Tecaliman
Center of expertise for a sustainable feed business

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Keys to the use of HACCP in animal feed

1. Definitions

This English acronym meaning "Hazard Analysis and Critical Control Points", which can be translated into French as "Analyse des Dangers - Points Critiques pour la Maîtrise" (J.L. Jouve - 1) refers to a technique that provides access to product quality control. Without wishing to provide a complete history, it may be necessary to remember that it was created by the chemical industry in the USA in the 1970s, but that it quickly turned out to be well suited to the human nutrition industry. Its main application in this sector was, and still is, controlling the hazard of microbiological contamination of food.

The term **hazard** used in HACCP should be understood as "an unacceptable possibility for the product". It differs from the notion of **risk,** which equates to an assessment of the probability of a hazard. A **critical control point or CCP** is a point, operational step or procedure, which can and must be controlled in order to eliminate a hazard or reduce its risk.

This method, the application procedure for which will be examined in the following paragraphs for each step in the animal feed sector, endeavours to identify the origins of a particular hazard, to assess its risks and to propose preventive and corrective measures that are applicable to the entire process flow diagram (Table 1).

HACCP is a quality control technique, but one that is proving to be a non-redundant addition to the quality assurance process. ISO 9000 standards aim to guarantee an entire company's development as regards the quality of its products, but with a flexible definition of this quality, while the HACCP method is only interested in a precise change in quality, known as a hazard, for a given product and not for all the company's products.

A practical comparison of these two methods is apparent from the facts: companies that are already certified also use HACCP. HACCP enables them to guide changes in their process flow diagram, their operating practices or prior technological choices as regards the application of new constraints including, for example, the manufacture of salmonella-free products (Figure 1). It always concludes with concrete proposals for making appropriate changes to the (technical or human) resources for the particular site.

Steps	Actions
1	Establishment of the team
2	Definition of the hazard and product
3	Description of the product expected
4	Definition of the process flow diagram
5	Verification of the site's process flow diagram
6a	Identification of the causes of hazards
6b	Assessment of their risk
6c	Proposal of preventive measures
7	Identification of critical control points: CCPs
8	Establishment of warning criteria for CCPs
9	Development of a CCP monitoring plan
10	Determining corrective measures to be implemented in the event of a warning
11	Effective establishment of the CCP monitoring system
12	Establishment of a procedure for verifying the effectiveness of the system

Table 1

2. Practical implementation of HACCP

2.1. Step 1: creating the team entrusted with the study

2.1.1. Method

The success of the study depends largely on the right choice of team members. The team must be multidisciplinary and non-hierarchical. The team must establish a timetable for actions.

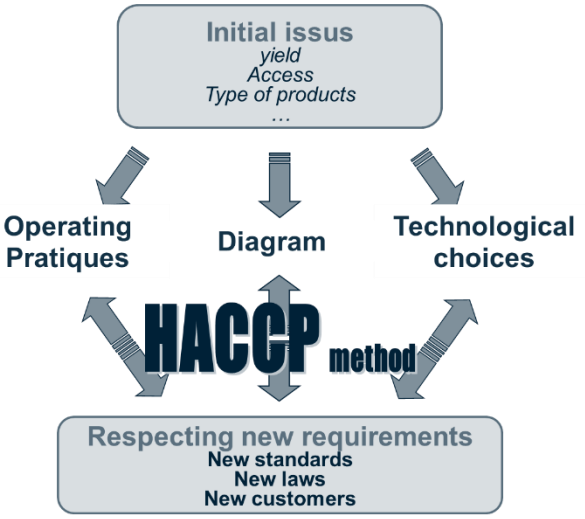

Figure 1

2.1.2. Difficulties

- Putting these two requirements into practice is often difficult. Multidisciplinarity involves choosing people, who are each familiar with a part of the process flow diagram. Therefore, people working on the ground are indispensable, but the fact that there are often small numbers of personnel on production sites frequently results in significant constraints for the team's meeting schedule. In the majority of cases, this results in either some of the team being absent or the study being spread over time. Faced with these two dangers, the will of management, regularly reaffirmed by involvement in a number of meetings, and the dynamism of the person in charge of the study are key.
- The high cost of the study, as it is largely made up of personnel costs
- The person in charge of the study must take responsibility for the team's non-hierarchical functioning. Therefore, he/she must be familiar with the method and not favour value judgements originating from hierarchy. This is why it is often a good idea for him/her not to form part of the company's organisation chart, which could increase the cost of the study.

2.1.3. Advantages

- The involvement of field personnel and non-hierarchical functioning results in mobilisation and the awareness of all site personnel of the hazard examined being fairly rapidly raised.
- The timetable provides a guarantee of results by known deadlines.

2.2. Steps 2 to 5: defining the study area

This area consists of a particular hazard, a given product, a use of the expected product by the client and the product production line.

2.2.1. Method

This is a matter of recording in writing, as regards the hazard: a knowledge of bibliographic data, the company's aims, clients expectations, the part of the process flow diagram that will be examined. The process flow diagram is "divided" into successive steps and operations in order to physically create what will become the framework of the entire study.

2.2.2. Difficulties

- In practice, the choice of each element in the study area requires a clear definition of the level of control that the company wishes to achieve: for which part of the process flow diagram, for which products, etc. The wider the choices and the greater the time needed, the more expensive the study will be.
- In terms of defining the product examined, adaptation of the method is necessary for animal feed. Generally, an HACCP study relates to a product made on a production line. However, in animal feed, "different" products, in terms of their formula, are produced one after another on a shared production line. In the majority of cases, the study relates to a product family (e.g. poultry feed) or to all the products passing through the production line. In fact, it is the production line that is chosen rather than the product.
- Determining the anticipated use is often an extremely delicate matter. It equates to actually defining the targeted quality aim. In many cases, it is hard to determine exactly what the client expects, as this often a tacit expectation that is not expressed. Failing this, various practical foundations can be used: overall professional knowledge, legal documents, contracts, label charters, etc.

2.2.3. Advantages

- All of these steps help to determine a precise framework for the study
- Establishing the process flow diagram and its verification on the ground enables certain sources of hazards to be detected and allows the team to become acquainted with actual practices on the ground.

2.3. Step 6: Analysing hazards and proposing preventive measures

2.3.1. Methods

This step is definitely the longest. It takes place in three successive phases for all operations performed on the product: identification of the causes of hazards, assessment of their risk, proposal of preventive measures for causes with a major risk. It is possible to use conventional quality

techniques (FMEA, pareto) or to carry out field tests, in order to assess risks.

2.3.2. Difficulties

- This is difficult and somewhat repetitive work. Therefore, the person in charge of the study must have the necessary dynamism to step back and keep the study area on course.
- It is essential to develop these three phases independently. For example, when seeking causes, you must not just identify causes that appear frequently. A cause may be rare but have disastrous consequences. On the other hand, an event may occur very frequently and be irritating to operators without actually having a significant consequence within the framework of the study area.
- It is undeniable that a knowledge of the company's history faced with the hazard in question is key when assessing risks and proposing preventive measures. Hence, this is a question of actions where field personnel are involved. This may lead to them seeking to resolve a problem that matters to them but which is not directly connected to the study area. In this case, it is essential to return to proposals within the framework of the study area or to check that the measures proposed actually reduce the risk of a cause appearing.

2.3.3. Advantages

- Research is comprehensive.
- The company's memory is used and partly formalised.

2.4. Step 7: identifying critical control points

2.4.1. Method

A critical control point does not necessarily equate to a machine, but could also be a raw material or a manual operation. Their identification is often essential following hazard analysis. Their aim is to encourage operators to develop and formalise hazard control at these points, with particular attention and diligence.

2.4.2. Difficulties

- It is necessary to choose them wisely in order not to dilute the attention of personnel by choosing too many points.

2.4.3. Advantages

- The attention of personnel will be focused on concrete and precise points.
- This is the beginning of real control.

2.5. Steps 8 to 11: Establishing hazard control

2.5.1. Method

For each critical control point, this involves choosing criteria to be monitored in order to achieve a guarantee of hazard control, and then of defining procedures for these controls and determining the levels of warnings resulting in the triggering of corrective measures. These measures must also be determined in advance.

2.5.2. Difficulties

- It may be possible to develop monitoring techniques that do not necessarily equate to physical measurements. In this case, those involved need to demonstrate their imagination.
- This development must formally involve the personnel affected by the application of monitoring techniques and corrective measures, in order for them to have a chance of being carried out on the ground. As a result, at these stages, the team needs to be widened to include these people.

2.5.3. Advantage

- An effective control mechanism is established

2.6. Step 12: verifying implementation of the system

2.6.1. Method

This involves a general review of the system with verification of the impact of possible changes in the process flow diagram or procedures on the system and the reality of system implementation including, specifically, checks at critical control points.

2.6.2. Difficulties

- It may possibly be difficult to implement. It is necessary to step back, question a system that has been difficult to establish and, above all, be prepared to accept that you will be faced with a possible system implementation failure. However, as implementing the eleven previous steps always requires some distance and criticism, team members will perhaps find it easy to adopt this attitude.

2.6.3. Advantages

- This monitoring guarantees the actual utility and effectiveness of the system

3. Conclusion

Using HACCP, and the same is true for other quality methods: it is easier to identify the cost of implementation than the savings that could be made. During the course of a symposium, Mr.

WOODGATE from Beacon Research (3) assessed an HACCP operation undertaken in order to control the hazard of salmonella contamination in a processing plant for abattoir by-products. The financial assessment speaks for itself (Table 2), as it reports a saving of £ 420,000 per annum. The quality assessment is no less revealing, as contamination of their products, which was 8.2 % in 1990 and 5.3 % in 1991, was reportedly 0 % in 1992 and 0.3 % in 1993 following HACCP implementation.

	Before HACCP	After HACCP
Cost of the HACCP operation	£ 0	£ 10,000
Cost of salmonella prevention	£ 440,000/year	£ 20,000/year
Frequency of contamination	8.2 to 5.3 %	0.0 to 0.3 %

Table 2: Results presented by Mr. WOODGATE from Beacon Research

The cost of an HACCP operation is largely made up of the time taken by personnel involved in the study. The time worked by the team and, therefore, the cost of the study depends on four factors: the size of the site, the involvement of team members, knowledge of the hazard examined and the expertise of the person in charge of the study. At Tecaliman, the importance of these factors emerged during the course of seven studies, in the form of an improved performance level with each new study. Nevertheless it appears, in all cases, that around thirty hours work by the team is necessary to be able to propose preventive measures (phase 6) and around another twenty hours to be able to succeed in monitoring critical control points (phase 11).

Within the majority of plants monitored by Tecaliman, the results have been tangible: modification of the process flow diagram, the purchase or removal of equipment, a change in practices, etc. It is even occasionally necessary to curb the desire for change. In effect, this can arise too early in the course of the study. After identifying causes, management may deem resolving a cause highlighted on the basis of an incorrect assessment to be a priority. However, subsequently, on completion of risk assessment, the team may deem the cause to be less important and not judge the investment to be essential. If the investment has already been made, this may be to the detriment of other measures to be implemented and, therefore, turn out to be counter to the method's conclusions. Even though implementation of this method is often lengthy from end to end (around a year), it is necessary to wait in order for it to be effective. For more information on the method and its application, please refer to the document produced by Tecaliman at the end of the technical day on 29th June 1994 (2).

4. Bibliography

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The essentials

- **The HACCP method complements that of quality assurance for ISO 9000 standards**
- **HACCP is a method for guaranteeing control of a single hazard.**