

## Report from XIX International Symposium of Ergonomics, Work Safety and Occupational Hygiene in Agriculture - Practical Problems Related with Work Protection in Agriculture

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Received date: July 6, 2016; Accepted date: July 11, 2016; Published date: July 14, 2016

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### Commentary

The XIX International Symposium of Ergonomic, "Work Safety and Occupational Hygiene in Agriculture-Practical Problems Related with Work Protection in Agriculture" was held from 3-4 December 2012, at the Witold Chodźko Institute of Rural Health in Lublin, in which participated 89 researchers and practitioners from Poland and Ukraine. The Symposium was organized by the Institute of Rural Health in Lublin, in association with the Agricultural Social Insurance Fund-Agency in Warsaw, the Agricultural Property Agency-Agency in Warsaw, Polish Ergonomics Association-Agency in Lublin, Chief Sanitary Inspectorate in Warsaw, and the Trade Union for Agricultural Workers of the Republic of Poland in Warsaw. The President of the Organizational Committee was Prof. dr hab. n. med. Jerzy Zagórski, President of Ergonomics and Safety Commission of the International Association of Agricultural Medicine and Rural Health (IAAMRH); the Scientific Secretary was Prof. dr hab. Leszek Solecki, President of the Polish Ergonomics Association, Agency in Lublin.

The scientific programme of the Symposium consisted of 2 thematic sessions, which included 20 presentations:

I – Especially dangerous work activities in agriculture in the context of technical and technological progress.

II – Present and newly arising environmental hazards in agriculture.

Within the thematic Session I, 12 presentations were made, discussing work activities which are especially dangerous in agriculture, in the context of implemented technical and technological progress. The participants were familiarized with non-injury accident events as a basis for preventive undertakings in agriculture (Józef Cież). Studies by Heinrich showed that each accident resulting in injury is preceded by the occurrence of many similar events which do not cause injury. Therefore, for the purposes of prevention, it is more important to investigate the events which may lead to injuries, than the injuries themselves.

Ergonomic characteristics of contemporary agricultural tractors was performed (Paweł Kielbasa) with the power of 80-100 kW and 130-165 kW, from the aspect of their adjustment to the operators' requirements and meeting the required standards. Work conditions of operators of these tractors are comparable to those of the driver of a lorry, or even passenger care. It was also discussed how the implementation of new technologies in animal production affect work safety, based on an example of an Agricultural Conglomerate in Kietrz (Jan Lach). The method of prevention of accident events in association with the work performed was presented in a mechanical workshop in "Top Farms" Głubczyce Ltd. (Mieczysław Hanussek). A large amount of old, poorly

effective equipment was replaced by machines of the 21<sup>st</sup> century – large, powerful, and computerized. The X-tract system of monitoring of vehicles and machinery has been implemented, which helps to organize and increase the efficacy of the machines' work. Modern, however, unfortunately very costly machines, allow the attaining of previously unimaginable effectiveness. This costly equipment, while bringing technological progress, has also brought a considerable improvement in safety and working conditions. The possibilities of using quad vehicles in agriculture was also discussed (Piotr Choina) which may bring specified benefits, but also cause considerable risk.

The assumptions of a media campaign were presented entitled: 'Respect Life. Safe work on the farm', organized by the Chief Sanitary Inspectorate (Jakub Chojnicki). Analysis of accident rates in agriculture in recent years shows that the number of accidents in private farming is maintained on a constant level (16,000-17,000 accidents), with a slight downward tendency. This means that in order to obtain a considerable improvement in the work safety of farmers, and reduce the number of occupational accidents, it is necessary to intensify educational and informative actions.

Based on statistical data possessed by the KRUS, accident rates in private farming were characterized (Renata Bielecka). In 2011, 25,772 accident events were reported to the KRUS, 16,574 one-time allowances were paid for health loss or death at agricultural work (including 81 fatal accidents). The majority of accidents were events of three types: human falls, being captured and hit by mobile parts of machinery and tools, and being hit, crushed or bitten by animals. Based on the analysis of causes and circumstances of accidents and occupational diseases, the directions of preventive activities by the KRUS are specified, as well as undertakings adequate to the causes and circumstances of accident events on behalf of the reduction of accidents and occupational diseases among farmers.

Accident risk in raising and breeding farm animals was discussed (Krzysztof Bielecki). Accidents of the group 'being hit, crushed and bitten by animals' constitute approximately 12-13% of accident events reported to the Agricultural Farmers' Insurance Fund (KRUS). The majority of these accidents are noted during feed distribution, milking, cleaning of animal rooms in the presence of animals, and driving or loading of cattle onto means of transport. Analysis of accidents with the participation of animals shows that farmers possess insufficient knowledge in the area of animal physiology and psychology. The Farmers' Insurance Fund (KRUS) undertakes preventive actions concerning the safe tending of animals, imparts knowledge pertaining to their demands and behaviour, striving towards the elimination of accident risks.

The circumstances and causes of human falls on farms were also characterized (Zbigniew Rapacki). Since the beginning of the functioning of the Agricultural Farmers' Insurance Fund (KRUS) in 1991, falls are the most common accidents among farmers. The 2011 analysis of the causes and circumstances of accidents at agricultural work shows that most frequently falls occur on flat surfaces in household yards, while climbing and descending from ladders, during translocation in farm rooms, and getting out of tractors and agricultural machines. During the Symposium, Capko et al., from the Ukraine had two presentations. The first presentation concerned labour protection while using modern mobile agricultural technology. The safety of employees operating sets of agricultural machinery, to a high degree, depends on the period of safe exploitation of machines which is determined by standards, i.e. the period for which the machine is operated after the last guarantee servicing; reliability of instrumentation and factors of the production environment. The most frequent causes of accidents in agricultural production are incorrect actions and inadequate methods of performing work activities by unqualified employees, who had not been properly instructed in the area of labour protection. Safe work while performing mechanized processes of plant production is assured by adequate organization of work of assemblies and means of transport, proper technical state of machinery, and possession of auxiliary equipment for their regulation, operation, and cleaning of work tools.

(In the second presentation Capko et al., undertook the current problems of work hygiene in new technologies for the production of biofuels from agricultural raw materials. The development of alternative power engineering in the rural areas is among the State priorities in the Ukraine. It is based on the implementation on a wide scale of modern technologies and appliances for the production of biofuels. Biomass for power engineering purposes may be used directly in the process of combustion of timber, straw waste materials, sapropelic coal, and in a processed form – as a liquid fuel (oil esters, alcohol) or gas-biogas, i.e. a gas mixture the main component of which is methane. Modern technologies are accompanied by, typical for them, hazardous factors of the production environment. It was found that employees may be exposed to the joint effect of biological, chemical and physical factors, which increase the risk for their health. However, scientific studies conducted in recent years confirmed that the biological factor is the most important. The biological factor was produced in the component of organic dust and diverse microflora, among which dominated filamentous fungi, including the products of the metabolism of these fungi called mycotoxins.

Analysis of work activities performed at the Stud Farm Tld. in Janów Podlaski (Jarosław Żuk), showed that the most dangerous activities are related with the breeding and raising of animals. These work activities cover painful veterinary and breeding procedures of large livestock (horses, cows); riding and training horses for racing, sport, and cart horses; and mechanical disposal of manure from boxes and cages of small size, with the use of the loader of 'BOBCAT' type.

The thematic Session II during the Symposium (8 presentations), concerned the current and newly-arising environmental hazards in agriculture. Attention was paid to new hazards related with chemical plant protection in the light of recent changes in the European Union regulations (Ewa Matyjaszyk). In the last two decades, essential changes have taken place from the aspect of safety of plant protection products in the European Union, including Poland. Directive 91/414/EEC concerning the placing of plant protection products on the market stated that 'Whereas the provisions governing

authorization must ensure a high standard of protection, which, in particular, must prevent the authorization of plant protection products whose risks to health, groundwater and the environment and human and animal health should take priority over the objective of improving plant production'. In order to achieve this goal, the criteria of authorization of new active substances in plant protection, and the substances used to-date were reviewed from the aspect of their safety for humans, animals and the natural environment. The review ended in 2009 with the withdrawal of 74% from among 1,000 active substances used in the European Union. At present, further legal changes are being introduced: Directive 1107/2009 and Directive 128/2009 adopted by the European Union in 2009. Their implementation is aimed at the unification of regulations within the European Union, and further improvement of the safe use of plant protection products. Considering radical changes with respect to safety, cases of intoxication with plant protection products (e.g. consumption of the product by children or inebriated people, consumption of chemically treated cereals) happen mainly due to an extreme lack of responsibility.

In the environment of work of a farmer there occur several groups of hazardous chemical factors (Zdzisław Brzeski and Wojciech Sodolski). These risk factors include: plant protection products, mineral fertilizers, organic fertilizers, products of metabolism of breeding animals, and fumes from the engines of agricultural equipment. Chemical plant protection products belong to the most hazardous compounds to which farmers are exposed. The authors of the presentation familiarized the participants with the hazardous effect of these groups of chemical agents on the health of a farmer from the aspect of early, primary, secondary and health prophylactic actions, as well as prophylaxis of Phase III, i.e. inhibition of the progress of the disease and reduction of complications. They also discussed the mechanism of action of chemical substances, toxic effect on body organs and systems in acute and chronic intoxications.

The subsequent hazardous factor occurring in agriculture, which is not always appreciated, is natural ultraviolet radiation (Stanisław Marzec). The performance of work in agriculture is associated with the necessity of staying outdoors, frequently during the highest insolation, which results in great exposure to natural ultraviolet radiation (UV). Long-term, repeated exposure to UV leads to damage to the eyes and skin, such as cataract, premature senile changes, or even dermal cancer, it also weakens the immune system. Exposure of farmers to natural UV radiation depends on such factors as: place (latitude, height above sea level), season of the year, time of day, size and type of cloudiness, degree and type of air contamination, shading, albedo value, as well as type of the protection means applied, method of dressing and the amount of time spent outdoors.

The classic acute consequence of UV on the skin is the development of erythems, i.e. sunburn (Agnieszka Osmola-Mańkowska and Wojciech Silny). The subsequent effect is the possibility of the development of photodermatoses—a group of diseases characterized by oversensitivity to sunlight. Among chronic reactions to sunlight are mentioned: ageing of the skin, occurrence of pre-cancerous states, such as solar keratosis, as well as contribution to the development of non-melanoma skin cancer-basal cell and squamous cell carcinomas, and malignant melanoma.

The subsequent, poorly recognized physical hazard which was presented to the participants were infrasounds which also occur in agriculture (Małgorzata Pawlaczyk-Łuszczynska). Infrasounds are generated, among other things, by the means of transport and some

industrial machines and appliances. Infrasound is perceived by humans by the hearing and vibration routes by mechanoreceptors. Infrasounds on the level of approx. 30-40 dB above the hearing threshold cause a number of unfavourable hearing effects, such as: ear pain, hearing temporary threshold shift (TTS), and understanding speech disorders. Irrespective of the route of action, apart from specific effects (hearing or resonance), the exposure to infrasound is accompanied by symptoms which evidence vegetative disorders. These disorders cover functional disorders of such systems as: cardiovascular, respiratory, alimentary, hormonal and nervous. These changes become intensified with the level of acoustic pressure. The dominant effect of exposure to infrasound noise of moderate levels typical of workplaces is the noxiousness occurring at slight exceeding of the hearing threshold, manifested by subjectively perceived states of excessive fatigue, discomfort, sleepiness, as well as disorders of the psychomotor and physiological functions.

Attempts have been undertaken to specify whether noise accompanying the work of wind turbines is troublesome for people living in their vicinity (Małgorzata Pawlaczyk-Łuszczynska). The dynamic development which has been recently observed in the use of wind power for electricity production is not accompanied by the consent of local communities for the construction of wind farms. The arguments most frequently repeated against their construction are: 'spoiling' the landscape, flickering of shade, and noise accompanied the work of wind turbines. The potentially hazardous and troublesome effect of noise, including infrasound, especially evokes controversy. Wind turbines are a relatively new source of environmental noise, hence their effect on human health has not yet been fully recognized. The conducted measurements of the noise level confirmed that the work of wind turbines is accompanied by broad spectrum of noise with an infrasound component. Noise which occurs at the places of residence (outside buildings) assumes values of an equivalent sound level A of 37-48 dB, and does not exceed hearing perception concerning infrasound. It was confirmed that noise from wind turbines of prognosticated sound level A of 30-48 dB was perceived outdoors as troublesome by every third respondent living in the neighbourhood of wind farms. The general attitude towards wind turbines and susceptibility (paying attention) to the spoiling of the landscape significantly affected the subjective perception of the noxiousness of wind turbines.

Analysis of whole body vibration emitted by agricultural vehicles was also performed from the aspect of the frequency of low back pain reported by private farmers (Leszek Solecki). Studies of mechanical vibration emitted by agricultural vehicles conducted at the Institute of Rural Health, showed that mechanical vibration occurring on seats may create a special risk for farmers while performing such work activities as: threshing and raking of hay, sowing fertilizers, aggregation of soil, mowing of grass and cultivation (accelerations: 0.44-1.35 m/s<sup>2</sup>). In turn, the survey conducted concerning pain complaints on the part of the musculoskeletal system showed that in the selected group of private farmers (58) from among four investigated regions of the motor organ, complaints concerning the lumbar region of the spine were most frequently reported (93.1% of the total number of respondents), while in the control group, pain in this region was mentioned by 63.4% of office workers. Low back pain in farmers usually occurs throughout the entire occupational life (64.8%), while in the control group this pain concerned the last 12 months.

The participants were also familiarized with newly-recognized sources of health risk due to legionellosis in farmers' work environment (Nimfa Stojek). In the work of farmers, including animal breeders, water and soil play a special role. In the environment of their work there are many potential sources of infection with *Legionella*, and many work activities are performed which create the risk of contact with these bacteria. The cause of infection may be the use, for various purposes, of water sprayed under pressure. In foil tunnels and greenhouses there is a special, warm and humid environment, which is especially conducive for the long-term survival of these bacteria. In turn, modern agricultural machines, e.g. tractors, are already equipped with air conditioning, which is a device considered as one of the most important sources of infection. We express the hope that the publication of materials presented during the Symposium will be of interest to specified decision-making groups (officers at the Ministry of Agriculture and Rural Development, Ministry of Health, and local self-governments), responsible for conducting proper agricultural policy and prevention of occupational accidents and diseases, as well as health services authorities, and additionally the farmers themselves- which would contribute to the undertaking of appropriate preventive and organizational actions.