

## **The Project “Safety Prevention in Agriculture”: Main Results of a Triennial Survey**

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### **Abstract**

The health and safety prevention measures in agriculture have achieved important results as far as organisation, and effectiveness are concerned. In fact the prevention campaigns have been planned on the basis of the specific context of Lombard agriculture.

Prevention system is based on an approach that combines information activities firstly, followed by check-up in the farms. Thus the concept of priorities through the progressive application of the rules is introduced. The rate of accidents was effectively reduced throughout the region. The survey – carried out in the years 2006-2008 on a sample of one thousand farms per year - involved all PSAL (Health and Safety in work premises) of the region.

The methodology is based on different action plans:

- Definition of certain key features of agriculture in the Lombardy region;
- Development of monitoring devices for safety at farm level;
- Identification of priority actions;
- Implementation of selected prevention campaigns to reduce serious and fatal accidents;
- Monitoring and promoting the implementation of safety standards.

The starting situation on safety in agriculture was defined in the first year of farm monitoring. Establishing the priority of intervention made it easier to plan prevention campaigns in order to reduce the number of fatal and serious accidents.

This project – based on information and subsequent control activities – proved to be a valuable means to ensure safety since most objectives have been achieved. Furthermore the analysis, performed at the territorial level, has helped to focus prevention activities where the need is the greatest.

**Keywords:** agricultural facilities, machines, equipments, PPE

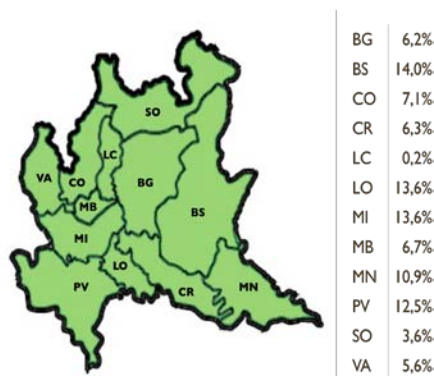
### **Introduction**

In accordance with regional policies for health and safety promotion in the workplace, the Local Health Unit of Lodi has started up the project "Safety prevention in agriculture" with the aim to develop a close integration between check-up, risk management and training of workers in order to improve the prevention system in agriculture, where there is a high rate of accidents. In particular, an Observatory to prevent the occupational accidents in agriculture and promote the health and safety in the workplace, has been activated with the aim to collect and organise all the information necessary to understand the accidents, implement the policies to reduce the risk, and monitor the achieved results (Ariano *et al.*, 2006).

The implementation of prevention campaigns based on emerged results, has been successful, leading to an overall decrease of injuries in agriculture, especially in the province of Lodi (where since 2001 to 2007 a reduction of 53% of accidents was recorded), and of sanctions in the farms (Dioguardi & Ariano, 2009).

## Materials and methods

This paper describes the results of a project, carried out in the Lombardy region, on the implementation of safety prevention systems in agriculture. In particular, the project has investigated the implementation of safety management programs, and assessed the compliance of farms with safety requirements in the workplace. The survey has been conducted in the years 2006-2008 on a sample of farms engaged in different patterns. A total of 2,236 farms, splitted at provincial level as shown in Figure 1, was examined.



**Figure 1. Percentage of analysed farms per province**

Information on farms and their safety management have been acquired by using a checklist in order to identify the main non-conformity concerning buildings, machines, risk assessment and implementation of prevention programs.

The checklist, created by PSAL of Local Health Unit of Lodi, is articulated into two sections. The first one contains information useful to classify the sample of farms in the production context with respect to labour, activities, crops, cultivated areas, livestock, buildings, machines, plants and equipments.

The second one is devoted to assess the compliance of buildings, machines and equipments with safety requirements, the environmental hygiene, and the use of good practices in the most hazardous activities (pesticide treatments and bull handling).

### Buildings, machinery and equipment

On a sample of farms a census of agricultural facilities (silos, hay barns, dryers, feed mills, wineries, dairies, workshop, etc.), machines (tractors, tillers, lawn mowers, chainsaws, mobile elevated platforms, etc.) and equipments has been made. Tractors were further classified by type (presence of cab and anti-rollover protection frames).

Safety devices are checked on facilities, machines, and equipments (e.g. hay barns, cattlesheds, ladders, tractors, transmission shafts, power take off, moving mechanical parts, and electrical systems).

### Safety requirement

The following safety requirements according to the law 81/2008, were evaluated:

- Appointment of persons responsible for safety in the farm (Responsible of the Service for Prevention and Protection, Occupational First Aider, Fire Warden, Workers' Representative for Safety) and assessment of their training;
- Presence of compulsory documentation;
- Health surveillance;

- Personal Protective Equipment;
- Toilet and changing room;
- Hygiene of the workplaces and services.

### Use of pesticides

Targeted investigations were carried out on pesticide management as it represents one of the most critical risk for workers' health. The following issues were examined: number of employees with license to use pesticides, register of pesticide treatments, purchase invoices for pesticides, type of tractor used for treatments (with conditioned or non-conditioned cab, or without cab), personal protective equipments used during treatments, characteristics of pesticide room.

The interpretation of collected information allows to know certain key features of agriculture in the Lombardy region, safety implementation at farm level, and the most critical factors on which focus the most appropriate prevention policies and training programs.

## Results

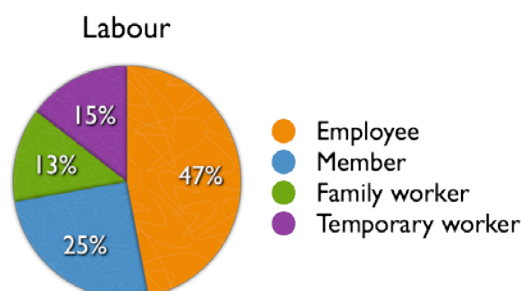
### Characteristics of the sample

A total of 2,236 farms (representing 4% of the number of Lombard farms in the year 2007) was checked. The corresponding Utilized Agricultural Area (UAA) is 128,182 hectares (representing 13% of the Lombard UAA). Just over half of farms employs 2-5 workers (Table 1), unlike the firms engaged in maintenance of green areas who have the greatest number of employees, about twenty, of which almost 60% are employees.

**Table 1. Characteristics of the sample of farms**

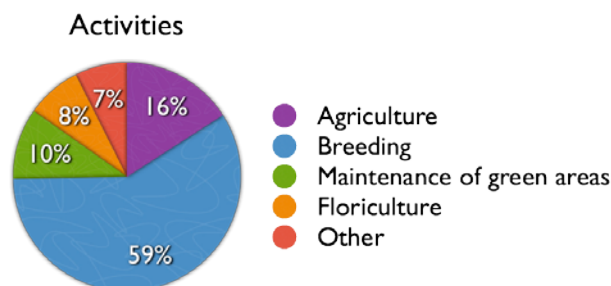
Classes of workers	% Farms	% SAU	% Employees	% Cattle breeding	% No. cow	% Pig breeding	% No. pig
1	11,5	4,1	0,8	10,2	3,9	9,2	5,2
2-5	51,5	43,0	15,0	58,9	50,5	52,3	33,7
6-10	21,3	26,0	19,2	22,4	28,8	24,6	22,8
>10	15,7	26,9	65,0	8,5	16,8	13,8	38,2

The total workforce of observed farms, amounts to 17,119 employees, of which 16% are foreign workers. Employees which represent 47% of workforce (Figure 2), are mainly employed in companies with more than 10 workers.



**Figure 2. Type of workforce in the farms**

Farms engaged in different productions (agriculture, animal husbandry, floriculture, maintenance of green areas, horticulture, viticulture, oliviculture, etc.) were observed. In particular, the sample was composed mainly of 59% of breedings, 16% of farms, and 18% of firms engaged in maintenance of green areas and floriculture, as showed in Figure 3.



**Figure 3. Main activities of sample of farms**

Structures, machines and equipments

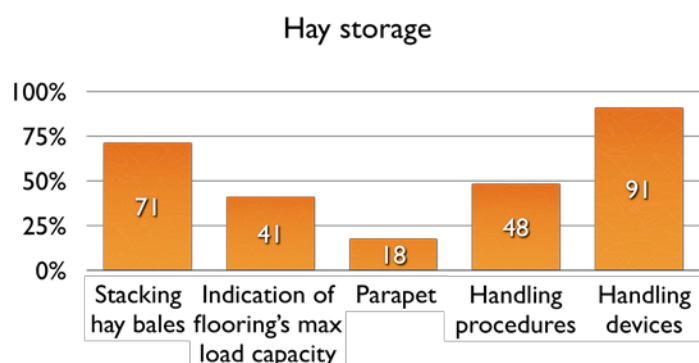
The most common facilities in the farms are vertical silos (65%), trench silos (50%), hay barns (46%) and workshops (34%).

Farms with raised barns are less than 40% of those observed, while the number of raised barns are almost one quarter of those observed. 90% of farms with raised barns, are in mountain areas.

The following issues in the hay storage were assessed:

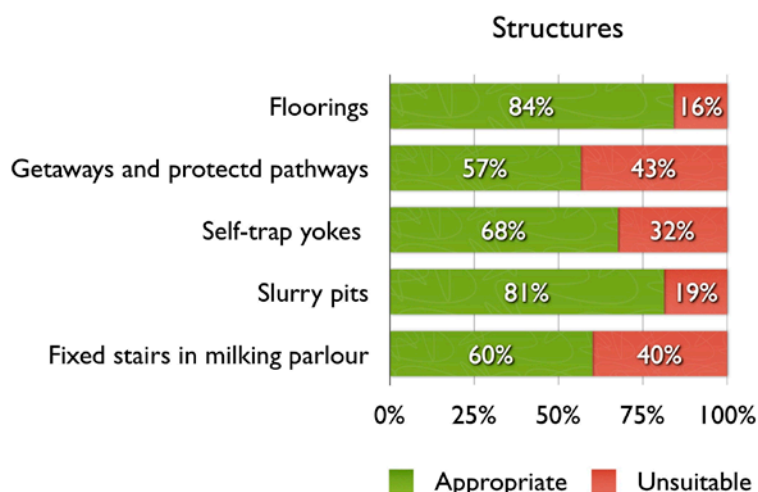
- stacking bales (maximum 4 bales);
- compliance of buildings (parapet and maximum load of floorings in raised barns);
- use of appropriate devices for hay handling;
- presence of verbal or written procedures for hay handling.

The evaluation of good practices in the hay storage is comforting (Figure 4). 71% of farms stacks less than 4 bales, 91% uses appropriate handling devices, but 52% does not have defined procedures for hay handling. Where defined, there is not substantial difference between written ones (25%) and oral ones (23%). The greatest safety problems were found out in raised barns: 59% of them does not have the indication of maximum load of the floor, and 82% is not provided with adequate parapet.



**Figure 4. Safety prevention measures in the hay storage**

The outcomes of observations on safety devices in breeding are illustrated in Figure 5.



**Figure 5. Structures equipped with safety devices**

Washable or anti-slipping floorings were detected in 84% of farms. Since 2006 transit surfaces which are in compliance with hygiene and safety requirements, are increasing. The most of farms with adequate floorings was observed in mountain areas.

Getaways and protected pathways were detected in 70% of farms, but in 19% of which in insufficient number.

Appropriate self-trap yokes were found out in 68% of farms without significant differences between those located in plain and hill. Self-traps yokes are less frequent in mountain farms where there are cattle sheds with fixed stabling.

14% of slurry pits is not consistent with safety requirements. There are nonconformities in 19% of farms.

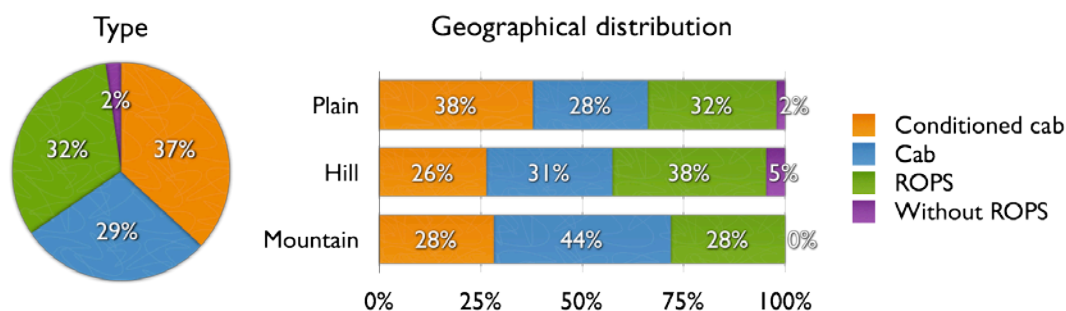
The access at the milking pit is provided with stairs equipped with anti-slip steps and handrails in 60% of farms. In the remaining farms there are stairs with or anti-slip steps or handrails (35%), and without any safety devices (5%). From 2006 to 2007 an increasing number of suitable stairs, was highlighted as a result of prevention campaigns.

Ladders are not safe (lack of anti-slip devices at the bottom of the two uprights, hooks or anti-slip supports at the top of the uprights) in more than 30% of farms. 30% of ladders is not consistent with safety requirements.

The most used agricultural machines, in addition to tractor, are equipments for the maintenance of green areas (chainsaws, hedge trimmers, brush cutters, lawn mowers).

8,546 tractors were considered, distinguishing if equipped with conditioned or non conditioned cab, or without cabs but with anti-rollover protection frames (ROPS), or without any kind of protection device. There are not significant differences by relating the type of tractor with the farm size. On the contrary, there is a prevalence of tractors with conditioned cab (38%) in the plain, with only anti-rollover protection frames (38%) in the hill, and with non conditioned cab (44%) in the mountain (Figure 6).

Although the tractors not equipped with anti-rollover protection frames are numerically 2% of observed agricultural machines, they were detected in 18% of farms, of which 14% are located in hilly areas.



**Figure 6. Type and geographical distribution of tractors**

The check-up on safety devices has showed situations of non-compliance in 19% of transmission shafts, and in 16% of power take off and moving mechanical parts.

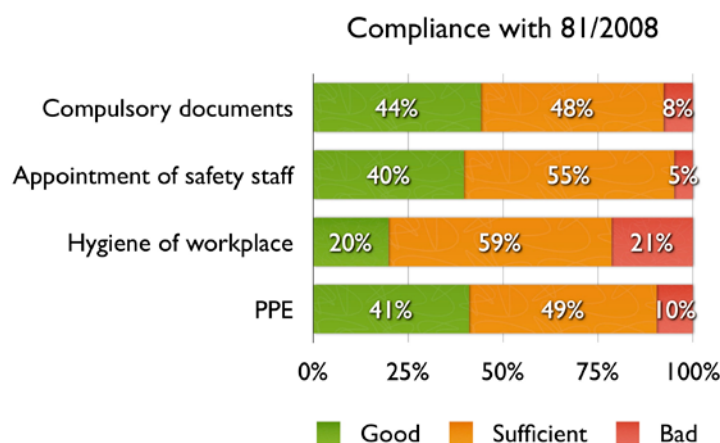
Altogether more than 30% of farms is not in compliance with transmission shaft and power take off and nearly 60% for unprotected moving mechanical parts. The most of non conformities were usually found out in mountain area.

The safety requirements of mobile elevated platforms and chainsaws were observed given the high number of firms engaged in the maintenance of green areas. The survey has revealed that more than 75% of machines and equipments are consistent with maintenance, documentation and are equipped with safety devices.

Regarding the electrical systems more than 70% of farms is provided with declaration of conformity, 54% with project of the installations and 92% checks periodically the ground wiring. The conformity of electrical systems is major in the big farms and since 2006 it is increasing.

### Safety requirements

The compliance of farms with the law 81/2008 (Figure 7) is satisfactory.



**Figure 7. Percentage of farms in compliance with 81/2008**

In more than 90% of farms there are the compulsory documents for safety, especially the document of risk assessment and the accident register. However several farms have not assessed the fire risk (34%) and do not have the fire prevention certificate (20%).

Regarding the safety staff, about 90% of farms have appointed the Responsible of the Service for Prevention and Protection (RSPP), the Occupational First Aider and the Fire Warden. Where RSPP is appointed, the employer covers this task in farms with fewer than 10 employees, while an employee or external consultant in ones with more than 10 employees.

The roles for first aid and fire prevention are usually covered by employer if the company has fewer than 10 employees, or by employees in the big farms.

The Workers' Safety Representative has not been appointed in 30% of farms, particularly in those with fewer than 10 employees.

An adverse opinion on training of safety staff was issued in 22% of farms.

There is the Occupational Health Physician in 44% of farms. In 64% of cases, where the health surveillance is practiced, there is a health protocol.

On average 10% of companies have inappropriate PPE, this situation is most evident in farms with only an employee, and in ones producing wine. 70% of farms is provided with safety footwear with anti-slip sole and anti-crushing device.

#### Hygiene of working environment and services

In just over a fifth of farms, especially those with fewer than 10 employees, a negative opinion for sanitation facilities (changing rooms, lockers, toilets, showers) was issued. Fortunately there is evidence of improvement in function of time.

#### Use of best working practices

Over 80% of farms uses pesticides. In 76% of cases, farms self-perform pesticide treatments. The percentage of farms who self-perform pesticide treatments, increases proportionally with the increasing of the number of employees.

80% of employees involved in pesticide treatments has the pesticide license.

During treatments tractors equipped with conditioned cab, and calibrated equipments for pesticide distribution are used respectively in 28% and 16% of farms.

Register of treatments and purchase invoices for pesticides have been found out respectively in 85% and 93% of cases. Pesticides are stored in unaccessible places in 95% of farms, but together with other products in 17% of cases. The overall opinion on pesticide storage is positive.

The assessment of bull management has showed that on average there is a bull in 20% of cattle breedings, in 75% of cases confined in suitable pen. Inner gates were detected on average in 45% of farms. The practice to apply a ring on the nose is spread in 20% of breedings, however, it is totally absent in mountain areas.

#### Final evaluation

The findings of the survey have showed that:

- 18% of farms has obsolete facilities, unsafe machines, and poor hygienic conditions, is not provided with toilets, ignores the law requirements, does not have the required documents, and manages the pesticides in hazardous way;

- 34% of farms has sufficient attention to safety, but has some gaps related to hygiene and good working practice, and lacks of safety management system;

- 42% of farms has fairly attention and care of structures and machines, knows the meaning of safety legislation and their requirements, but has some deficiencies in the safety management;

- 6% of farms is safety-conscious, has excellent hygienic conditions of working environments, adopts a safety management system, and has good knowledge and attention in the use of pesticides.

Overall, smaller farms and those in mountains show the more critical factors for the implementation of the safety prevention system.

## **Conclusion**

There is some evidence also from other countries (Solomon, 2002) that farm activity may influence the risk of accidents. In particular activities such as animal husbandry (housing and handling animals), maintenance (of machines, buildings, and green areas), tractor driving, and storage of crops were associated with the largest number of fatalities (Dioguardi *et al.*, 2008; HSE, 2010).

The main approaches to prevent agricultural accidents are by engineering improvements and through education and training of the workforce. One of the most effective engineering contributions to agricultural safety has been the anti-rollover protection frame for tractors. Other safety measures include installation of handrails and parapets where people might slip or fall, and proper facilities for animal handlings as it results from different surveys (DeRoo, 2000).

Information on safety level in the farms and accident data do not make any prevention by themselves, but their use in an integrated way is useful in policymaking, prioritisation, prevention campaigns and workers' training (Jørgensen, 2008).

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