Integrated approach to the safety of dairies through the use of check lists

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Abstract
The mechanization and plant engineering of agro-industries have made a notable contribution to the socio-economic development of industrialized countries and the consequent well-being of their populations. This has also led to an increasing need for improved working conditions for workers' safety. Quality management and quality assurance and environmental management are also issues that need to be taken into account. Therefore these systems have to match and coordinate each other. In the agro-industrial sector, small companies, often find it difficult to comply with such laws due to the family-centred organization of their production, the limited size of their farms, and the general absence of a real culture of work safety. This has resulted in a decrease in adequate investments due to the perception that there would be no immediate economic returns. The aim of this work is to evaluate the existing situation by adopting check lists with regards to workers' safety and health, quality management and quality assurance, and environmental management. With these check lists inspections were made in some dairies of the Umbrian region (Italy). The data gathered was elaborated and displayed by means of radar diagrams. The use of radar diagrams gave an immediate idea about the critical aspects that require urgent intervention so as to facilitate the planning of adequate investments with time.

Keywords: workers' safety, food quality, environmental management.

Introduction

Workers' safety at work is an important element to promote productivity and raise the quality of life. However, it is now necessary to address the security issue sistematically, to assessing the implications of occupational safety, food security and environmental security. This implies the need therefore to consider a large number of laws in these three fields. For example, the Legislation of Machinery (DPR 547/55, DPR 459/96 etc…), the rules on food hygiene (Leg. 155/97, Regulation (EC) 178/2002), Environmental Standards (UNI EN ISO 14000, Leg. 152/2006, the provisions on waste water), etc…

In the field of small agro-business, for example it is necessary to consider local conditions governing the excellence and quality of their products. These businesses find themselves in difficulty in adapting to these laws. Because of the lack of appropriate organisational facilities, because family owner activities productions, with an inadequate organizational structure, they have slowed investment in this area, because it doesn't give immediate economic returns.

For example the dairy production, widespread in Italy, takes place throughout the entire year, with sustained work. In Umbria Region there are 25 companies (20 privately owned and 5 establishments cooperative entities) operating in the dairy sector, collecting a total of about 908,600 q milk annually, of which about half are used for transformation into cheese and the other destined for direct consumption.

In order to know the existing situation, but also to have a major tool easy to use, were developed a check list, which has carried out a series of surveys on such production. The aim is to know broadly the status quo in terms of job security, food security and environment. The

data collected were processed and displayed charts with radar, which has an immediate indication of the critical aspects which are most urgent and also the ability to plan over time an investment programme.

Materials and methods

The aim of this work is to define and apply the instrument of check list to companies in the dairy sector, allowing their evaluation of the risks to workers, major structural deficiencies and installation of establishments,

hygiene standards and quality for food and environmental implications.

In the province of Perugia, production units are more popular family-run, with fewer than 10 employees and have, in addition to its own outlet, a market concentrated in sales to shops, supermarkets, restaurants and pizzerias. In addition a summary was made of the general technical conditions of each of the establishments visited. In particular were found data on the general characteristics of dairy production, product quality, management of the safety of operators, the management of environmental security (use of alternative energy resources, possible control atmospheric emissions and management waste).

The development of a check list was used as a starting point this "macroindicatori" for the study of the existing legislation.

This "macroindicatori" specifies areas of investigation which has followed the development of a series of questions, which have been assigned a score, on the parameters: Relevance (A), efficiency (B), sensitivity socio-territorial (C) (regarding the environmental safety), relevance, management / organizational aspects technological / Structural (concerning food safety), relevance, management / organizational aspects technological / plant (regarding operator safety). For parameter "significance" means the importance of the appearance environmental safety / food / labour in the productive sector taken into consideration, namely the risk area of that (the dairy industry) to cause damage to environment, to food products, to the operator. For parameter "managerial / organizational" means the management of environmental, food and security for operators, namely the provision of tasks and responsibilities, training and training of personnel. For parameter "technology / equipment, technology / structural" shall mean the adjustment measures undertaken by the company in terms of tools, machinery, equipment, facilities, equipment, legislation related to aspects of occupational safety and security of quality food products.

For parameter sensitivity "socio territorial" means the ability of the territory surrounding the company, to absorb the impact that comes from. The macroindicatori identified were detected with regard to environmental safety, starting from Annex VI of the Rules and Emas are: energy resources, atmospheric emissions, waste, water cycle (water, waste water), noise, impact on infrastructure. Security and fire risk, interactions with the landscape, dangerous chemicals in the soil, into the raw materials and auxiliary.

The macroindicatori identified were detected, with regard to food safety, starting from the Italian Legislative Decree 1155/1997 are: analysis of hazards, sufficiency of resources, identification of security procedures, application, maintenance and updating of security procedures, tracing, structural prerequisites, prerequisite of plant and process, control of infestations, chemical / microbiological analysis, periodic training of personnel.

The macroindicatori identified were detected, with regard to job security on the basis of Italian Legislative Decree 626/1994 and subsequent amendments are: assessment of risks to health, assessment of risks to safety risks of fire and explosion and signs, incidental risks assessment, emergency management, prevention measures and collective protection,

information and training, Individual protection devices, health surveillance, documentation, monitoring.

At this point were calculated numerical values of three parameters A, B, C, for each aspect considered and for each sector (environmental, labor, food), as the arithmetic mean between the aggregated scores from individual applications. They then multiplied the values of the averages of three parameters, obtaining a numerical value between 1 and 64, where 1 is the score that expresses the worst situation and 64 is the best score or the score that indicates a good management by the dairy of environmental security, food and work. This type of scoring provides the first indications on the hierarchy of rational actions for the achievement and continuous improvement of security in the three areas under consideration. Within the scale of priority levels, was set a threshold beyond which analysed aspects should be considered significant, or halfway between 1 and 64 and then in need of urgent interventions, to distinguish them from those less significant that may be overlooked or not subject to immediate improvement.

The check-list were initially tested on a significant sample of 4 dairies and then applied to all companies under study. The figures were revised by spreadsheet, through which was created a matrix for processing statistics in order to identify the parameters of comparison of companies. The final results were displayed through appropriate graphics-type radar, which allow an immediate interpretation of the situation.

Results

The data collected through the checklist and use of radar graphs have permitted a rapid display of critical points present, which then can implement targeted interventions. The check-list on food safety has brought to light the problem of training of personnel (especially if casual) (Fig.1).

The need in some periods of casual labour when they are not always readily available, makes the choice to fall on those little specialized, often foreign and inexperienced. The brief time spent by workers on training and thereby to the detriment of food safety and workers' safety themselves.

Another critical point emerged in that of track and trace of the product. In some dairies traceability is achieved in a rudimentary way. It simply reports the date of packaging and expiry date of the product, which is not sufficient for the identification of the history of the product.

Other dairies, especially those medium-large, display traceability in a analytical manner, with technical personnel of the company and with the help of external consultants. It should however be noted that there is a process of adjustment in the procedure of traceability, which include the identification code of the product in transport documents.

With regard to HACCP, all dairies have been found adequate and are followed by external companies, which have fulfilled the conditions of manual. In general it was found that this is almost always the same consulting firm that follows and realizes for most dairies all the various plans and diagrams flow of production provided by HACCP.
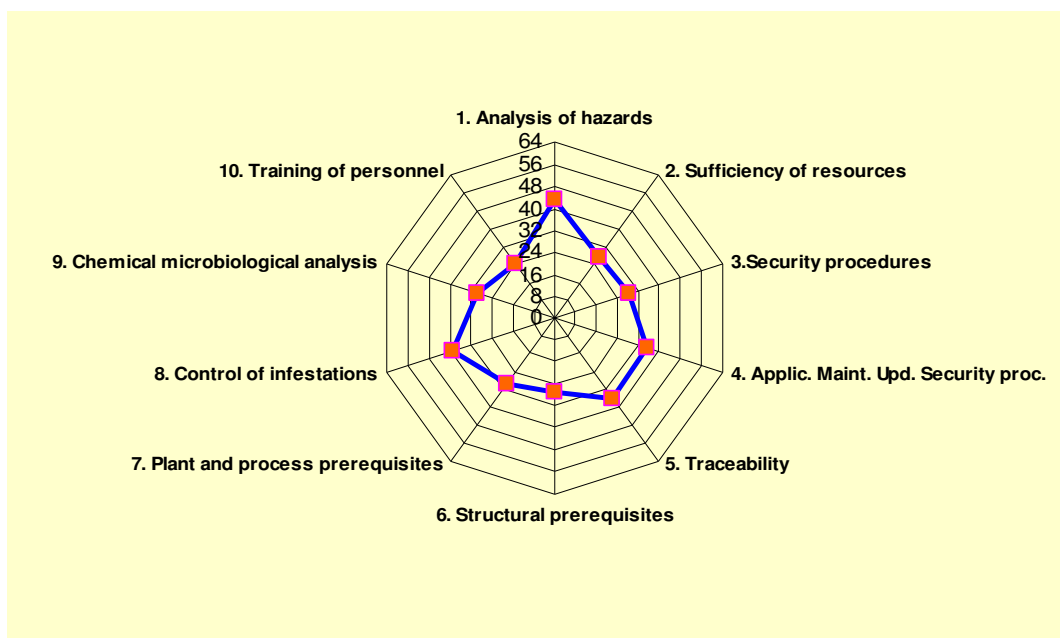
Figure 1. Food safety.

The same can be said regarding the workers' safety, followed by consultancy firm external to the company (Fig.2). With regard to this aspect the main problem was the noise, both external and internal. The main sources of emissions are the pasteurizer, in the boiler room and steam boilers double bottom.

In particular, the production plant steam develops high noise levels. This problem is obviously more important where the size of dairy production is greater. Unfortunately, P.P.E. (Personal Protection Equipments) only rarely are used.

There have been reports in which the external noise causes same troubles, so as to cause complaints by the neighbouring population. In general, in fact, in almost all the dairies subject to inspection has been found no zoning acoustics. However, keep in mind that, except for one case, the plants are located in agricultural or industrial zone, with few homes nearby.

The problem of waste is important, but it is almost always resolved in an appropriate manner (Fig.3).

With regard to this environmental aspect it is possible to make a distinction between large and small dairies. In fact, while the medium to large dairies operate separate collection for 5 types of waste (packaging, paper and paperboard, plastic, empty containers, mud residue processing) plus unsorted waste going to municipal bins, all other dairies operate undifferentiated disposal in bins without any management mode.

With regard to environmental security what emerges clearly is a general disinterest, a closure (except for two dairies respectively located in sites of significant environmental interest) to reliance on alternative energy sources (photovoltaic). They are to report also "Raw materials and auxiliary", not yet controlled by legislation, but still covered by EMAS Regulation.
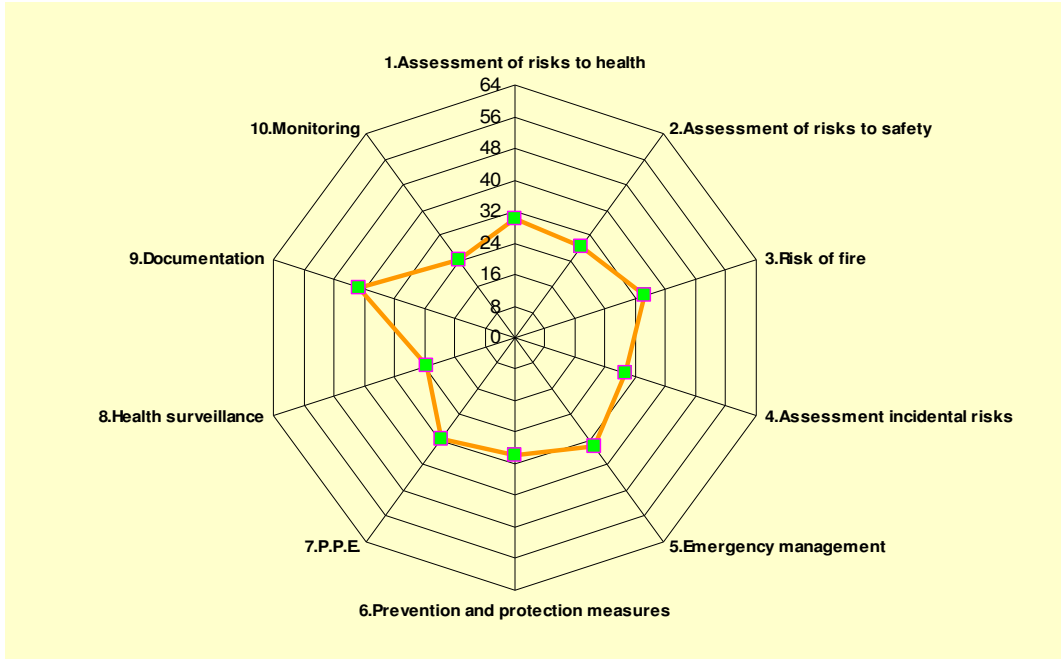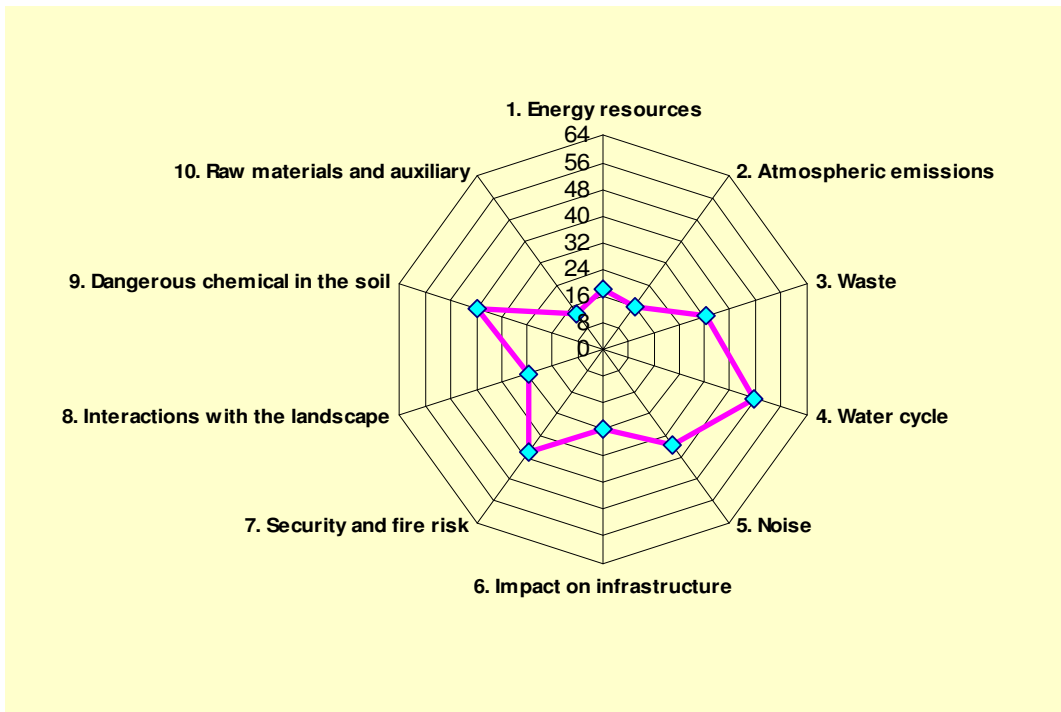
Figure 2. Workers' safety at work.

Figure 3. Environmental security.

Conclusions

The checklist gave an overview of security in the dairy sector in question. Moreover it is a tool for easy application and also able, with appropriate adaptations, to be used in other agro-industrial sectors.

Important is also the possibility, by the employer, to make a quick summary judgement on the conditions on his
factory, even after ameliorative interventions have been adopted, to know their efficacy.

For every aspect taken into account several questions were raised, to which were given a different score, so the check-list provides implicit suggestions on how to improve the situation.

The marks awarded are surely the most subjective method, but beyond the numerical results, does not affect the meaning of the results themselves. In practice where there are problems are evident.

Acknowledgements

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