

AT-04

Ver 1.2



Practical realisation of the HACCP plan





DOCUMENT HISTORY

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AT-04: Practical realization of the HACCP plan

1. Introduction

The examples presented in this document are for illustration purposes only. They should not be used in analyzing the hazards of the processes present in the company or for the used, stored, transported, produced and/or traded animal feed in the company.

The references, included in item 3 of this document, are a major source of information as regards the hazard analysis to be performed by the company:

- For the animal feed
- For each step of the developed processes

There may, at the level of certain sectors, exist a generic approach, providing a hazard analysis for animal feed.

As for the processes concerned, Annexes have been developed containing HACCP plans, for many activities. They have been added as subsections (AT-04-01 and next) to this document.

Any overall consulted evaluations, must be reviewed, and adapted according to the processes implemented in the company.

Any deviation, in the individual assessment of a hazard occurring at sector based level, should be motivated and described in detail, as regards the company's hazard analysis.

The definitions of the most commonly used terms, included in this annex, can be found in document 'AC-00: Introduction'.



Mandatory HACCP study

An HACCP-study is a mandatory requirement, involving all companies active in the animal feed sector. For companies, producing, trading or distributing animal feed, such a study is necessary. This has consequences for companies who, at first sight are not subject to this obligation (e.g. producers of agro fuels, putting their by-products on the market, such as DDGS, glycerol, etc.).

This animal feed may also present some hazards (e.g. mycotoxins in DDGS).



Reader, Attention – Important preliminary remark

One should consider document AT-04 and its subsections as a tool for the companies. A working method with examples has been proposed. If the company wishes to do so, they may deviate from this and choose another method.

At the level of Regulation (EC) No. 183/2005 (Art 6), only the concept 'Critical Control Point' (CCP) is taken into consideration. The proposed method however, uses multiple assessment scores (see point 2.9 of this document), whereby the term 'Point of Attention' is also used. However, 'Point of Attention' is not applied in Regulation (EC) No. 183/2005, and is therefore inherent to the proposed method.

One should therefore be aware that the HACCP-analysis of a company or sector, provided motivation, may differ from this document and its subsections.



2. How to make an HACCP-PLAN?

2.1. Context

In the context of the realization of the HACCP-plan (more specifically, item 3 in 'AC-01: General Provisions') and the drafting of product specifications, it is necessary to identify various hazards that could occur in animal feed that has been received, stored, transported, produced and/or traded by the company.

The process, applied by the company itself, could also be a source of a hazard/ hazards.

It might be possible that:

- hazards, present in used products, are enhanced through the activity (e.g. sorting with valorization of meal waste) ;
- hazards, present in used products, are eliminated through the activity, or reduced to an acceptable level (e.g. sorting with elimination of meal waste) ;
- new hazards created by the company (e.g. cross-contamination through use of a part of the installation, without prior emptying, contamination induced by heating at an inadequate temperature).

The question is whether or not these hazards are presenting a real threat in the context of food safety and animal health.

2.2. HACCP-principles

Traditionally there are 7¹ HACCP-principles.

These principles are:

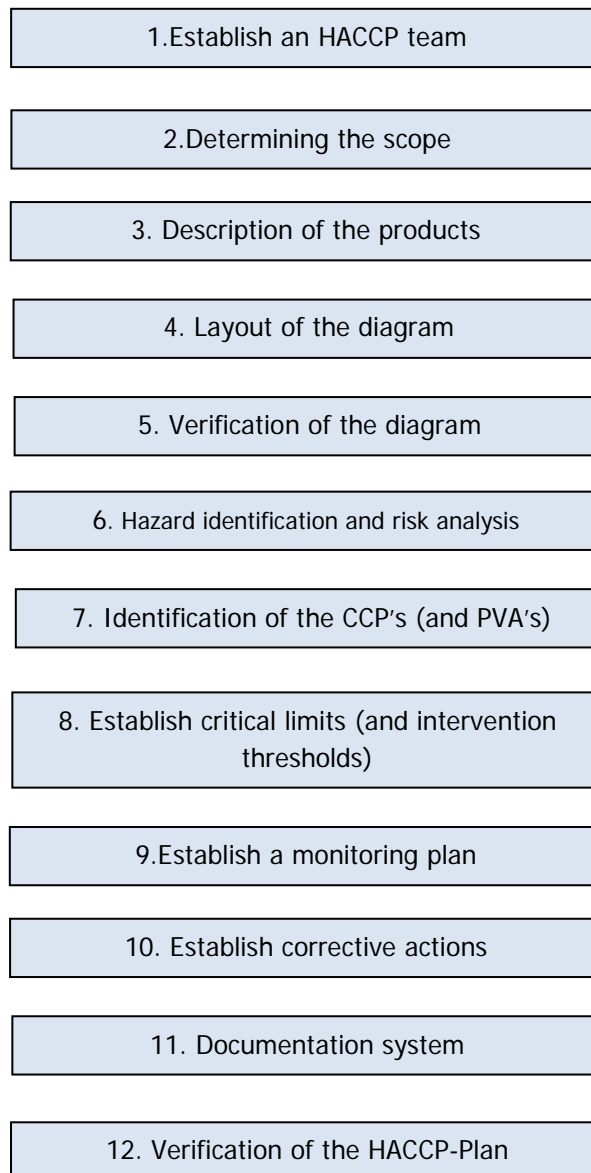
1. Identify hazards that must be prevented, eliminated or reduced to acceptable levels;
2. Identify the critical control points at the stage or stages at which control is essential in order to prevent or eliminate a hazard or to reduce it to an acceptable level;
3. Establish preventive measures with critical limits for each control point to determine what is or isn't acceptable in order to prevent, eliminate or reduce identified hazards;
4. Establish and implement procedures to monitor the critical control points;
5. Establish corrective actions to be taken when monitoring shows that a critical control point has not been met;
6. Establish verification procedures to confirm that the measures outlined in items 1 to 5 are complete and working effectively. Verification procedures shall be carried out regularly;
7. Establish documents and records on the nature and extent of the feed company showing effective application of the measures set out in items 1 to 6.

2.3. Know yourself!

In view of setting up a complete HACCP-plan, you should approach your own company with its developed activities as objectively as possible.

Don't assume that a hazard will only occur at your neighbors. Don't be blinded by daily routine either. Even if your company is doing very well, there is always room for improvement or change. It is also quite possible that you never give much thought to a particular problem in relation to foods safety. In view of the structured application of the 7 HACCP-principles we suggest you apply the methods here below.

¹ Cfr. Regulation (EC) No. 1831/2003 of the European Parliament and of the Council of 22/09/2003 laying down requirements for feed hygiene



All these steps are explained here below.

2.4. Establish an HACCP-team

In order to obtain the most objective vision, it is better to have several individuals present for reflection purposes. For this reason an HACCP-team should be composed. This team will bring every HACCP-study to a successful end.

This team must consist of at least two persons. One must also ensure that this team has sufficient knowledge:

- in the technical field;
- as regards the actual processes, applied within the company.

This team must also be able to take decisions. Certain proposals which they will be required to make, might involve investments or modifications of the working methods. The opinion of the company management is hereby crucial.

The company management will approve the activities of the team. They must also support the team in their work.

The company will register the composition of the HACCP-team. This composition could change over time. All expertise is not necessarily required, upon handling the different cases.

The working method applied by the team is included in a general document. A procedure may perfectly serve this purpose.

VSC

For a VSC (e.g. composed of one person) it is difficult to form a team.

In order to address this problem, the person responsible for the VSC will, at regular intervals, exchange ideas with other persons (in family circle, with colleagues, a service of a professional federation, etc.) to confirm or refute each step of his HACCP-plan.

The subsections "HACCP-plans" to this document, is designed as a tool, to facilitate the implementation of this plan.

2.5. Determining the scope of the study

You need to define where your study will start and where it will end.

For a production, the study generally starts from the moment you receive the animal feed (whether physically or not) until the moment, when you transfer the product to your customer.

For trade, the study generally starts from the moment you receive the animal feed (whether physically or not) until it is sold to your customer.

For other services such as transportation or storage for third parties, the study will start as soon as you receive the instruction, until the moment you have completed the service performance (e.g. delivery).

2.6. Description of the products

Companies that purchase, produce and/or trade animal feed must have a good knowledge of this feed.

The following information is useful in order to perform an HACCP-analysis:

- Name of the product (possible trade name);
- Composition;
- Origin (for purchase outside of Belgium);
- Intended use for the sale (animal feed for the professional (farmer) or for the individual, feed for pet animals, etc.);
- Storage life;
- Packaging;
- Labeling;
- Conditions for receipt (upon purchase);
- Storage and transport conditions (purchase and sale).

It is best to collect the information available both in the company (for purchase/sale and for the productions) as well as outside the company (suppliers, literature, professional associations, etc.).



You can also add the main hazards associated with this animal feed (see below).

You can group this information together into a data sheet (e.g. with the specifications of the purchased and sold products).

You can also categorize the products with similar characteristics. Instead of treating

Poultry feed one by one for example, you can group them into a single data sheet "Poultry feed".

2.7. Establishment and verification of the activity diagram

In order to visualize the process realized in your company a graphical representation is necessary.

Indeed a picture is worth a thousand words.

Examples of diagrams (also called "Flowcharts") are given in the subsections of the HACCP plan "activities".

These plans are to be adapted to your company, but they are a good working basis.

When the diagram has been drawn up by the HACCP-team, verification on-site is necessary.

For production one must especially pay attention to the flows that might have been forgotten, such as return flows, addition of steam or water, sieve residues, processing aids, etc.

2.8. Hazard identification

A hazard is defined as a biological, chemical or physical 'pollution' in the product, which may have a harmful effect on the health of humans animals or plants.

Generally 3 types of hazards have been identified:

Chemical hazards: undesirable substances that can render the product dangerous for human or animal health. The hazards might already have been present at the time of purchase. They could be of a natural origin (e.g. attached to the plant from which the feed originates) or of an artificial origin (e.g. result of contamination from outside sources).

The chemical hazards can also appear during the process itself, for example following the use of a processing aid, lubricant leakage or leaky pipes.

(Micro) biological hazards: the undesired presence of micro-organisms that can cause a contamination or a detrimental development rendering the product unsafe for consumption. The contamination could be present at the time of purchase or may develop during the process.

Physical hazards: This type of hazard is caused by the presence of foreign bodies such as glass, metal, packing, grains or seeds that are not indigenous to the feed material, etc. It can be present in the purchased product or it can appear during the course of the process.

The presence of one of the above mentioned hazards is strongly influenced by the various processes the product has undergone prior to purchase or during its passage in your company.

One should particularly consider, the circumstances as regards cultivation, harvest, storage, production and transport, which the animal feed has undergone, should be taken into consideration. Consultation of the HACCP-plans concerning the processes (see for instance the subsection: mineral extraction, production of animal fat, food industry) can help you to determine the conditions encountered by the product.

Based on a careful study of the legislation in force for the sector (see 'AT-01: Legislation') one can usually determine the general hazards to which the activity and the products are exposed.

Either by product (purchased or transferred to your customer) and/or per process step, you must identify potential hazards present. These hazards are listed one by one. In order to systematize the task, the HACCP-

team can rely on the checklist presented in table 1 here below. The hazards can be subdivided in detail (DON, ochratoxin, zearalenone, etc.) or even grouped (remaining mycotoxins).

Table 1 mentions different hazards that can occur in animal feed.

Reminder: this list is for indicative purposes only. The company must approach each situation differently, based on its specificity, whereby other kinds of hazards will also be identified.

Hazard category	Description of the hazard
(Micro)biological	Salmonella
	Enterobacteriaceae
	Other bacteria
	Moulds
	Viral contaminants
	Other micro-organisms
Chemical	Aflatoxin B1
	Other mycotoxins (DON, ZEA, FUM, B1 and B2, OTA)
	Pesticide residues
	Heavy metals
	Anti nutritional factors
	Dioxins
	PCB's
	Biogenic amines
	Other chemical pollution (e.g. solvents)
Physical	GMO-contamination
	Botanical impurities
	Insects
	Presence of meat meal
	Other foreign objects (metal parts, rests of packaging, stone chippings, soil, etc.)

Table 1: Hazard examples

Service providers who do not own the animal feed they transship, transport or store, should identify the hazards for their own work steps only.

When you have listed the hazards, you can also continue your research by applying the method of the "5 M's".

With this very simple method you can go through the possible origins of these hazards. It suffices to wonder whether the identified hazards could be originating from:

- Material (= the purchased, loaded, transported, stored, manufactured or sold product);
- Milieu (= the surroundings, i.e. transport or storage duration, the installations, the climatic circumstances, as well as the location of the company);
- Manpower (= persons involved in the company and/or come in contact with the product);
- the method (= the established procedures and instructions as well as the documents used);
- Means (= mainly the equipment or means of transport).

Table 2 shows the method of the 5M, generally applied to the animal feed sector.

This is a suggestion. The company is free to use other methods. The goal is to obtain an inventory as extensive as possible of potential hazards.



Once the different hazards have been listed and included in a recapitulating table, the company's HACCP-team will perform a hazard evaluation.

Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
(Micro) Biological	Moulds	<ul style="list-style-type: none"> - product remainder - moist or contaminated product 	<ul style="list-style-type: none"> - inadequate installations - long term storage 	<ul style="list-style-type: none"> - poor use of equipment - non-compliance with the instructions (i.e. cleaning) 	<ul style="list-style-type: none"> - lack of control - non-compliance with the contractual requirements or incomplete requirements - absence of traceability 	<ul style="list-style-type: none"> - inappropriate storage and/or transport compartment (i.e. sealing) 	<ul style="list-style-type: none"> - maintenance and cleaning of the installations - compliance with contractual requirements (receipt/dispatch) - control (before loading, on receipt, during storage, etc.) - rotation of the stocks 	<ul style="list-style-type: none"> - moist product - humidity, high temperature - inadequate cleaning frequency - duration of transport and parking - Storage duration too long or inappropriate collection frequency - Product microbologically very perishable
	Bacteria	<ul style="list-style-type: none"> - Product remainder - moist or contaminated product 	<ul style="list-style-type: none"> - inadequate installations - long term storage 	<ul style="list-style-type: none"> - poor use of equipment - non-compliance with the instructions - contamination through staff 	<ul style="list-style-type: none"> - lack of control - non-compliance with the contractual requirements or incomplete requirements - absence of traceability - in case of production: inadequate treatment 	<ul style="list-style-type: none"> - Inadequate storage space and/ or transportation - System of maintaining the temperature defective or incorrectly adjusted - in case of production: inadequate equipment (i.e. temperature) 	<ul style="list-style-type: none"> - maintenance and cleaning of the installations - compliance with the contractual requirements (receipt/dispatch) - control (before loading, upon receipt, during storage, etc.) 	<ul style="list-style-type: none"> - moist product - humidity, increased ambient temperature - inadequate cleaning frequency - extended transport and parking time - storage duration too long or inappropriate frequency of collection



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
					(acidification, thermal treatment, etc)		<ul style="list-style-type: none"> - rotation of the stocks - calibration of the monitoring system (t°, pH or other process parameters) - personnel training 	<ul style="list-style-type: none"> - microbiologically very perishable product - in case of production: inadequate treatment
	Mycotoxins	<ul style="list-style-type: none"> - product remainder - moist or contaminated product 	<ul style="list-style-type: none"> - inadequate installations - long term storage 	<ul style="list-style-type: none"> - poor use of equipment - non-compliance with the instructions (i.e. cleaning) 	<ul style="list-style-type: none"> - lack of control - non-compliance with the contractual requirements or incomplete requirements - absence of traceability 	<ul style="list-style-type: none"> - inappropriate storage and/or transport space (i.e. sealing) 	<ul style="list-style-type: none"> - maintenance and cleaning of the installations - compliance with the contractual requirements (receipt/dispatch) - control (before loading, upon receipt, during storage, etc.) - rotation of the stocks 	<ul style="list-style-type: none"> - humidity, increased ambient temperature - Storage duration too long or inappropriate collection frequency - inadequate cleaning frequency - in case of production: inadequate formula of the 'finished product' (in function of the target animal)
	Insects and mites	<ul style="list-style-type: none"> - product remainder - contaminated product 	<ul style="list-style-type: none"> - inadequate installations - (close surroundings) 	Not applicable	<ul style="list-style-type: none"> - lack of control - non-compliance with the 	Not applicable	<ul style="list-style-type: none"> - maintenance and cleaning of installations - compliance 	<ul style="list-style-type: none"> - humidity, increased ambient temperature - Storage duration



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
					contractual requirements or incomplete requirements - absence of traceability		with the contractual requirements (receipt/dispatch)	too long or inappropriate frequency of collection
	Birds and rodents (dead bodies and macroscopic traces)	- Product remainder - contaminated product	- inadequate installations - close surroundings	Not applicable	- lack of control - non-compliance with the contractual requirements or incomplete requirements - absence of traceability	- facilities or vehicles available (openings, fences, canvas, etc.)	- maintenance and cleaning of the installations - compliance with the contractual requirements (receipt/dispatch)	- poor general hygiene - inadequate pest control
	In case of conversion of category 3 material (rendering of fats): Prion (TSE) contamination through infection germ	- Category 1 and/or category 2 material in category 3 material which is collected or purchased	Not applicable	Not applicable	- lack of control (presence coloring agent) - non-compliance with the contractual requirements or incomplete requirements - absence of traceability	Not applicable	- compliance with the contractual requirements (purchase contract) - collection with dedicated transport	
	Animal protein	- product remainder	- inadequate installations	- poor use of equipment	- lack of control	- inappropriate storage and/or	- maintenance and cleaning	- presence of flows with and without



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
		<ul style="list-style-type: none"> - containing animal protein - contaminated product 		<ul style="list-style-type: none"> - poor use of separation principle 	<ul style="list-style-type: none"> - non-compliance with the contractual requirements or incomplete requirements - absence of traceability - poor separation between the flows with and without animal protein 	<ul style="list-style-type: none"> transport space (separation of the equipment / vehicles) 	<ul style="list-style-type: none"> of the installations - compliance with the contractual requirements (receipt/ dispatch) 	<ul style="list-style-type: none"> animal protein at the same site - in case of production: inappropriate production sequence
	Products with GMO's	<ul style="list-style-type: none"> - product remainder - contaminated product 	<ul style="list-style-type: none"> - inadequate installations 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> - non-compliance with the contractual requirements or incomplete requirements - absence of traceability 	<ul style="list-style-type: none"> - inappropriate storage and/or transport space (separation of the equipment / vehicles) 	<ul style="list-style-type: none"> - purchase specifications - maintenance and cleaning of the installations - compliance with the contractual requirements (receipt/ dispatch) 	<ul style="list-style-type: none"> - presence of flows with and without GMO at the same site - in case of production: inadequate production sequence
Chemical	cross-contamination : product remainder (animal feed or other) recently transported, handled and/or stored	<ul style="list-style-type: none"> - product remainder 	<ul style="list-style-type: none"> - inadequate installations 	<ul style="list-style-type: none"> - poor use of equipment - non-compliance with the instructions (i.e. cleaning) - in case of 	<ul style="list-style-type: none"> - non-compliance with the cleaning procedures - absence of traceability 	<ul style="list-style-type: none"> - Concept of installation 	<ul style="list-style-type: none"> - maintenance and cleaning of the installations - training of staff - if production: 	<ul style="list-style-type: none"> - poor management of return flows - if production: poor knowledge of the level of cross-



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
				production: non-compliance with the instructions for use (i.e. dosage) of an animal feed			regular testing for cross-contamination - if production : establishment of a production sequence	contamination of the installation
	Product flow transported or stored simultaneously	- product poorly attached during transport - transport, transshipment or storage of damaged products	Not applicable	- poor use of equipment (vehicle and accessories, equipment for loading and unloading, etc.)	- non-compliance with the contractual requirements or incomplete requirements - absence of traceability	- unsuitable equipment	- training of staff - compliance with the contractual requirements	
	If production : increased level of an authorized substance, of an undesirable substance or of an additive or medication (in case of medicated premixtures), by inappropriate dosage or formulation	Not applicable	Not applicable	- poor use of equipment - non-compliance with the requirements (i.e. dosage or production sequence) - non-compliance with the user's manual or with the requirements for the authorization of	Not applicable	- concept of the installation - calibration of the dosage installation	- training of staff - regular calibration of the dosage installations	- poor knowledge of the level of cross-contamination of the installation



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
				additives, or with the veterinary prescription in case of medicated premixture				
	Processing aids	- product remainder	Not applicable	- non-compliance with the instructions (i.e. dosage)	- non-compliance with the contractual requirements or incomplete requirements - absence of traceability	Not applicable	- purchase specifications - formulation - training of staff - compliance with the contractual requirements	
	In case of food industry: Food additives	- presence of a Food additive (not authorized in FEED) in animal feed - increased level of FEED additive (i.e. vitamins and/or trace elements in "enriched" foodstuffs for human consumption)	Not applicable	- Non-compliance with the instructions (i.e. separation)	- Non-compliance with the procedures for separation - absence of traceability	Not applicable	- purchase specifications - formulation - separation/ sorting of the products that are revalued in animal feed - training of staff - compliance with the contractual requirements	- on site use of Food additives not allowed in FEED
	Undesirable substances / prohibited materials (i.e. packaging remains)	- product remainder - natural presence in the	- inadequate installations - surroundings	- poor use of the equipment - Non-compliance with the	- Non-compliance with the procedures	- unfit transport and/or storage space	- Control of the stocks - Rotation of the stocks	- if production: inadequate formula of the 'finished product'



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
		<ul style="list-style-type: none"> animal feed - if production: presence of processing aids - in case of production: presence in the reagents 		instructions (i.e. cleaning)	<ul style="list-style-type: none"> for cleaning or storage - non-compliance with the contractual requirements or incomplete requirements - absence of traceability 		<ul style="list-style-type: none"> - Training of staff - compliance with the contractual requirements (receipt/ dispatch) 	(in function of the target animal)
	Pesticide residues (including rodenticide)	<ul style="list-style-type: none"> - product remainder - contaminated product 	Not applicable	<ul style="list-style-type: none"> - poor use of the equipment - Non-compliance with the instructions (withholding period, dosage, etc) 	<ul style="list-style-type: none"> - non-compliance with the contractual requirements or incomplete requirements - absence of traceability 	<ul style="list-style-type: none"> - application system of un-calibrated or defective pesticides 	<ul style="list-style-type: none"> - maintenance and cleaning of installations - personnel training - compliance with the contractual requirements 	
	Residues of detergents/ disinfectant	<ul style="list-style-type: none"> - Detergent or disinfectant not authorized for contact with animal feed 	Not applicable	<ul style="list-style-type: none"> - Insufficient cleaning and rinsing - Non-compliance with the instructions (instructions for use, dosage, etc.) 	<ul style="list-style-type: none"> - Non-compliance with the cleaning procedures 	<ul style="list-style-type: none"> - Facilities and/or unsuitable vehicles (slope, accumulation, etc.) 	<ul style="list-style-type: none"> - purchase specifications (detergent/ disinfectant allowed for contact with animal feed) - maintenance and cleaning of the installations - personnel training 	



Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
	Oil and lubricants	<ul style="list-style-type: none"> - « non Feed Grade » oil or lubricant - accidental presence in oils and/or fats intended for animal feed 	Not applicable	- poor handling	Not applicable	- poor design of lubrication points	<ul style="list-style-type: none"> - purchase specifications - maintenance and cleaning of the installations - use of « Feed grade » oils or lubricants (if existing) 	- lack of maintenance
	hydrocarbons from equipment for loading and unloading	- presence in animal feed	Not applicable	- poor handling	Not applicable	- loss of fuel	- maintenance and cleaning of equipment for loading and unloading	
	Liquids from installations	- « non Feed Grade » liquid	Not applicable	- poor handling	Not applicable	- loss of liquids for heating or cooling	<ul style="list-style-type: none"> - use of " Feed Grade " liquids - maintenance and cleaning of the installations 	- lack of maintenance
	Water (liquid or steam)	- insufficient quality of the used water for the intended purpose	<ul style="list-style-type: none"> - Installations or vehicles not protected against bad weather conditions - (surroundings – submerged area) 	- poor handling	Not applicable	- inadequate installations and/or vehicles (type of tubes, etc.)	<ul style="list-style-type: none"> - maintenance and cleaning of the installations - Control of the used water (quality adjusted to the intended purpose) 	

Nature of the hazard	Hazard	Origin of the hazard					Control measures	Aggravating factors
		Material	Milieu	Manpower	Method	Means/ Equipment		
Physical	Foreign objects	- presence in the product	- inadequate installations	- poor use of the installation - insufficient cleaning - contamination through staff (personal belongings, etc.)	- lack of control - non-compliance with the contractual requirements or incomplete requirements - absence of traceability	- inappropriate installations and/or vehicles	- maintenance and cleaning of the installations - compliance with the contractual requirements (receipt/dispatch) - specific aids (i.e. magnets) - personnel training	
	Mixing of two (or more) products	- possibility of contact between products with different characteristics	Not applicable	- poor use of the installations and/or vehicles	- non-compliance with the contractual requirements or incomplete requirements - absence of traceability - non-compliance with the sequence of production, storage, transshipment or transport	- inappropriate installations and/or vehicles	- training of staff - compliance with the contractual requirements	

Table 2 : Example of the application of the 5M method

2.9. Evaluation of each hazard

When evaluating an animal feed or a process step, one must, for each previously identified hazard ask the following question:

- For the examined step or animal feed, what is the risk that an identified hazard occurs to such extent that it threatens the food safety of the consumer and/or animal health?

When it comes to animal feed leaving the company, one might also ask whether a specific standard or action threshold is likely to be exceeded. It all comes down to evaluation and control.

There are several methods available for the evaluation, a ranking of all hazards, minimally based on:

- The gravity corresponding to the impact of the hazard on food safety for consumers and the health of the animals;
- The frequency of the hazard.

It is also possible to consider a third evaluation parameter, namely the detect ability of the hazard. The probability of detection (or non-detection) of the hazard is hereby taken into account. This parameter is very important since it allows the motivation of some estimations and adopted measures.

The estimation of the severity is generally based on a literature study (see items "references") the existence of a possible standard and on the assembled expertise of the company, while the frequency is determined by data from the company itself (monitoring) and/or based on the collected data within the sector.

Table 3 gives an example of an evaluation grid that could be used.

Seriousness ↓				
High (3)	3	6	9	Serious symptoms, possible death, irreversible injuries
Average (2)	2	4	6	Substantial injuries or symptoms of a transient nature
Low (1)	1	2	3	limited, less serious consequences and/or in a limited group or at extremely high doses during a long time
Frequency →	Low (1)	Average (2)	High (3)	
	from "theoretical" to "can occur"	"the hazard has already occurred", or "there are clear signs it already occurred"	"the hazard occurs repeatedly"	


Table 3 : example of a decision matrix

Its use is very simple. The HACCP-team determines the frequency and the severity of the examined hazard. The hazard is evaluated by multiplying the two factors, i.e. the probability that the examined hazard will actually have a negative impact on the examined process step or product.

This concerns only one of the existing methods. The various references listed in this Annex allow the HACCP-team to choose a method.

After evaluation, and depending on the obtained score, it will be determined whether this concerns a Point of Attention (PA) or a Critical Control Point (CCP).

If using table 3 as a basis, a score 3 or 4 represents a PA and a score 6 or 9 represents a CCP or, in opposite case, it does not concern a non-pertinent hazard .

 Examples of hazard scores					
Example no. 1: Hazard evaluation during a process step					
<p>The HACCP-team identifies the hazard « <u>presence of foreign bodies</u> ». they will evaluate this hazard during the <u>phase of bulk storage of the finished products</u>. This concerns a physical hazard.</p>					
Hazard description	Cat.	Freq.	Serious.	Risk	Motivation
Presence of foreign bodies in the stored products	P	2	2	4 - PA	<u>Frequency</u> : already occurred <u>Seriousness</u> : significant consequence at non-detection
<p>The team will motivate and retain its decision. In this way, upon re-verifying the HACCP-plan, they will be able to retrieve previously performed analysis and make adjustments if necessary. By taking measures during a later step (i.e. a properly maintained metal detector at the load line) the company will be able to eliminate risks formed by ferrous metal particles and will be able to guaranty a safe final product (decreased frequency).</p>					
Example no. 2: Evaluation of hazards in a product upon purchase and reception					
<p>The HACCP-team identifies the hazard « <u>presence of heavy metals (in particular cadmium)</u> » in zinc sulphate. This natural presence is a hazard of a chemical nature. One must of course evaluate the case where the norm is exceeded.</p>					
<p>This hazard was identified following an investigation of the type HACCP-plans (i.e. in this case "mineral excavation") but also based on the alert signal, etc.</p>					
<p>The HACCP-team judges it should dissociate the purchases with and the purchases without certificate.</p>					
Gevaren-omschrijving	Cat	Freq	Ernst	Risico	Motivering
Presence of heavy metals (in zinc sulphate) (purchase without certificate, or with a certificate which is not identifiable by	C	2	3	6 - CCP	<u>Frequency</u> : already occurred (RASFF-notifications in 2006) <u>Seriousness</u> : significant consequence for human or animal health

lot)					
Presence of heavy metals (in zinc sulphate) (purchase with certificate identifiable by lot)		1	3	3 - PA	<u>Frequency</u> : theoretical <u>Seriousness</u> : significant consequence for human or animal health

The team will motivate and document its decision. This way, when re-verifying its evaluation, the earlier analysis will easily be retrieved and adjusted if necessary.

The following tables 4A; 4B, and 4C provide an overview of examples of potential CCP's and PA's (with the exception of GMO's) for some feed materials, used in the different sectors. It concerns **non** exhaustive tables which should solely be considered as a tool. The determination of CCP's and PA's depends on the company specific risk analysis. This analysis should be performed for all used, produced or commercialized feed materials.

i Evaluation of hazards at sector based level and at individual level

Certain professional associations have proceeded with a hazard evaluation at sector based level. These assessments are of a more general nature, than those performed by a company at individual level.

Example:
A company, receiving certain guarantees from a privileged supplier, may consider a specific hazard as irrelevant, whereas purchase of that same product may, at sector based level, be considered as a CCP.

Moreover, each sector is likely to assess a same danger for a same animal feed in a different way. This is easily explained by the fact that each sector assesses the presence of a hazard in function of its own activities.

Example:
Belgian cereal collectors will not consider aflatoxin B1 in corn in their hazard analysis, as they don't commercialize this type of product. But the compound feed sector will take this parameter into consideration if the origin of the corn is unknown, or if it relates to corn originating from regions where this mycotoxin has regularly been detected.

For illustration purposes, the following tables 4A, 4B and 4C have included a few examples. Specifically intended for certain sectors.

i Product groups and hazard analysis

The hazard analysis may be performed per product at individual level, or per group of products. In the context of the identification of the hazards, it is necessary to define this group clearly, by using clear and relevant distinguishing criteria. Do not lose sight of this aspect of the HACCP-study, when you elaborate the potential groups.

Example 1:
You could define a group « cereals » regrouping all forage cereals which you use.
You could also split them according to species: cereals , winter barley, triticale, etc.
You could also use the origin in order to determine the group (origin does not necessarily relate to one or more countries). It could also relate to a zone where e.g. cultivation conditions are the same).

The criterion “supplier” may also be relevant: e.g. cereals originating from a trading establishment, and cereals (primary products) supplied directly by the manufacturer. Indeed in the first case, there may have been additional controls and/or operations.

When considering the hazard « mycotoxines » for cereal supplies, by a primary producer (farmer), a difference should be made between deliveries during harvest, and those outside this period. Indeed, storage at the farm may have been the source of development of ‘storage’ mycotoxins, other than ‘field’ mycotoxins, which are present during harvest.

Measures to be taken may therefore be different depending on the hazard analysis.

Example 2:

Knowledge of the process is also a parameter that may influence the formation of a Group.

Fats of animal origin e.g. may be divided in groups according to the process from which they originate (e.g. there is a difference between fat originating from the manufacturing of gelatin with possible use of hydrochloric acid therefore dioxin formation cannot be excluded, and fats derived from other processes in which no hydrochloric acid has not been used).

If the production process of the fat is unknown (origin unknown), the product cannot be classified with certainty, therefore the hazard assessment providing the highest security the most must be chosen.

Primary product (*) (feed materials)	CCP	PA
Barley		Pesticides Other mycotoxins (DON, OTA, ZEA, HT2 and T2)
Oats		Other mycotoxins (DON, OTA, ZEA, HT2 and T2)
Corn dry EU		Other mycotoxins (ZEA, FUM B1 and B2) Pesticides
Corn moist EU		Other mycotoxins (ZEA, FUM B1 and B2)
Rye		Other mycotoxins (rye ergot) pesticides
Wheat		Other mycotoxins (DON, OTA, ZEA) Pesticides
Triticale		Other mycotoxins (DON, OTA, ZEA) Pesticides

(*) Climatic and cultural circumstances may strongly influence the hazard analysis.

Table 4A: examples of CCP and PA for certain primary products (feed materials) collected by the Belgian sector of cereal traders.

Feed material	CCP	PA
Animal fats	Dioxins and dioxin-like PCBs (if originating from gelatin production) Insoluble impurities (if rendered ruminant fat or containing it)	Dioxins and dioxin-like PCBs (if originating from other than from gelatin production) PCB Other chemical impurities (e.g. solvent)

Feed material	CCP	PA
Fish oil	Dioxins and dioxin-like PCBs PCB	-

Table4B: examples of CCP and PA upon production of animal fats and oils

Feed material	CCP	PA
Groundnut meal, groundnut expeller	Aflatoxin B1	
By-products from the potato processing industry		Pesticides (only fresh tubers)
Sugar beet pulp		Heavy metals (As, Cd, Pb, Hg) and fluorine
Citrus pulp		Pesticides Dioxins and dioxin-like PCBs
DDGS (agro fuels)		Other mycotoxins (DON, OTA, ZEA) Pesticides
Animal fats	Dioxins and dioxin-like PCBs (if originating from gelatin production)	Dioxins and dioxin-like PCBs (if originating from other than from gelatin production) PCB Other chemical impurities (e.g. solvent) Insoluble impurities (if fat derived from ruminants or containing it)
Barley		Pesticides
Cottonseed, extracted Cottonseed, expeller		Aflatoxin B1
Coconut, extracted Coconut, expeller	Aflatoxin B1	
Rape seed		Salmonella
Rape seed extracted		Salmonella
Dried Lucerne (direct contact with combustion gases)		Dioxins and dioxin-like PCBs
Macro minerals (mineral origin)	Dioxins and dioxin-like PCBs	Heavy metals (As, Cd, Pb, Hg) and fluorine
Corn moist (European Continent)		Other mycotoxins (ZEA, FUM B1 and B2)
Corn dry (European Continent)		Other mycotoxins (ZEA, FUM B1 and B2) Pesticides Aflatoxin B1 (only for corn originating from Southern and eastern Europe)
Corn dry (North American Continent)		Aflatoxin B1 Other mycotoxins (ZEA, FUM B1 and B2) Pesticides
Corn dry (origins other than from the European or North American Continent)		Aflatoxin B1 Other mycotoxins (ZEA, FUM B1 and B2) Pesticides

Feed material	CCP	PA
Corn products (European Continent)		Aflatoxin B1 Other mycotoxins (ZEA, FUM B1 and B2)
Corn products (North American Continent)	Aflatoxin B1	Other mycotoxins (ZEA, FUM B1 en B2)
Corn products (origins other than from the European or North American Continent)	Aflatoxin B1	Other mycotoxins (ZEA, FUM B1 en B2)
Corn feed meal (North American Continent)	Aflatoxin B1	Other mycotoxins (ZEA, FUM B1 and B2)
Corn feed meal (origins other than from the European or North American Continent)	Aflatoxin B1	Other mycotoxins (ZEA, FUM B1 and B2)
Milk powder		Melamine (origin China)
Milicorn, milo, sorghum,		Aflatoxin B1
Palm kernel, extracted Palm kernel, expeller		Aflatoxin B1
Peeling (oats, barley)		Other mycotoxins (DON, OTA, ZEA)
Vegetable fats and oils		Dioxins and dioxin-like PCBs
Fatty acids of vegetable origin		Dioxins and dioxin-like PCBs
Bran		Aflatoxin B1 Other mycotoxins (DON, OTA, ZEA) Pesticides
Rye		Other mycotoxins (rye ergot) Pesticides
Soya beans		Salmonella
Soya bean hulls		Pesticides
Soya beans, extracted		Salmonella
Wheat- spelt		Other mycotoxins (DON, OTA, ZEA) Pesticides
Wheat by-products		Other mycotoxins (DON, OTA, ZEA) Pesticides
Wheat gluten		Other mycotoxins (DON, OTA, ZEA) Pesticides
Triticale		Other mycotoxins (DON, OTA, ZEA) Pesticides
Vinasses, yeast (agro-fuels)		Antibiotics
Fish meal	Salmonella Dioxins and dioxin-like PCBs PCB	Heavy metals (As, Cd, Pb, Hg) Biogenic amines Animal meal
Fish oil	Dioxins and dioxin-like PCBs PCB	

Table 4C: examples of CCP and PA upon purchase of feed materials by the sector of compound feed manufacturers

Anti nutritional factors may also be evaluated. These are naturally occurring components of certain feed materials, which, if they exceed a certain value, their use might be compromised. It is up to the company to define an acceptable limit, e.g. in function of the target animal for whom the finished product is intended, or in function of an existing standard.

It should be noted that a Legal standard (e.g. gossypol content in feed) should always be respected in both, purchase and sale. Dilution must never be considered as a control measure for an undesirable substance for which there exists a legally defined maximum (see 'AT-01: Legislation' Directive 2002/32/EC).

Feed material	Anti nutritional factor(s)
Beans	Enzyme inhibitors, phyto haemagglutinines, polyphenols, cyanogenic glucosides
Cocoa hulls	theobromine
Peas	Antitrypsin factor
Cotton seed, extracted	gossypol
Rape seed, extracted	glucosinolates
Lupines	α –galactoside
Milo, sorghum, Dari (milocorn)	Tannins, fytin acid
Field beans	vicine, convicine, tannins

Table 5: examples of anti nutritional factors possibly present in some food materials.

Table 6 provides an overview of examples as regards CCP en PA (with exception of GMOs) for a number of additives.

Additives (and premixtures containing them)	CCP	PA
Choline chloride		Dioxins and dioxin-like PCBs
Nutritional additives (b)		Heavy metals (As, Cd, Pb, Hg) Dioxins and dioxin-like PCBs
Sensory additives (a and b)		Pesticides Dioxins and dioxin-like PCBs
Technological additives (a, b, c and d)		Dioxins and dioxin-like PCBs
Technological additives (g)		Heavy metals (As, Cd, Pb, Hg) Dioxins and dioxin-like PCBs

Table 6: examples of CCP and PA (1) upon production of certain additives (or premixtures containing them) or(2) or their purchase by the sector of the manufacturers of premixtures or compound feed

Note: the letter entries after each category of additives refer to the functional groups described in Annex I of Regulations (EC) No 1831/2003

Table 7 provides an overview of examples as regards CCP and PA (with exception of MGOs) which might occur during the production of compound feed.

These examples should be refined by the company and/or the sector in function of:

- The type of compound feed (e.g. complete compound, complementary feed);
- The target animal (food producing animals, fur animals, pet animals);
- The situation of the target animal and consequently its needs and sensitivities (maintenance, periods of growth, pregnancy or nursing);
- The formulation/composition of the feed (presence of certain ingredients whether or not in large quantities);
- The implemented processes (all-mash, grinding, molder, extrusion, etc.).

These examples stem from a very general approach. A completely different evaluation may be performed, based on the practice, with significant variations from one company to the next.

Compound feed	CCP	PA
Compound feed for ruminants		Aflatoxin B1 Other mycotoxins (DON, OTA, ZEA, FUM B1 and B2, HT2 en T2)
Compound feed for pig		Other mycotoxins (DON, OTA, ZEA, FUM B1 and B2, HT2 en T2)
Compound feed for poultry		Other mycotoxins (DON, OTA, ZEA, FUM B1 and B2, HT2 en T2) Salmonella
Compound feed for cats and dogs		Salmonella
Mineral premixtures		Heavy metals (As, Cd, Pb, Hg) and fluorine

2.10. Risk control

Following this assessment, and depending on the identified hazards, several action opportunities are available.

According to the example given in Table 4, the reactions are being based on the obtained score.

In this case the following actions are applicable:

Score 1	No control measure for hazard required
Score 2	One-off measure
Score 3 or 4	Risk can be controlled through general measures (for a PA)
Score 6 or 9	Risk must be controlled through specific measures (for a CCP)

The control measures in the company are:

- present and are sufficient, or
- yet to be strengthened, or
- yet to be implemented.

These measures could for example be:

- special purchase conditions;
- the delivery of certificates;
- the controls upon receipt;
- to call upon evaluated and authorized suppliers;
- a modification of a monitoring plan (sampling and analyses);
- a treatment of the merchandise.

The company's HACCP-team will draw up an overview table of the hazard analysis for the process as well as those for each animal feed. The team can make use of table 5 for example, or of another equivalent document.

2.11. Determination of critical limits and/or action thresholds

Now that the CCP's and the PA's for each step or animal feed are known, you must, determine for each of these CCP's and PA's the following:

- The critical limits that cannot be exceeded for this step or for this animal feed;

- The (potential) action thresholds.

It is not always easy to determine these critical limits or action thresholds. Nevertheless you will need to determine the critical limit or action threshold yourself each time the step requires it.

Some of these limits or thresholds are determined by law (i.e. levels of undesirable substances). Consultation of document 'AT-03: Table of norms, action thresholds and notification limits' in this sense can help. Other critical limits can be determined contractually in the relation "supplier/customer" (buyer/seller).

Finally, in many other cases you will need to determine the limits and action thresholds in function of your own working methods or according to the client's wishes.



Examples of critical limits or action thresholds related to the process steps

- The exceeding of a temperature of which you think should not have been exceeded (i.e. preservation of a feed material such as liquid dairy by-products);
- The exceeding of a moisture level (i.e. moisture content for a stock of cereals);
- A pH which is not reached, whilst such an acidity would guarantee the microbiological quality of the product;
- The presence (or absence) of a parameter (i.e. the presence of such a parameter upon receipt equals a refusal or an adoption of additional measures).

2.12. Control of the CCP's and the PA's

Let's recapitulate:

- Now you know the points of « risk » (concerning food safety) of your company and of the animal feed you buy and place on the market.
- You know the limit under which you must keep certain points of your process and certain levels in your animal feed.

Conclusion: as a result you need to set up a control of the PA's and the CCP's.

2.12.1. Control of the animal feed

When you are in possession of animal feed (legal owner) and want to place it on the market, you must control it. This specific control is the object of document 'AT-05: Monitoring'.

2.12.2. Control of the process steps

For this control the company determines the parameters for control as well as the frequency of control. Depending on the type of installation a continuous control (such as for temperature, flow rate or pH for instance) or a periodical control is conceivable.

The detectors of certain installations are equipped with alarm systems that are triggered when exceeding the limits or thresholds. Such systems are not mandatory, but may obviously contribute to the control of the hazards.



Examples

- After a manual addition you have installed a system (restarting of the installation, confirmation) that gives you the assurance that the addition actually took place;


- At regular intervals (to be determined by yourself based according to your use) you control the quantities of manually added products that remain in stock;
- You systematically (or randomly, according to a frequency determined by yourself) apply a control (which varies according to the animal feed in question) upon receipt;
- You control (according to a frequency determined by yourself, i.e. once a day) the temperature upon exit of a cooler (or dryer);
- You control once a day the pH of your finished products;
- During storage of cereals you control their temperature regularly (i.e. once/week).

2.13. Corrective actions in case of exceeding critical limits or action thresholds

In case a critical limit or action threshold is exceeded the company must:

- Establish a corrective action (put an end to the situation that caused the exceeding and evaluate the consequences for the animal feed (conform or non-conform));
- Record the exceeding and the measures taken.

The HACCP-team will help to determine the most appropriate corrective action to be taken. Often the company has already introduced various measures. However it is possible that some of them will need to be adjusted.

 Examples
<ul style="list-style-type: none"> - You notice that on the product sheet a manual addition was not entered. You block this production. You conduct an internal investigation. Several actions can be taken: <ul style="list-style-type: none"> o The addition took place but was not registered. The product can continue the process; o The addition did not take place. In function of the actual composition the product can still continue the process, be reoriented or be destroyed.
<ul style="list-style-type: none"> - You have come to realize that the quantities of processing aids (or additives or another product) that are actually in stock are not consistent with the quantities expected. You conduct an internal investigation. Several actions can be taken: <ul style="list-style-type: none"> o It concerns a registration problem. With correction the quantities match; o Quantities don't match. A quantity larger (smaller) than expected was used. You must perform additional controls on the concerned animal feed to check whether they should not be considered as non-compliant products.
<ul style="list-style-type: none"> - During a control on receipt you are not able to establish a link (traceability) between a batch and an accompanying certificate of analysis. The presence of a valid certificate of analysis is a parameter that you have imposed upon receipt of the animal feed. Several actions can be taken: <ul style="list-style-type: none"> o You refuse this batch of animal feed; o You block the batch and perform the necessary analyses yourself in order to obtain the guarantees which you have requested by means of the certificate. Your supplier's evaluation must take this incident also into consideration.
<ul style="list-style-type: none"> - You check the temperature daily upon leaving the dryer. With a temperature higher than the one recommended by the manufacturer you run the risk that the product will be damaged (due to heat), or initiate the phenomena of condensation which is higher in comparison to what you would have expected at consequent steps. In extreme cases undesirables substances can be formed. Most installations are equipped with automatic probes that stop the drying as soon as the temperature is too high (fire protection). Your control reveals a temperature higher than the one you had recommended. In order to fix this you must reduce

<p>the time of duration in the dryer. You evaluate the production that may have been subject to this temperature increase (subsequent condensation, product characteristics, presence of undesirable substances, etc.).</p>
<ul style="list-style-type: none"> - Twice a day you control the pH of your finished products. During a control you notice that the pH is higher than the maximum value (critical limit) which you had established. You block the product. Several actions can be taken: <ul style="list-style-type: none"> o You correct the pH (i.e. addition of acid) and the product can continue the process; o You consider the product as non-conform and treat you treat it as such.
<ul style="list-style-type: none"> - You notice an increase in temperature in a batch of cereals. You ventilate the product in order to lower the temperature and evaluate the impact this heating had on the animal feed.

2.14. Up-date of the documentary system

The work of the HACCP-team could result in changes to some of the working methods. It is important to have all of this written down on paper or in digital format so that the transmission of information in the company is optimal.

It is also possible that documents must be created, such as registration forms.

A procedure also mentions the way in which the HACCP team has worked and how the HACCP plan has been achieved. This procedure must contain all the steps.

The procedures and working instructions must mention the following (or make reference to a document (i.e. table) mentioning this):

- The critical limits and/or action thresholds;
- The actions to be taken in the event of exceeding these limits and thresholds.

2.15. Verification of the HACCP-plan

We have now almost reached the end of the HACCP-plan, we will have it reviewed in its entirety to make sure everything works and links with other parts of the autocontrol system are correctly made. The consistency between the application "on paper" and the application "on the field" should be checked as well.

The HACCP-team will review all the work done. They will confirm the control by indicating it on the documents (i.e. with indication "Review on ... (date)").

2.16. Revision of the HACCP-plan

Your HACCP-plan should be reviewed on a regular basis, and at least once per year. It must be reviewed every time you make changes to your process. After all, any changes in conditions could affect the previous conclusions of the risk analysis.

It is important to plan the review. It should reflect the review date specified in the HACCP-study (see previous point) or should intervene during any change of the process.

During this review the HACCP-team will also take into account the complaints and non-conformities registered. Based on this they will especially verify the risk analysis, revalidate the critical limits and evaluate the application on the field.

In order to facilitate the work, this review of the HACCP-plan can be part of the internal audit or take place just before that. In case of an amendment, the review must occur before and during changes in the installation.

The conclusions of this review are being evaluated during evaluation of the system by the management.



Concept of a new line

If you want to invest in a new line, it is recommended to take the HACCP-principles into account right from the start.
You obviously dispose of an HACCP-study for the new line. The HACCP-plan of the company should be reviewed at that time.

1	2	3	4		5	6	7	8	9
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Considered product or step	Hazard description	Cat	α	β	γ	Risk	PA or CCP	Motivation & reference to literature	Control measures	Related documents

Legend:

Column 1: Name of the animal feed or the process step that is being evaluated

Column 2: Accurate description of the hazard discovered for this product or this step, taking into account the specificities of the company

Column 3: One of the hazard categories in which the hazard is classified (physical, chemical or (micro)biological)

Columns 4: Factors used for the risk evaluation (such as: frequency of the hazard appearance, seriousness² or , possibly, detectability³)

Column 5: Numerical score, resulting from the risk evaluation⁴

Column 6: Classification based on the evaluation, in PA or in CCP

Column 7: Motivation based on which the HACCP-team has performed the evaluation. If applicable, the source of information which was consulted is mentioned here

Column 8: Measures that are existing, strengthened or implemented following the evaluation, in order to control the hazard (in order to eliminate it or to reduce it to an acceptable level)

Column 9: Reference to the documentary system of the company (a document that is existing, modified or implemented following the evaluation, allowing control of the hazard)

Table 5 : Example of an overview table for the risk analysis of a process or animal feed

² The seriousness corresponds to the consequences of the hazard for the human and animal food safety.

³ « detectability » should be interpreted as the probability of (non-)detection of the risk. The HACCP-team can evaluate the risk (its criticality) differently depending on whether it concerns a visible hazard, which is the object of systematic controls, or on the contrary it is an invisible hazard that is the object of punctual controls (i.e. chemical contamination).

⁴ In the literature the risk indicator R can also be defined as the « criticality ». This criticality is the product of the scores assigned to the frequency, the seriousness and, possibly, the detectability (in case this factor was deemed relevant by the HACCP-team and is used for the risk evaluation).

3. References and short bibliography

This document and the subsections (HACCP-plans) were elaborated by the OVOCOM-secretariat, presented to the involved sectors and evaluated in a working group.

The information in the references below can lay the foundations of the risk analysis that the HACCP-team has to perform for the company. They will of course not remove the responsibility from the company to take into account her own specificity.

Scientific Committee of the FASFC Terminology of hazard and risk assessment according to the Codex Alimentarius [online]. FASFC. Brussels

3.1. Internet sites

- FASFC (Federal Agency for the Safety of the Food Chain) – Scientific Committee: Advice[online]. Available at http://www.favv-afsc.fgov.be/scientific_committe/advice/
- BEMEFA (Profession Association for compound feed producers) – Hazard analysis raw materials [online]. Available at <http://www.bemefa.be/RiskAnalysisIngredients.aspx> (password and login required)
- FEDIOL – Library: Risk Analysis [online]. Available at <http://www.fediol.org/5/index9.php>
- GMP+INTERNATIONAL - Feed Safety Database [online]. Available at <http://fsd.gmpplus.org/fsd/page/1/home.aspx> (password and login required)
- Product Board for Margarins, Fats and Oils – MVO/EFPPRA risk analyses (animal fats) [online]. Available at: <http://www.mvo.nl/Kernactiviteiten/KwaliteitenVoedselveiligheid/RiskAnalyses/MVOEFPPRA/tabid/502/language/nl-NL/Default.aspx>

3.2. Works

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- **Arvalis & FFCAT** – Séchage des grains en organisme stockeur – Guide pratique. FFCAT (actuellement Coop de France – Métiers du grain). Paris. (2003) 137 p.
- **Scientific Committe of the FASFC** –Terminology of hazard and risk assessment according to the Codex alimentarius [online]. FASCS. Brussels. (2005) 46 p. Available at <http://www.favv-afsc.fgov.be/wetenschappelijkcomite/publicaties/terminologie.asp>
- **Centre de recherche sur les céréales** - Protection des céréales, des oléagineux et des légumineuses à grain entreposés à la ferme contre les insectes, les acariens et les moisissures [online]. Centre de recherche sur les céréales. Winnipeg (Manitoba) Canada. (2001) 58 p. Beschikbaar onder (ook in Engels) <http://grainscanada.gc.ca/storage-entrepouse/aafc-aac/pfsg-pgef-fra.htm>
- **Coop de France – Nutrition animale & SNIA** - Guide de bonnes pratiques de la fabrication d'aliments composés pour animaux. Coop de France & SNIA. Parijs. (2008) 68 p.
- **FAMI-QS** – Annex 11: Guidance on risk assessment in production. In: Community Guide to Good Practice For Feed Additive and Premixture Operators [online]. Fami-QS. Brussel. (2007) pp 72-111. Available at http://ec.europa.eu/food/food/animalnutrition/feedhygiene/guide_goodpractice_en.htm
- **FEDIAF** – Guide to Good Practice for the Manufacture of Safe Pet Foods [online]. FEDIAF (Fédération Européenne de l'Industrie des Aliments pour Animaux Familiers). Brusselq. (2010) 66 p. Available at http://ec.europa.eu/food/food/animalnutrition/feedhygiene/guide_goodpractice_en.htm

- **FEFAC** – [Community guide to good practice for the EU industrial compound feed and premixtures manufacturing sector for food-producing animals - European Feed Manufacturers Guide](http://ec.europa.eu/food/food/animalnutrition/feedhygiene/guide_good_practice_en.htm) [online]. FEFAC (Fédération Européenne des Fabricants d'Aliments Composés). Brussel. (2007) 59 p. Beschikbaar onder http://ec.europa.eu/food/food/animalnutrition/feedhygiene/guide_good_practice_en.htm
- **FFCAT** – Guide Collecte/Stockage – Hygiène et sécurité sanitaire – Référentiel technique. FFCAT (tegenwoordig Coop de France – Métiers du grain). Paris. (2003) 102 p.
- **Institut Technique des Céréales et des Fourrages (ITCF) & FFCAT** – Le Guide du chef de silo – Les bonnes pratiques du stockage des grains. FFCAT (tegenwoordig Coop de France – Métiers du grain). Parijs. (1995) 71 p.
- **Unité de Technologie des IAA (FSAGx)** – Stockage des céréales à la ferme ou en organismes de collecte / mise en place d'un système de gestion de la qualité. FSAGx. Gembloux. 122 p.
- **SAV** - HACCP – Transport, storage and food distribution. SAV (currently Transport & Logistiek Vlaanderen). Gent. 69 p.

3.3. Standards

- **Codex Alimentarius** – Code d'usages en matière de prévention et réduction de la contamination des céréales par les mycotoxines, y compris les appendices sur l'ochratoxine A, la zéaralénone, les fumonisines et les trichothécènes [online]. CAC/RCP 62 (FAO), 2006, 9 p. Available (also in English and Spanish) at http://www.codexalimentarius.net/web/standard_list.do?lang=fr
- **Codex Alimentarius** – Code d'usages pour la prévention et la de la contamination des produits destinés l'alimentation humaine et animale par dioxines et les PCB de type dioxine [online]. CAC/RCP 51 (FAO), 2006, 13 p. Available (also in English and Spanish) at http://www.codexalimentarius.net/web/standard_list.do?lang=fr
- **Codex Alimentarius** – Code d'usages pour la réduction en aflatoxine B1 dans les matières premières et les aliments d'appoint destinés au bétail laitier [online]. CAC/RCP 45 (FAO), 1997, 4 p. Available (also in English and Spanish) at http://www.codexalimentarius.net/web/standard_list.do?lang=fr

4. Annexes

Document AT-04 has been supplemented with 11 sub-sections. They approach one by one the processes already existing within a number of animal feed sectors.

These sub-sections are as follows:

No.	Title	Process
AT-04-01	Common processes	Reception, packaging, bagging, labeling, palletizing, storing, transshipment, loading, weighing
AT-04-02	Road transport	Acceptance of an assignment, control, loading, transport, unloading, cleaning
AT-04-03	Storage and transshipment	Acceptance of an assignment, temporary storage, transshipment, treatment prior to storage, treatment during storage
AT-04-04	Trade	Temporary storage, treatment prior to storage, treatment during storage, flattening.
AT-04-05	Food Industry	Purchase of ingredients, storage of ingredients, food production, storage of end products, distribution

No.	Title	Process
AT-04-06	Production of vegetable oil	Storage, mechanical separation, production of crude oil, refining, storage (of end products), mixing, transshipping, loading
AT-04-07	Production of fats of animal origin	Collection/reception, mechanical reduction, thermal process, chemical extraction, mechanical separation/filtration, storage of end products, transshipment, loading
AT-04-08	Mining of minerals	Exploration of mining areas, mining, enrichment, handling, mixings, storage of finished products, transshipment, loading
AT-04-09	Production of additives	Purification of feed materials, synthesize, purification of desirable substance, drying, mixing, dilution, finishing, storage of finished products, transshipment and loading
AT-04-10	Production of premixtures	Transshipment, formulation, dosing, mixing, storage of finished products, transshipment and loading
AT-04-11	Production of compound feed	Transshipment, formulation, dosing, mixing, pellettizing, cooling, molder, sieving, coating, storage of finished products, transshipment and loading