: working condition, food company, musculoskeletal system.

Category of the paper: Case study.

1. Introduction

The food industry in Poland covers a very wide area of activity and is characterized by a large number of small plants. The food industry deals with the processing of animal products (e.g. meat or dairy industry), the processing of plant products (e.g. fruit and vegetable industry, cereal and pasta industry), manufacturing processing (confectionery, soft drinks, bakery industry, food concentrates, feed) and production stimulants (alcohols).

Nowadays, in every enterprise, human resources are the most valuable and important asset of the organization (Kosieradzka et al., 2022). Therefore, for the employer, the development of the occupational health and safety system is an important issue in the organization of the work environment (Lis et al., 2017; Santos et al., 2015; Bartnicka et al., 2020). With the well-being of employees in mind, the work environment should be shaped taking into account subordinates' expectations regarding safety and comfort of work (Siemieniuch et al., 2015), as well as creating a good atmosphere, which has a positive impact on professional satisfaction (Zare et al., 2020). A measurable parameter of human homeostasis in the production process, understood as working conditions acceptable to society, is the level of occupational risk related to the load on the musculoskeletal system and the associated risk of accidents at work and occupational diseases resulting from poor work performance and incorrect work organization (Wieczorek, 2014; Nowacki, 2019; Bartnicka et al., 2021).

Awareness of the benefits of properly designed working conditions in production is widespread. The results of studies assessing the health status of employees are used to adapt the work environment to human nature in order to ensure an appropriate level of health, friendly working conditions and increase efficiency while minimizing biological and social costs (Kok et al., 2019; Kolny et al., 2019; Zhang et al., 2014).

The aim of this article is to present the results of a study on the self-assessed health status of food workers, with a particular focus on the frequency and intensity of musculoskeletal pain. An additional aim is to indicate which segments of the musculoskeletal system are most frequently affected by pain and which activities performed during meat processing are most strenuous for workers.

2. Research methodology

The analysis of working conditions in food industry enterprises was carried out in the years 2020-2023 in selected 6 meat processing plants located in Poland. The research was carried out in three stages:

- surveys with employees of individual production departments,
- focus interviews with management staff and occupational health and safety specialists,
- observations combined with video recording and photographic recording of production processes.

The survey was conducted among randomly selected two employees representing the same job position in each company. The group of respondents consisted of 96 people, employed in the following departments/production units:

- warehouse,
- packing hall,
- smokehouse hall,
- production hall,
- tavern hall,
- curing hall,
- cutting hall,
- unloading hall.

The size of the representative sample was selected based on the interviewer's beliefs (Sztumski, 2020). The research was conducted in person in the presence of the interviewer, therefore a 100% return of the surveys was achieved. The survey questionnaire consisted of three parts:

- information for respondents about the purpose of the research,
- details characterizing the examined persons,
- basic questions, divided into two thematic groups.

The first group of questions related to the health condition of employees, the type, frequency and intensity of ailments in the musculoskeletal system, and in particular in the areas of:

- spine in the lumbar-sacral section,
- spine in the thoracic section,
- spine in the cervical section,
- wrists,
- shoulder-joint,
- hip-joint,
- knee-joint.

In relation to the indicated areas of the musculoskeletal system, respondents could choose from the following answers:

- no pain,
- rare occurrence of pain (once a week),
- frequent occurrence of pain (several times a week),
- daily occurrence of pain.

Additionally, respondents assessed the intensity of pain in the musculoskeletal system using a Likert scale, where 1 meant no pain at all and 7 meant severe pain (Kaczmarek, Tarka, 2013).

The second group of questions aimed to identify particularly burdensome activities in meat processing plants in terms of burden on the musculoskeletal system and to propose solutions to improve working conditions.

The next stage of the pilot research was to conduct focus interviews in individual plants. The person performing the research is a moderator of the discussion on working conditions and the nuisance of activities performed at workplaces, as well as possible solutions to improve

working conditions. The researcher and 5 people from each company took part in the focus interviews, i.e.:

- production director,
- production manager,
- maintenance manager,
- technological line service leader,
- occupational health and safety specialist.

All interviews were recorded on a voice recorder, and the moderator also wrote down in a notebook the observations that came to his mind during the discussion. The next stage of the pilot research was observation combined with video recording and photographic recording of selected work stations, the main goal of which was to become familiar with:

- organization of the production process (including the flow of raw materials, semi-finished products, and products),
- organization of work stations (including work rhythm and pace, work position, work space).

Additionally, metric measurements were made of selected workstations where many activities are performed manually.

The results from the survey questionnaire were entered into a Microsoft Excel spreadsheet containing a research matrix enabling quantitative analysis and statistical calculations. Information obtained from focus interviews and observational studies was collected in the form of descriptions, photos and video recordings. The results were presented in descriptive form (qualitative research) and graphically and in tables (quantitative research).

3. Results and analysis

In the analyzed group of 96 people, women constituted 29% and men 71%. The largest group of respondents, as many as 35 people (36%), were represented by people with work experience ranging from 2 to 5 years. 24 people (25%) represented employees with the shortest work experience, namely up to 2 years. The next place was taken by a group of 15 people (16%) with 6 to 10 years of work experience, and then a group of employees with the longest work experience, over 16 years - 14 people (15%). A slightly smaller group of people included 8 employees (8%) whose work experience ranged from 11 to 15 years. Based on information about the employee's weight and height, the BMI was calculated, which indicates whether the proportions of body weight in relation to height are appropriate (Fedewa et al., 2019). 48% of the surveyed people had a normal body weight, while 42% of the employees were overweight and 9% of the respondents were obese. In the group of people examined, one was underweight.

All respondents declared that they experienced pain with greater or lesser frequency, or with greater or lesser intensity, in at least one segment of the musculoskeletal system. A significant group of respondents declared that they suffered from pain around the lumbar-sacral spine (78%), around the shoulder-joints (70%) and around the wrists (70%). Detailed results are presented in Figure 1. The statistical analysis also included people with sporadic cases of pain in the musculoskeletal system.

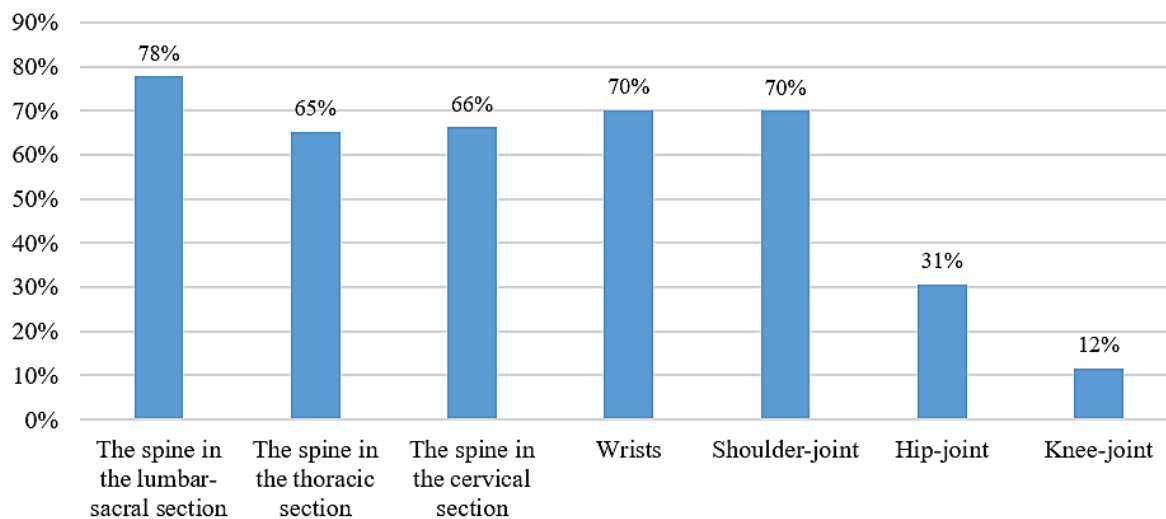


Figure 1. The structure of pain in the musculoskeletal system.

In addition, respondents determined the frequency and intensity of pain in individual segments of the musculoskeletal system. The percentages represent the percentage of employees who experienced pain every day, several times a week, several times a month, or no pain at all. The numerical values indicate the average pain intensity in particular frequency ranges. Detailed data are presented in Figure 2. In the case of the analyzed group of employees, we can talk about chronic pain with high pain intensity. The structure of illnesses shows that most employees experience daily spine pain with high intensity in the lumbar-sacral and cervical sections, as well as in the area of the wrists and shoulder-joints.

After taking into account the most common responses of respondents regarding the occurrence of pain in the segments of the musculoskeletal system (lumbar-sacral spine, shoulder-joints, wrists) and excluding from the calculations rare cases of discomfort in the musculoskeletal system, a detailed analysis was carried out. The percentages of individual bars express the percentage of employees at identified workplaces whose pain in the musculoskeletal system occurs every day or several times a week, as shown in Fig. 3. All people working in the warehouse, packing room and cutting room experience chronic back pain in the lumbar-sacral section. Additionally, Figure 3 shows numerical values that determine the average pain intensity declared by employees. Analyzing the static data, we can say that the least onerous working conditions occur in the unloading department and the smokehouse.

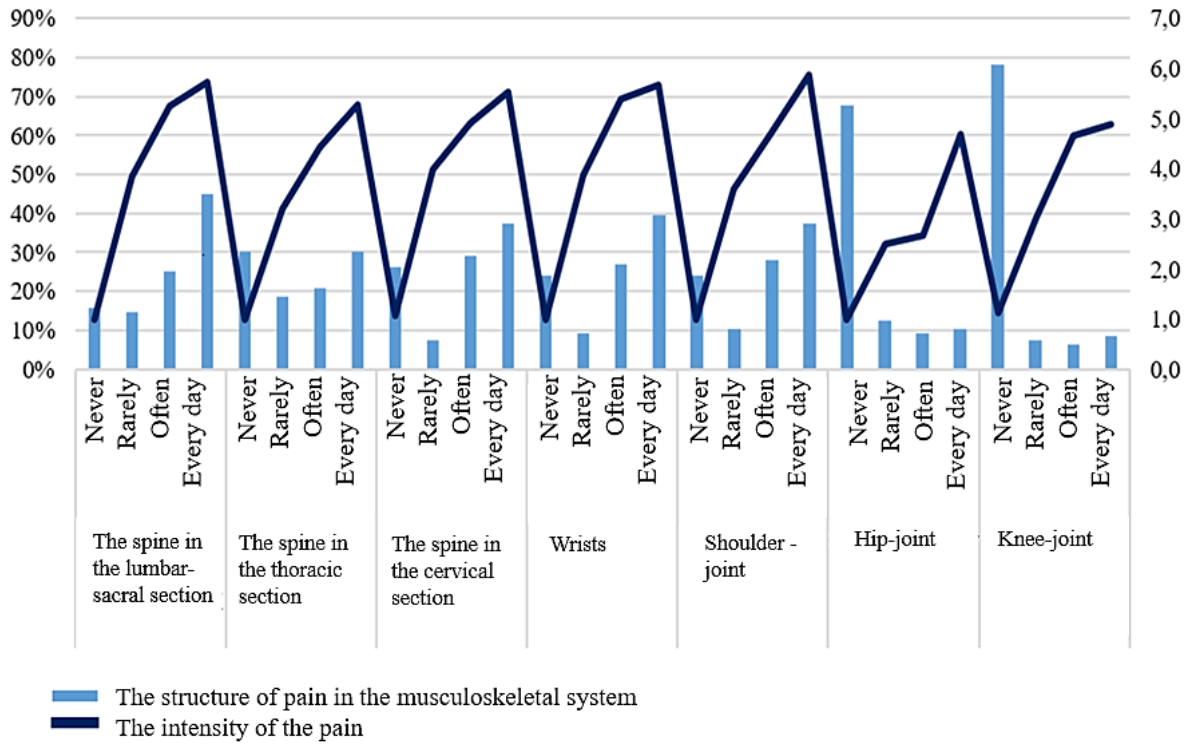


Figure 2. Structure of ailments within the musculoskeletal system, including the frequency and intensity of pain.

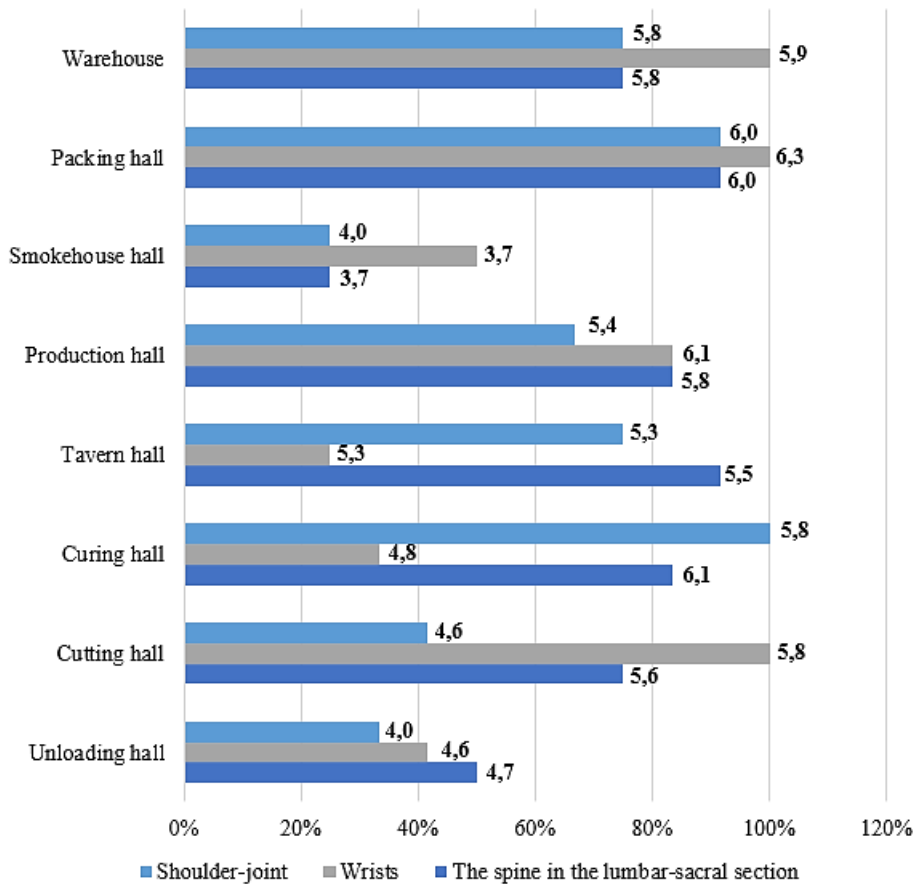


Figure 3. The structure of chronic pain in individual production cells.

The above conclusions regarding the relationship between pain in the musculoskeletal system and the way work is performed are approximate. Detailed research should be carried out on a larger research sample in enterprises representing various branches of the food industry.

The importance of further research into the burdensome working conditions in food industry plants is confirmed by the high percentage of people, 61%, who went to a doctor for advice due to musculoskeletal problems. Every second person participating in the survey took sick leave to treat musculoskeletal disorders. Moreover, with the increase in employment experience, an increased percentage of people using medical advice and sick leave was observed. The surveyed group of respondents was divided into 5 categories based on their length of service (Table 1).

Table 1.

Number of employees according to seniority

Employment experience in years	Number of respondents
until 2	24
from 2 to 5	35
from 6 to 10	15
from 11 to 15	8
over 16	14

The chart below (Fig. 4) shows the relationship between the percentage of people using medical advice and sick leave due to ailments of the musculoskeletal system and the length of service. There is a clear upward trend in the use of medical consultations and time off work as the length of service increases. Most people who sought medical advice received temporary leave from work. At least 80% of respondents with more than 5 years of work experience went to a doctor for treatment of musculoskeletal disorders.

In addition, employees were asked how they assessed their health condition (Fig. 5). The analysis of the collected material shows that the majority of employees assess their health condition as good (47.9%). It is worth noting that none of the employees assessed their health condition as poor.

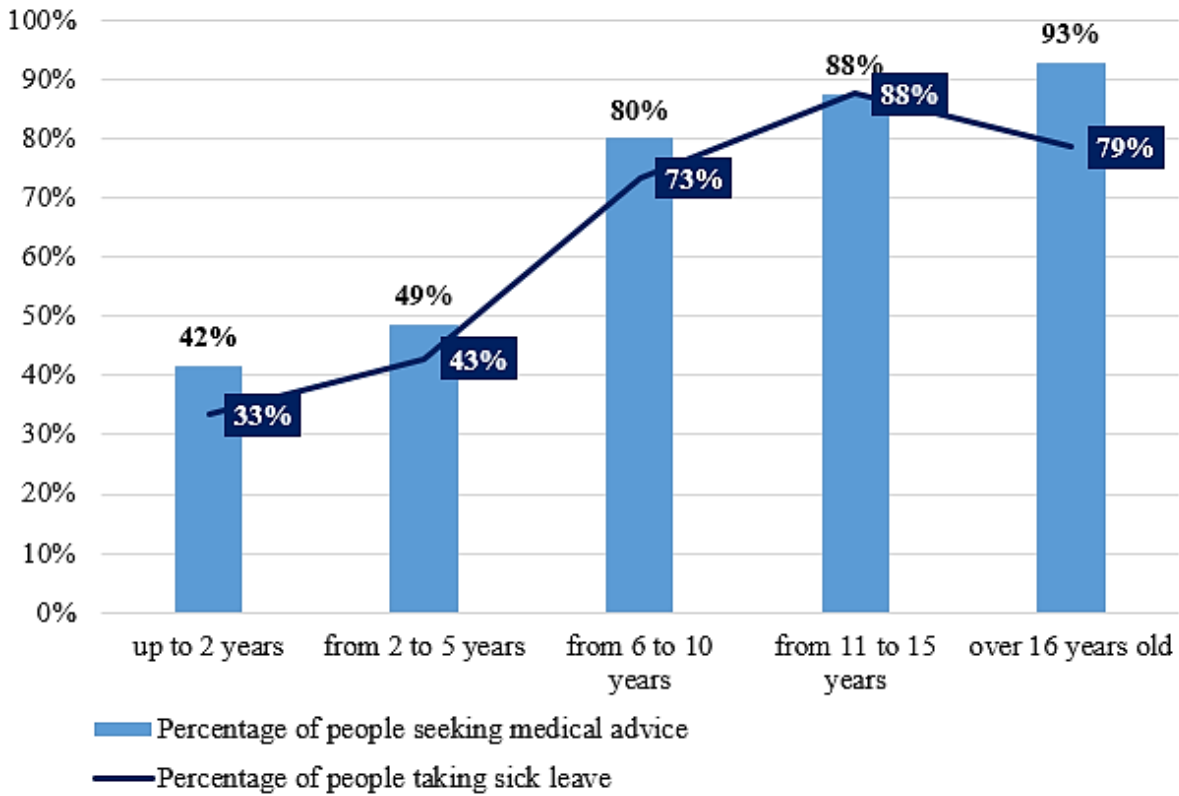


Figure 4. Chart of the relationship between length of service and the percentage of people using medical advice and sick leave.

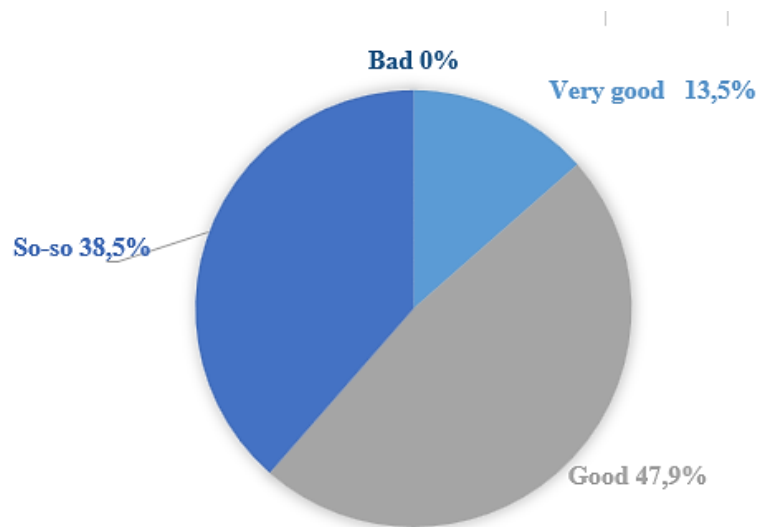


Figure 5. Employees' assessment of their health condition.

Further analysis regarding the causes of load on the musculoskeletal system was based on a group of open questions in the survey questionnaire and focus interviews. Based on their own professional experience, people participating in the research indicated positions at work and activities that they believed were burdensome. Although the diagnosis of working conditions was carried out in various meat processing plants, respondents identified the same burdensome activities, which in further research are representative and are performed in all analyzed enterprises. Table 2 presents a summary of the most burdensome activities performed during

professional work, which were verified by management staff and occupational health and safety specialists.

Table 2.

List of burdensome activities

No.	Activities identified by employees as burdensome
1	Movement of pork/beef carcasses
2	Standing work
3	Using a knife
4	Machine operation
5	Lifting and carrying (transporting)
6	Removing raw material from deep trolleys
7	Placing sticks with sausage bales onto the smoking trolley
8	Sealing cartons
9	Loading cars
10	Stacking cardboard boxes on a pallet
11	Removing block hams from molds
12	Meat classification
13	Vacuum packaging of finished products
14	Placing smoking trolleys into the ovens
15	Hall cleaning

During focus interviews, special attention was paid to activities performed that were dynamic and related to lifting, moving and putting down raw materials/semi-finished products/products and tools. Some of the tasks performed by employees in enterprises are static, such as operating a cutter, a smokehouse or a container washing machine. Moreover, the work of a meat cutter who stands at the table using a sharp tool for the entire shift was highlighted, which causes static load. Moreover, he is exposed to dynamic load caused by the displacement of meat elements and to psychological load due to the need for high concentration and precise, quick movements with a sharp knife, which increases fatigue.

The pilot research ended with a question about proposals for possible organizational and equipment improvements that would reduce the burden of work. The list of proposed improvements is presented in Table 3.

Table 3.

List of proposed organizational and technical improvements

No.	Suggestions for work improvements
1	More employees on a work shift - especially men
2	Training in safe work methods
3	Purchase of a pallet wrapper
4	Communication between manager and employees
5	Changing the arrangement of workstations in the production hall
6	Better technical condition of machines
7	Introduction of ergonomic mats
8	Expansion of the production line with an automatic packaging line
9	Implementation of Lean Management (5S system, Kaizen, VSM and others)
10	Equipment adapted to the employee's height
11	Modern machines
12	Introduction of scissor lift trucks

Cont. table 3.

13	Ergonomic work tools
14	Lifts
15	Reorganization of the workplace
16	Light roller trolleys for moving goods
17	Air-less hall cooling system
18	Smoke carts with electric drive
19	Roll pusher for moving film rolls

Many of the proposed improvements can be implemented in enterprises through organizational changes that require large financial outlays, such as changing the arrangement of workstations in the production hall or purchasing machines and equipment. However, organizational changes that do not require the involvement of financial resources were also presented, such as reorganization of the workplace or ensuring the proper technical condition of machines.

4. Conclusion

Currently, the need to improve working conditions in production processes and general human activity is still valid and important, especially since the galloping technological and service civilization requires the use of new and previously unknown means of work, and therefore ergonomic solutions adapted to them. Similarly, the demands of a competitive market to increase work efficiency force the need to look for new ways of working, and those uncontrolled in ergonomic terms may cause irreversible changes in the health image of specific professional groups. Shaping working conditions should therefore be consistent with all contemporary activities undertaken in all sectors of the economy.

In the companies surveyed, more than 70% of the employees surveyed experience pain in the lower back. Many tasks are performed in forced body positions, leading to musculoskeletal overload. These problems arise from both the routine performance of employees and the inadequate organisation of the workspace. In addition, key areas and activities that need improvement in the company have been identified.

Conducting further research is necessary to further improve working conditions in the food industry and increase the competitiveness of enterprises in this sector.

In addition, the results of the study can inform the development of a thematic scope for training in the prevention of WMSD (work-related musculoskeletal disorders) for meat workers.

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