

Contemporary Engineering Sciences, Vol. 8, 2015, no. 27, 1267 - 1277  
HIKARI Ltd, [www.m-hikari.com](http://www.m-hikari.com)  
<http://dx.doi.org/10.12988/ces.2015.56183>

**Workplace Safety Management in Dairy Farms –  
From Risk Assessment to Design of the Workplace  
(Results of a Study Performed in Friuli Venezia  
Giulia Region)**

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## Abstract

The study punctually analyzes the safety management in animal farms considering in particular infrastructural aspects, management of machines and equipment and handling of animals. The research, realized in Friuli Venezia Giulia region during years 2012-2014, allowed to record in detail, through a specific registration protocol, the existing critical issues. Results show a situation still lacking regarding safety: both prevention and protection are aspects poorly understood from farmers. In addition to chronic and structural deficiencies, such as obsolescence of machines, there are some operative weaknesses respect to animal management, animal handling (procedures often incorrect) and absence of escape routes.

**Keywords:** safety management, animal farms, animal handling, prevention, protection

## 1 Introduction

Safety at workplace is an old question, despite legislation deliberated on it only recently. The final text of the Decree 09/04/2008 n. 81 (TUSL) was published in the *Gazzetta Ufficiale*. The new regulation, containing 306 articles and 51 annexes, constitutes the Consolidated Workplace Safety Act and during 2009 it was supplemented with the corrective provisions contained in Legislative Decree 106/2009. [1] [2]

Among the most relevant aspects considered from TUSL, the concept of security organization is evident: to organize means share tasks between all personnel, implying that all subjects are involved and responsible for safety management. Therefore, also in farms, everyone is responsible for his own safety and for safety of the other workers. From a formal perspective, the obligations for farms/companies are classified according to the diagram reported in Table 1.

The difficulties for farms start already with the risk assessment (Table 2), which is not easily standardized and nor codified or predictable with conventional methods. [3] To the common risks concerning security, health and organization, which regard all farms, those arising from the contact with animals, that often are large size animals, must be added, since they expose workers to a range of additional risks, such as:

- accident risks, sometimes characterized by trauma and severe bruises, during handling or managing animals or in case of accidental contact with mobile structures of containment;
- biological risks for the possible presence of infectious transmittable diseases, manures, [4]
- chemical risks in case of sanitary and environmental treatments; [5]
- ergonomic and postural risks.

Farms/companies without workers (supply for members of family enterprises – under Article 230-bis of Civil Code – and self-employed workers)	Farms/companies with < 10 workers	Farms/companies with > 10 workers
<p>Obligations for members of family enterprises (under Article n. 230-bis of the Civil Code), self-employed workers (who perform work or services under article n. 2222 of C. C.), small entrepreneurs (under Article 2083 of C.C.) and members of simple societies working in agriculture:</p> <ul style="list-style-type: none"> <li>a) Use work equipment complying with the provisions of Title III.</li> <li>b) Obtain the personal protective equipment and use them in accordance with the provisions of Title III.</li> <li>c) If providing services in a workplace in which activities are under contract or subcontract, provide an adequate identification card containing photo and personal information.</li> </ul> <p>Subjects under Paragraph 1, in relation to risks of their activities and at its own expense, have the right to:</p> <ul style="list-style-type: none"> <li>a) Make use of the health surveillance, as expected from Article 41, respecting the obligations imposed by the special rules.</li> <li>b) Take part to special training courses on health and safety at the workplace focused on the risks of their activities, as expected from Article 37 and respecting the obligations imposed by the special rules.</li> </ul>	<ul style="list-style-type: none"> <li>a) It is obligatory to perform the evaluation of all risks for health and safety.</li> <li>b) It is necessary, but not obligatory, to perform the evaluation of fire risk and take the necessary measures in order to prevent fires and evacuate workplaces.</li> <li>c) It is not required to convene the periodic meeting on safety.</li> </ul>	<ul style="list-style-type: none"> <li>a) Perform the evaluation of all risks for health and safety and elaborate the corresponding document (Risk Assessment Document).</li> <li>b) Appoint the person in charge of prevention and protection (Responsible Service Prevention and Protection).</li> <li>c) Appoint the company physician (CP) to perform the health surveillance, when expected, and ensure that workers respect the appointment to the medical checks.</li> <li>d) Designate the workers assigned to fire prevention and first aid.</li> <li>e) Provide workers with the necessary and suitable personal protective equipment, on CP and RSPP's advice.</li> <li>f) Fulfill the obligation of information and training of workers.</li> <li>g) Allow workers to elect their safety representative (Workers Representative on Safety).</li> <li>h) Process the Assessment Document for interference risks in case of assignment of activities to suppliers.</li> <li>i) Communicate to the National Institute of Insurance Against Work Accidents and Occupational Diseases (INAIL) information regarding the occupational accidents causing an absence from work of more than three days and record them on a special register.</li> <li>j) Carry out the assessment of the fire risk, prepare the related evaluation document and adopt the necessary measures for the prevention of fires and the evacuation of the workplaces.</li> <li>k) Organize the periodical meeting in farms/companies with more than 15 workers.</li> <li>l) Update periodically the risk assessment.</li> <li>m) Report yearly to the INAIL the name of the representative for workers' safety.</li> </ul>

Table 1 – Fulfilments of farms/companies based on the number of employees and the type of organization

In particular, the owner of farm/company, occupying at least one worker, must fulfill some specific obligations summarized as follows:

- draw up the evaluation of all risks, in different ways depending on the number of workers employed in the farm/company;
- choose and appoint the figures in charge of the security;
- provide information and training to workers.

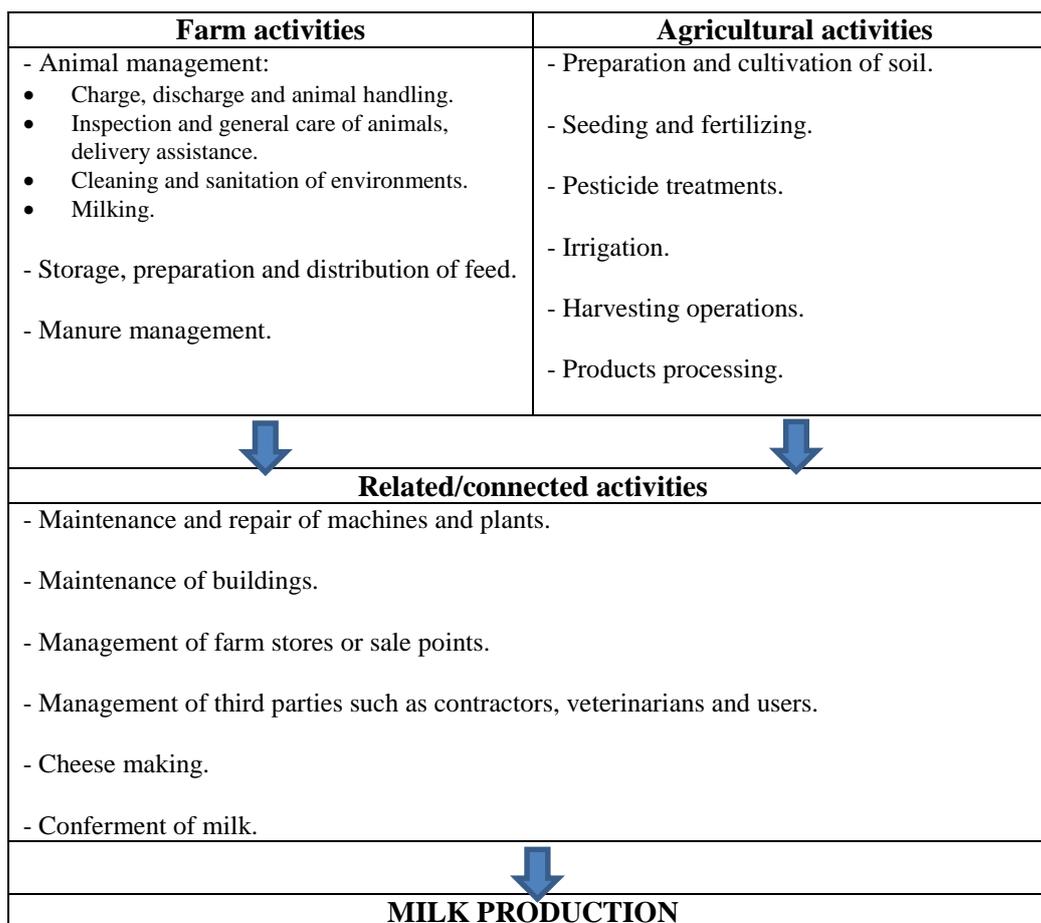


Table 2 – Example of an activity scheme on which the risk evaluation must be performed (dairy farm)

To analyze the safety situation of farms in Friuli Venezia Giulia region, data resulting from two different research projects were used:

- “BELLIMPRESA” project, conducted from the University of Udine, funded from the Program for Cross-Border Cooperation - Italy-Slovenia 2007-2013, from the European Fund for regional development and from national funds and finalized to relaunch dairy farms through the streamlining of internal resources and the spread of a business culture focused on multi functionality and economic sustainability;

- “DEMETRA” project, conducted in collaboration with the National Institute for Insurance against Work Accidents and Occupational Diseases (INAIL) and the local Institutions of Health Services (ASS), finalized to evaluate the situation of regional farms concerning safety at workplace.

Overall, a number of 135 farms, located over the whole territory of Friuli Venezia Giulia, were involved in the study. The visits into the farms were realized between years 2011 and 2014 and the sample was composed from farms breeding dairy and beef cows (75%), pigs (20%) and poultry (5%).

## 2 Methods and results

The survey covered three main areas:

- a document area, to verify in farm the presence of documents required by law;
- an operative area, divided in macro areas of investigation that concern the infrastructural aspects (check of safety requirements of structures, machines and equipment and evaluation of procedures useful to produce behaviors and attitudes of workers to operate properly and safely);
- a training area, to verify fulfillment of obligations in terms of information and training of personnel.

Each session was characterized from 80 survey points and was used to build a congruous database. From observation reported in Figure 1 it appears clear that, despite efforts of category associations, sector operators often underestimate the work safety issue: considering the documental area, in 60% of cases documents required by law was absent or not consistent with the rules. In 15 farms, documents were referred to the previous legislation (626/94).

With regard to operative area, the following aspects were investigated (Figure 2):

- **B1- infrastructural:** conditions and requirements of safety about farm structures like stables, milking parlor, housing areas, plants, tanks, silos, buildings for agricultural machinery shelter; [14]
- **B2 - machines and equipment:** all machines and equipment used in the farm;
- **B3 - procedurals:** behaviors and attitudes of personnel useful to operate properly and safety (this evaluation was realized during the phases of animal handling, milking, loading and unloading, and in case of environments sanitation).

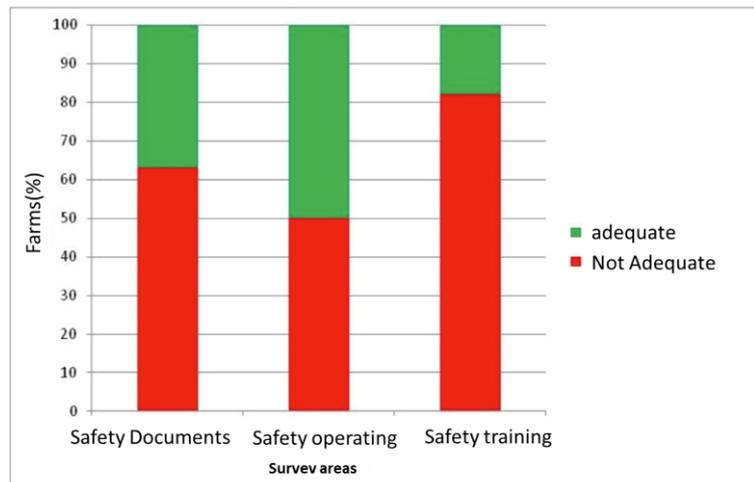


Figure 1 – Data analysis of the three areas

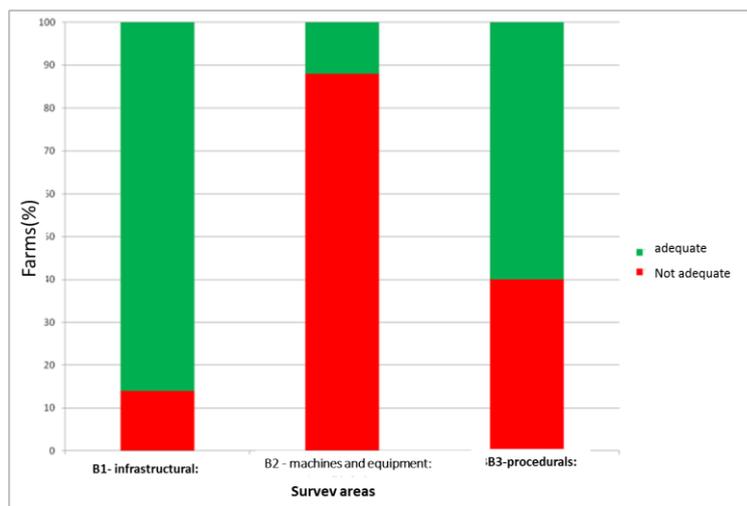


Figure 2 – Data analysis B1; B2; B3

Although structures were adequate in terms of safety (excluding areas dedicated to equipment and machines shelter and maintenance), data represented in Figure 2 indicate that the main risk factors are related to the use of equipment and machines (B2). The most critical elements were represented from tractors used into the stable (Figure 3; Figure 4)

It is necessary to remember that the employer have to ensure that all the equipment and the machines used at workplace comply with legislation. This last aspect is fundamental in security management: injuries caused by not regular machines have serious civil and penal implications. This becomes even more significant considering that the average age of tractors used in this sector is of 27 years: this characteristic indicates machines technically obsolete. (Figure 3)

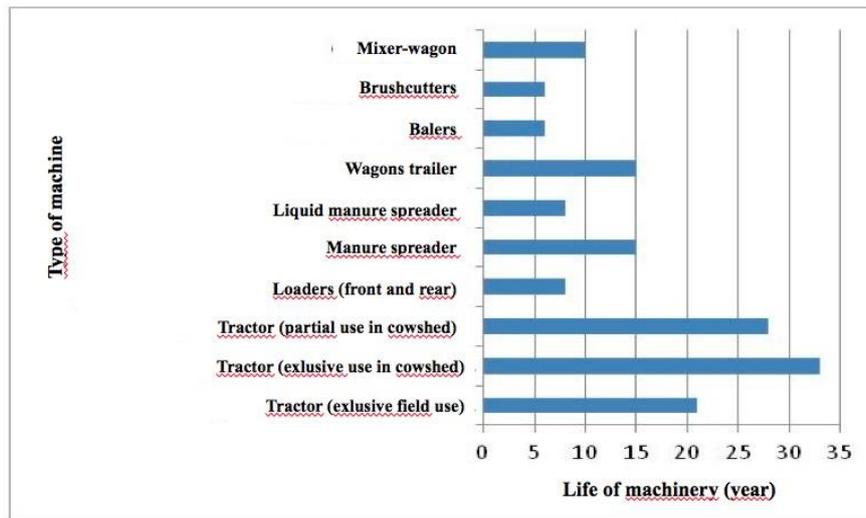


Figure 3 – Results obtained from the analysis of 481 machines founded in the dairy farms

For all type of machines used in farm the employer has to respect the following indications:

- possess and make available to the users the technical documentations and the user manual;
- do not perform changes in a machine, unless permitted by the technical regulation;
- take immediate action to adapt non-compliant machines;
- perform the periodic and extraordinary maintenance of machines (extraordinary maintenance has to be performed from specialized personnel certifying and ensuring the efficiency and safety of intervention);
- make inoperable obsolete or not normal machines.



Figure 4 – Tractor out of norm: it is not equipped with safety frame, seat belts and regular access structures, the hot and moving parts are not suitably protected

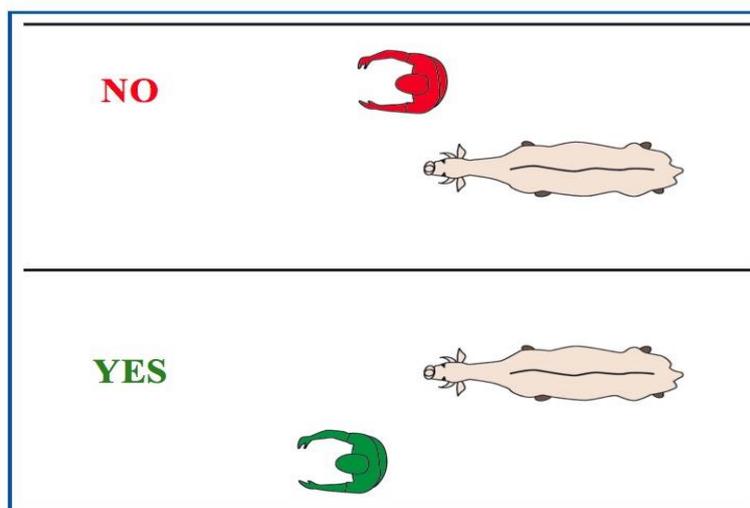


Figure 5 – a) incorrect position of the operator, no escape route between the wall and animal; b) correct positioning

Training process	Definition	Application and contextualization in the zootechnical sector
<b>Formation</b>	Educational process through which it is possible to transfer to workers and other subjects of prevention and protection system the knowledge and procedures useful to acquire the skills, to carry out in safety their occupations, and to identify, reduce and manage the risks at workplace.	Extra-farm: training certificate (law 81/2008) for all figures with responsibilities relating to safety at work and for workers, managers and supervisors (area of inquiry C1).
		Intra-farm: educational process related to the specific farm procedures regarding safety at workplace. Training level depends on findings of risk evaluation (area of inquiry C4).
<b>Information</b>	Set of activities designed to provide knowledge useful to identify, reduce and manage the risks at the workplace.	Educational process on risks direct to users of a farm, for example veterinarians, technicians or contractors (area of inquiry C5).

<b>Training</b>	Set of activities designed to learn to workers the proper use of equipment, machines, plants, materials and personal protective equipment and the correct working procedures.	Learning procedure for the equipment or machine operator or for activities with high risk as for example the handling of mean and large size animals (area of inquiry C2).
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Table 2 – Intra and extra-farm training elements

The analysis of procedural aspects (B3) showed that operators operate sometimes without attention, especially during the riskier work phases, as for example during animal handling.

The following uncorrected behaviors were frequently observed:

- operator located between wall and animal (Figure 5 – cows handling);
- operator positioned in the animals charge/discharge area (pigs handling); [12]
- failure to use the escape hatch;
- risky operations realized in solitude.

To reduce serious and fatal accidents in the livestock sector it is fundamental to know the specific behavior of animals. To manage correctly the safety at workplace, the breeder has to analyze the risk factors deriving from the direct contact with medium and large size animals. The first step to reduce the risk is the application of training process, which must be specific and based on the real operating context of the worker.

It is essential to introduce, as basic element for the operator safety, a training including also animal ethology, to know the animal behavior in relation to human presence. As reported in Figure 6 the worst results in terms of safety were found analyzing the training area.

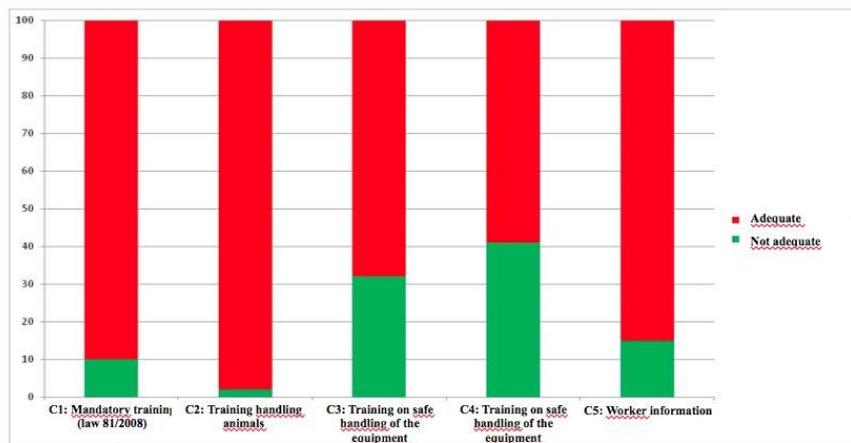


Figure 6 – Results of training area

### 3 Conclusions

To have a farming system with a lower risk of accidents, many changes have to be made in the livestock sector. In animal husbandry, but more generally in the whole agricultural sector, the number of serious and lethal accidents is still high and the increase of occupational diseases is considerable.[15] [16]

In this sense, the investment on safety is not exclusively an economic issue, but means a necessary and basic change of mindset: a competitive farm has to be safe for workers, suppliers, customers and potential guests.

**Acknowledgments.** The research was realized within the Project “BELLIMPRESA/ Rationalizations of internal resources and dissemination of a business culture aimed at the multi-functionality and economic sustainability of farms”, funded in the context of the Cross-Border Cooperation Programme Italy-Slovenia 2007-2013 by the European Fund of regional development and by National funds.

### References

- [1] Gazzetta Ufficiale n. 101 del 30 aprile 2008, Suppl. Ordinario n. 108.
- [2] Gazzetta Ufficiale n. 180 del 05 agosto 2009, Suppl. Ordinario n. 142/L.
- [3] S.R.S. Cividino, O. Malev, M. Lacovig, G. Pergher, D. Dell'Antonia, R. Gubiani, M. Vello, BiogasAgriAtex, new methods of risk assessment explosion on biogas plants, *Applied Mathematical Sciences*, **8** (2014), no. 132, 6599-6619. <http://dx.doi.org/10.12988/ams.2014.46449>
- [4] G. Pergher, R. Gubiani, S.R.S. Cividino, D. Dell'Antonia, C. Lagazio, Assessment of spray deposition and recycling rate in the vineyard from a new type of air-assisted tunnel sprayer, *Crop Protection*, **45** (2013), 6-14. <http://dx.doi.org/10.1016/j.cropro.2012.11.021>
- [5] B. Gaspardo, S. Del Zotto, E.A. Torelli, S.R.S. Cividino, G. Firrao, G.D. Della Riccia, B.A. Stefanon, A rapid method for detection of fumonisins B1 and B2 in corn meal using Fourier transform near infrared (FT-NIR) spectroscopy implemented with integrating sphere, *Food Chemistry*, **135** (2012), no. 3, 1608-1612. <http://dx.doi.org/10.1016/j.foodchem.2012.06.078>
- [6] S.R.S. Cividino, A. Colantoni, *La Fire Safety Engineering All'interno del Settore Agrozootecnico: Sicurezza e Salute nei Luoghi di Lavoro*, ISBN 13: 9783639619683, Edizioni Accademiche Italiane, 2012.
- [7] S.R.S. Cividino, M. Vello, R. Gubiani, La gestione della sicurezza sul lavoro in

- agricoltura, L'azienda Agricola, Edizioni Veneto Agricoltura, Volume I, giugno (2014).
- [8] S.R.S. Cividino, M. Vello, R. Gubiani, La gestione della sicurezza sul lavoro in agricoltura, L'azienda Vitivinicola, Edizioni Veneto Agricoltura, Volume II, giugno (2014).
- [9] S.R.S. Cividino, M. Vello, R. Gubiani, La gestione della sicurezza sul lavoro in agricoltura, L'azienda Zootecnica, Edizioni Veneto Agricoltura, Volume III, giugno (2014).
- [10] M. Cecchini, F. Cossio, A. Marucci, D. Monarca, A. Colantoni, M. Petrelli, E. Allegrini, Survey on the status of enforcement of European directives on health and safety at work in some Italian farms, *Journal of Food, Agriculture & Environment*, **11** (2013), no. 3&4, 595-600.
- [11] D. Monarca, R. Moschetti, L. Carletti, M. Cecchini, A. Colantoni, E. Stella, G. Menghini, S. Speranza, R. Massantini, M. Contini, A. Manzo, Quality maintenance and storability of chestnuts manually and mechanically harvested, *ISHS Acta Horticulturae 1043: II European Congress on Chestnut*, (2014), 45-152. <http://dx.doi.org/10.17660/actahortic.2014.1043.19>
- [12] A. Marucci, D. Monarca, M. Cecchini, A. Colantoni, S. Di Giacinto, A. Cappuccini, The heat stress for workers employed in a dairy farm, *Journal of Food, Agriculture & Environment*, **11** (2013), no. 3&4, 20-24.
- [13] K. Boubaker, A. Colantoni, E. Allegrini, L. Longo, S. Di Giacinto, D. Monarca, M. Cecchini, A model for musculoskeletal disorder-related fatigue in upper limb manipulation during industrial vegetables sorting, *International Journal of Industrial Ergonomics*, **44** (2014), no. 4, 601-605. <http://dx.doi.org/10.1016/j.ergon.2014.03.005>
- [14] S. Di Giacinto, A. Colantoni, M. Cecchini, D. Monarca, R. Moschetti, R. Massantini, Dairy production in restricted environment and safety for the workers, *Industrie Alimentari*, (2012), no. 530, 5-12.
- [15] A. Colantoni, A. Marucci, D. Monarca, B. Pagnello, M. Cecchini, R. Bedini, The risk of musculoskeletal disorders due to repetitive movements of upper limbs for workers employed to vegetable grafting, *Journal of Food, Agriculture & Environment*, **10** (2012), no. 3&4, 14-18.
- [16] M. Cecchini, A. Colantoni, R. Massantini, D. Monarca, The risk of musculoskeletal disorders for workers due to repetitive movements during tomato harvesting, *Journal of Agricultural Safety and Health*, **16** (2010), 87-98. <http://dx.doi.org/10.13031/2013.29593>

**Received: March 30, 2015; Published: October 16, 2015**