DRAWING UP A TOOL (CHECKLIST) TO EVALUATE POTENTIAL HAZARDS IN COMPOUND FEED PRODUCING

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Abstract

Potential hazard is a biological, physical or chemical agent, present in animal feed or food, with the potential to cause a negative effect on human and animal health. The aim of the paper is to create a synoptic observation sheet, in the form of a checklist, in which we present the three potential hazard categories (physical, chemical and biological) associated with the production of compound feeds and the raw materials used in their production. Methodologically, the information obtained following the study of the Community and national legislative norms in the field of food and feed safety was processed, analyzed and synthesized. The obtained results are transposed into a synoptic observation sheet in the form of a checklist. The checklist has applicability in the units producing compound feeds and allows an overview on the three categories of potential hazards being structured on two general sections: the first section presents the aspects identified in the legislation, and the second section the aspects to be followed during the visits made in the compound feed production units. Community and national legislation regulated the maximum permitted levels of undesirable substances for the compound feed intended for different species of animals, but also for the raw materials used in their production. As a result of the study carried out, the checklist created allows to follow the aspects required by the legislation and the aspects identified in the compound feed units, facilitating the opportunity of preventive and corrective interventions.

Key words: compound feed, food safety, hazard, checklist, legislation

INTRODUCTION

The role of animal feed in the production of safe food is recognized worldwide [2]. The assessment of compound feed safety is an extremely complex issue that has long been underestimated. Compound feed safety assessment in fact requires expertise in multiple disciplines such as agriculture, feed processing and technology and animal nutrition. Added to these basic disciplines, compound feed safety assessment also requires an understanding of microbiology and biosecurity measures, toxicology and animal health sciences and ultimately experience in risk assessment methodologies. The four essential elements of a quantitative risk assessment are hazard identification and characterization, exposure assessment and risk characterization [4].

Efficient, intensive production of meat, milk, eggs and other foods requires blended and balanced feeds. Safe feed products enable farms to ensure food safety, reduce production costs, maintain or increase food quality and consistency and enhance animal health and welfare by providing adequate nutrition; they also can reduce the potential for pollution from animal wastes by providing only necessary amounts of highly bio-vailable dietary nutrients [3].

The compound feed and raw materials can be contaminated with undesirable substances, which can come from the environment and/or from the production process. When animals consume such contaminated compund feed, the contaminants can be transferred to food of

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animal origin, such as milk, meat and eggs [1].

Some food safety crises in the recent past have made it clear that animal feed has to be considered as a potential hazard to public health, one which can be responsible for decreasing confidence in the safety of food of animal origin. Although nutritional quality are important point in the industry, the main concern is feed safety as part of food safety. Risk analysis must take into consideration those hazards that could have a negative impact on human health due to their presence in the compound feed or animal products [6].

MATERIALS AND METHODS

The information obtained from studying the Community and national legislative norms in the field of food and feed safety was processed, analyzed and synthesized. The data entered and processed in the study came from regulations, recommendations, orders and manuals [5], [8], [9], [10], [11], [12], [13], [14], which entered in force between 2003 and 2015. These data have been ordered as a checklist.

The interpretation of the data has led to some conclusions that are aimed at both the participants in the food chain and the feed chain.

RESULTS AND DISCUSSIONS

Potential hazard is a biological, physical or chemical agent, present in animal feed or food, with the potential to cause a negative effect on human and animal health [7].

Following the study of the specific legislation in the field of food and feed safety, we drew up a synoptic observation sheet, in the form of a checklist (tab. 1). The observation sheet has applicability in the units producing compound feed, and allows an overview of the three potential hazard categories (physical, chemical and biological). The sheet is divided into two general sections; the first section includes the aspects identified in the legislation, and the second section includes the aspects to be followed during the visits made in the units producing compound feed. Within the section that includes the legislative aspects, we have pursued for elements: potential hazards, products for animal feed in which the dangers may appear, the maximum limits of the hazards, and the legislative support that supports these limits. For chemical hazards, we identified as potential hazards mycotoxins (aflatoxin B1, deoxynivalenol, fumonisin B1 + B2, ochratoxin A, toxin T-2 and zearalenone), heavy metals (arsenic, cadmium, mercury and lead) and pesticides. The biological hazards are bacterial contaminants (*Salmonella*, *Escherichia coli*, *Listeria monocytogenes* and *Clostridium perfringens*). The physical hazards are represented by the foreign objects present in the cereal seeds used as raw materials for the production of the compound feed. The products intended for animal feed in which the identified potential hazards may occur, are the compound feed for different species of animals, and the raw materials used in their production.

Depending on the effect of the hazards on the health of the animals, the Community and national legislation regulated the maximum limits allowed for their presence in the feed.

Within the aspects identified in the units of compound feed production, we will follow the elements: identification of products (raw materials or finished products), the value determined following the analysis of the potential hazards, the stage of the process in which the analysis was done, and the observations regarding the classification or exceeding the maximum allowed limits.

Table 1 Hazard observation sheet

Legislative aspects regarding the safety of compound feed					Aspects identified within the units producing compound feed			
Potential regulated hazards		**Products for animal feed**	**Maximum permissible limit**	**Legislative support**	**Product identified in the unit**	**Determined value**	**Process stage**	**Observations**
Mycotoxins	Aflatoxin B_1	Cereals and cereal products	0.02 mg/kg	Reg. EU no. 574/2011				
		Compound feed for pigs and poultry. with the exception of young animals	0.02 mg/kg					
		Other compound feed	0.01 mg/kg					
	Deoxynivalenol	Cereals and cereal by-products. except maize by-products	8 mg/kg	Reg. EU no. 576/2006				
		Maize by-products	12 mg/kg					
		Compound feed for pigs	0.9 mg/kg					
		Other compound feed	5 mg/kg					
	Fumonisin B_1+B_2	Cereals and cereal by-products	60 mg/kg	Reg. EU no. 576/2006				
		Compound feed for pigs	5 mg/kg					
		Compound feed for poultry	20 mg/kg					
	Ochratoxin A	Cereals and cereal products	0.25 mg/kg	Reg. EU no. 576/2006				
		Compound feed for pigs	0.05 mg/kg					
		Compound feed for poultry	0.1 mg/kg					
	Toxin T-2	Cereal based products	500 µg/kg	Reg. EU 165/2013				
		Compound feed	250 µg/kg					
	Zearalenone	Cereals and cereal by-products. except maize by-products	2 mg/kg	Reg. EU no. 576/2006				
		Maize by-products	3 mg/kg					
		Compound feed for piglets and sows	0.1 mg/kg					
		Compound feed for pigs	0.25 mg/kg					

Legislative aspects regarding the safety of compound feed					Aspects identified within the units producing compound feed			
Potential regulated hazards		**Products for animal feed**	**Maximum permissible limit**	**Legislative support**	**Product identified in the unit**	**Determined value**	**Process stage**	**Observations**
Heavy metals	Arsenic	Feed materials	2 mg/kg	Reg. EU 186/2015				
		Compound feed	2 mg/kg					
	Cadmium	Feed materials of plant origin	1 mg/kg	Reg. EU 1275/2013				
		Feed materials of animal origin	2 mg/kg					
		Compound feed	0.5 mg/kg					
	Mercury	Feed materials	0.1 mg/kg	Reg. EU 574/2011				
		Compound feed	0.1 mg/kg					
	Lead	Feed materials	10 mg/kg	Reg. EU 186/2015				
Pesticides		Feed materials	absent/present	Reg. EU 396/2005				
		Compound feed	absent/present					
Biological	*Salmonella*	Feed materials	absent/ present in 25 g	Ord. MAAP 249/2003				
		Compound feed	absent/present					
	Escherichia coli	Feed materials	absent/present					
		Compound feed	absent/present					
	Listeria monocytogenes	Feed materials	absent/present					
		Compound feed	absent/present					
	Clostridium perfringens	Feed materials	absent/present					
		Compound feed	absent/present					
Physical	Foreign objects	Cereal seeds	< 2%	Handbook of grading for consumer seeds				

CONCLUSIONS

In the stages of production, transport and distribution of the compound feed, due to deviations from their quality safety norms, accidental or deliberate contamination can occur, with undesirable impact on the health of the animals, as well as on the safety of food intended for human consumption. The main sources of contamination of the compound feed can be identified in environmental factors (soil, water, air), factors in the plant area (plants with toxic action), irrational use of chemical fertilizers, molds and mycotoxins, defective waste handling and disposal, as well as through different species of animals, insects and rodents.

The European Union has established a very solid regulatory system that aims to maintain the safety of the food chain. This regulatory system includes general principles for operators and authorities involved, hygiene rules for operators, feed safety rules and rules for controls performed by authorities. The objectives set can only be achieved with the full commitment of the food chain participants.

It can be concluded that the realization of the proposed checklist allows timely preventive and corrective technical interventions, thus ensuring that all categories of hazards are kept under control.

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