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SHARING GOOD PRACTICES IN SLAUGHTER HYGIENE

**General
Guidelines**

Pork

**Bovine
Animals
(adults)**

**Ovine
Animals**



SHARING GOOD PRACTICES IN SLAUGHTER HYGIENE

General Guidelines

Preface

The European slaughterhouse industry, represented by UECBV, has decided to share some of the **good practices in slaughter hygiene** that are currently employed effectively in some EU slaughterhouses.

This guidance document focuses on **preventing and minimising contamination of fresh meat with faecal or ingesta material during slaughter** by effective means.

The guidance is not intended to be comprehensive and slaughterhouse operators are not obliged to follow the advice in this guide, as there may be other means of achieving the same objective.

There will be other procedures and tools/equipment not included that may be of benefit and these should not be neglected

The guidance may assist slaughterhouse operators to create and develop their own effective measures and practices.

Slaughterhouse operators should consult with their own competent authorities on implementation of any of these good practices in slaughter hygiene as opinions on these may vary.

These practices are dependent on primary producers presenting clean animals, or sufficiently clean animals, such that the slaughterhouse operator's food safety management system and procedures can process them hygienically so as to achieve the microbiological criteria required by regulation.

Legal Framework

The legal framework is the **EU Hygiene rules** (Regulation (EU) 852/2004, 853/2004 and 854/2004) **and the EU General food law Regulation** (EC) 178/2002.

In addition, the European Commission guidance document on the implementation certain provisions of Regulation 853/2004 advises that it is the food business operator who is to develop the means to avoid contamination of the meat so as to ensure that the microbiological criteria required by Regulation is achieved.

The Guidance suggests that guides to good practice may be an appropriate tool to assist slaughterhouse operators to define the means to achieve this objective.

This guidance does not replace other national guidance in this area.

In addition, this guidance document is not HACCP guide, but reference is made to the slaughterhouse operator's HACCP based food safety management system.

This document should be used to support the slaughterhouse operator's HACCP based food safety management system.

How to use the Guide

The guide contains

1. a general part with good practices related to the four species (pigs, bovine, ovine/caprine)
2. followed by species specific parts emphasizing both preventative measures and corrective measures.

The intention is to give information of the good practices in text and pictures as the challenges arise chronologically in the production line.

OVERVIEW

GENERAL PRESENTATION AND RECOMMENDATIONS

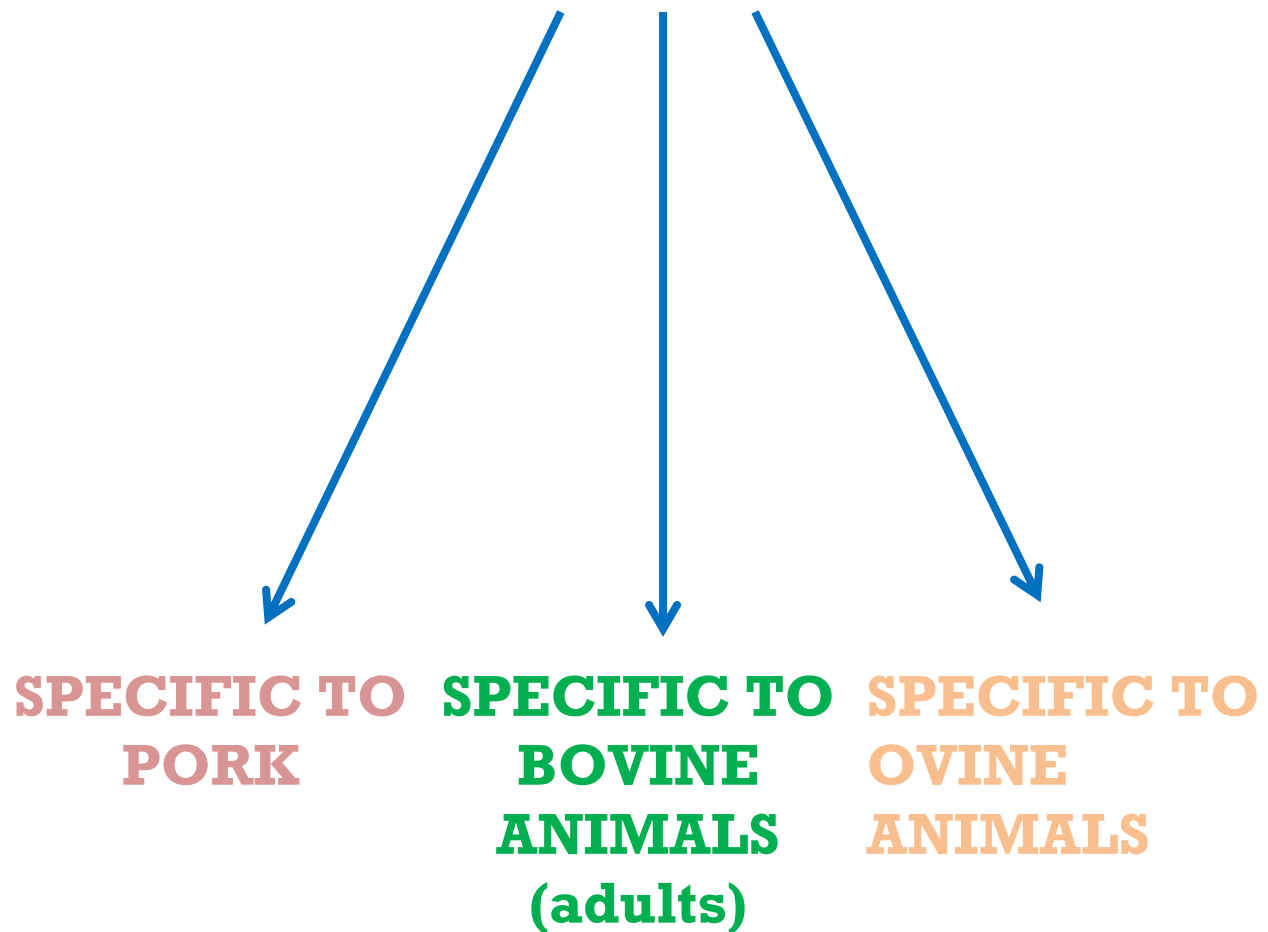


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SHARING GOOD PRACTICES IN SLAUGHTER HYGIENE - CONTAMINATION PREVENTION

General approach

prevention rather than cure, minimise contamination

In slaughter establishments, faecal/ingesta contamination of carcasses is the primary avenue for contamination with pathogens. Pathogens may reside in faecal/ingesta material, both in the gastrointestinal tract and on the exterior surfaces of the animal going to slaughter. Without care being taken in handling and dressing procedures during slaughter and processing, the edible portions of the carcass can become contaminated with bacteria capable of causing illness in humans. Once introduced into the establishment environment, the organisms may be spread directly or indirectly from carcass to carcass.

Therefore, it is important to prevent and minimise visible faecal or ingesta contamination on carcasses including head, tail and toes, and, if contamination occurs, to remove such contamination when found.

Primary producers must present clean animals, or sufficiently clean animals, such that the slaughterhouse operator's food safety management system and procedures can process them hygienically so as to achieve the microbiological criteria required by Regulation.

1. Clean animals

1.1. The Regulations require that the animals be clean

Food business operators rearing (...) animals are to take adequate measures, as appropriate, as far as possible to ensure the cleanliness of animals going to slaughter (Regulation EC 852/2004 - annex I, part A, point II.4c)

Food business operators operating slaughterhouses in which domestic ungulates are slaughtered must ensure compliance with the following requirement: Animals must be clean (Regulation EC 853/2004 – annex III, section I, chapitre IV, point 4)

Ante-mortem inspection shall include verification of food business operators' compliance with their obligation to ensure that animals have a clean hide, skin or fleece, so as to avoid any unacceptable risk of contamination of the fresh meat during slaughter (Regulation EU 627/2019 – article 11.4)

The EU Guidance document on the implementation of certain provisions of Regulation (EC) No 853/2004 on the hygiene of food animal origin addresses clean animals states at point 5.2:

The requirement for animals to be clean is referred to in several parts of the new Hygiene rules:

1. Farmers must take adequate measures, as far as possible, to ensure the cleanliness of the animals going to slaughter (Annex I, Part A, point II. 4(c) of Regulation (EC) No 852/2004);
2. Slaughterhouse operators must ensure that animals are clean (Annex III, Section I, Chapter IV, point 4 of Regulation (EC) No 853/2004);
3. The official veterinarian is to verify compliance with the requirement to ensure that animals that have such hide, skin or fleece conditions that there is an unacceptable risk of contamination of the meat during slaughter are not slaughtered unless they are cleaned beforehand (Annex I, Section II, Chapter III, point 3 of Regulation (EC) No 854/2004)

The background for this requirement is that there is substantial proof that unclean animals have been at the source of carcase contamination and subsequent food poisoning. Animals that are sent for slaughter must therefore be clean enough not to present an unacceptable risk for slaughter and dressing operations.

The objective of the requirement is indeed to avoid contamination of the meat during slaughter so as to ensure that the microbiological quality required by Community law is achieved.

Developing the means for reaching the objective is a task to be achieved by the food business operators concerned. There are different means of reaching the objective, including:

- The effective cleaning of animals, or
- The sorting of the animals in accordance with cleanliness and developing an appropriate slaughter scheme, or
- Developing procedures for the hygienic dressing of animals that must protect carcasses from unnecessary contamination, or
- Other appropriate procedures.

Guides to good practice may be an appropriate tool to assist slaughterhouse operators in defining these means.

It is the task of the competent authority to verify whether the procedures developed by the operators are carried out properly.

1.2. Bovine and ovine/caprine

1.2.1. National strategy on the cleanliness of animals sent at slaughterhouse : a major challenge

These strategies of sector, thought at the national level, contribute strongly to the improvement of the state of cleanliness of the animals which arrive at the slaughterhouse. The implementation of these sector strategies should be encouraged in countries that do not have

Existing cattle sector strategies have similarities; they are often based on the following main principles

Commitment of the sector, supported by the authorities

Animal cleanliness rating grid (photos and scoring)

Individual and systematic recording of the animal's cleanliness

Feedback to the breeder or sanction (authorities) of the breeder or provider

1.2.2. Preparation of animals before leaving the farm

Cleanliness of livestock going to slaughter is influenced by a variety of factors including diet, housing, bedding, clipping, feeding and transport. To ensure livestock arrive clean to the slaughterhouse means giving attention to the preparation of animals before leaving the farm. The aim should be to prevent animals from becoming dirty in the first place, but some degree of cleaning may be necessary.

Every animal should be regularly inspected during finishing and before leaving the farm, and appropriate corrective actions should be taken if necessary.

The following procedures are examples of good practice during finishing of cattle. Farmers should use these and other methods to ensure that they only deliver sufficiently clean animals.

Livestock may self-clean sufficiently if moved to a suitable area with adequate bedding. Sufficient time for animals to clean up should be allowed within this area. Cattle should be housed at the correct stocking density. Ideally, such conditions should exist in the usual finishing pens. Animals that are simply wet or slightly dirty may then be fit for slaughter within a day or so, but if animals are very dirty they could require 3 to 4 weeks to clean up.

Consideration should be given to the finishing diet. It has been shown that cattle fed on straw and water only 1-2 days prior to transport have reduced dung contamination during transport.

Farmers must achieve dry hides and must avoid washing finished cattle before slaughter as the hide must be completely dry before the animal leaves the farm.

1.2.3. The slaughterhouse sets up specific control measures according to the state of cleanliness of the animals

1.2.3 a) Measures of control according to the state of cleanliness of the animal

The FBO have to classify the animals presented for slaughter according to the hide condition. He can use the national rating grid when it exists, or he can have implemented his own system

Dirty animals can not be slaughtered; cleaning or clipping the standing animal are corrective actions that can be put in place to bring the condition of the hide back to cleanliness compatible with slaughter. The use of these corrective actions should not replace the collective will of the livestock sector not to send dirty animals to the slaughterhouse; it is also recalled that actions on live animals involve issues of animal protection and operator safety.

Insufficiently clean animals are slaughtered in accordance with control measures aimed at reducing the risk of cross-contamination. The FBO have to describe in a procedure these measures (example: slaughter by the end of the day) and the internal controls which make it possible to guarantee their good implementation.

1.2.3 b) Case of online clipping, after the death of the animal

Online clipping may be recommended to reduce the level of hide contamination and thus reduce the risk of contamination from the hide to the carcass at the time of hide cutting.

This FBO sets out the procedures for implementation and verification of effectiveness. Examples of good implementation practices are described in part 3.6 of the Guide

1.3. Porcine

Regarding porcine, this guideline addresses slaughtering employing scalding, dehairing and singeing/flaming. The processes in the unclean area must effectively remove faecal contamination on the rind, it is therefore less relevant from a food safety perspective whether pigs are clean at the time of delivery to the slaughterhouse.

1.4. Transporting animals to slaughter

Vehicles should be cleansed and disinfected between transport loads. Stocking rates should follow recommendations and partitions should be used to prevent injuries as a result of under-stocking.

2. Definition

2.1. Identification of faecal/ingesta contamination

Foreign material should be identified based on both colour and texture (visual inspection) as either faecal or ingesta.

Identification of faecal or ingesta contamination should be performed as visual inspection (visible to the human eye) under conditions of routine line speed and with adequate lighting.

2.2. Characteristics

Livestock Feces and Ingesta Contamination Identification Chart

	Beef		Swine	Sheep and Goat
Color	Cattle	Calves	Yellow, tan, brown, or green	Green, brown, to black
	Yellow, green, or brown	White, yellow, tan		
Texture	Fibrous or plant-like texture; may include grain particles depending on diet		May include identifiable grain particles or fibrous plant material	Fibrous or plant-like, feces or ingesta may also be tarry

3. Examples of good practices general prerequisites and SOPs for all species

3.1. Operators' training

Appropriate training of slaughterhouse personnel is a major factor in achieving good carcass hygiene. The level of food safety risk associated with different operations will vary and the training should reflect the risk associated with the operation.

Initial training relating to good practice, in general, hygiene, and the necessity of its implementation to guarantee food safety are a prerequisite.

Further, training prerequisite is an explanation of the job description and any practical training that should ensure that the operators have understood their duties and role in fulfilling meat safety requirements, so that the job will be well done. As an example, job descriptions can be discussed regularly with the operators during one-on-one assessments with their management. This is an opportunity to clarify certain points or to improve the operating procedures.

3.2. Job descriptions

The job description is essential because it is the basis for the training and the evaluation of operators.

An example of a proposed job description can be as follow, divided into three parts:

1. Detailed operating procedure

All steps should be specified in chronological order.

2. Operator hygiene

Hygiene procedures should be specified, depending on operation, species etc. and reflect the risk associated with the specific operation.

3. Recommendations in the presence of contamination

This part should explain what action to take with any contamination, no matter its origin, including incidents during the operating procedure at the workstation or at a previous workstation.

All recommendations for workstations should be included in a standardised procedure for the management of contamination.

3.3. Importance of management / supervision

Management will designate a qualified person to be responsible for supervising operations to ensure that operators are adhering to their job descriptions and Standing Operating Procedures (SOPs) (for example, a line manager). This person has a crucial role for the smooth running of the slaughter hall.

During slaughter operations, the designated person must ensure the implementation of working instructions and good hygiene practices, thereby preventing and minimising any contamination. Regular evaluations of all the slaughter steps and of the hygiene of a representative sample of carcasses before entering the chill can fulfil this obligation.

Relevant documented procedures should allow the prompt detection and appropriate response based on the food safety risk to any deviation from the standard.

3.4. HACCP based system

Ownership and maintenance of the HACCP based system should be developed by an internal team. This is a good way for the HACCP based system to be tailored to the needs of the slaughterhouse and be understood and applied by staff.

The HACCP principles are applied according to the description in Regulation No. 852/2004, Article 5.

These procedures should mean that the necessary action is taken, with a focus on actions that not only address the problem, but prevent it from reoccurring.

It is essential to point out that it is not so important whether or not process steps are called Critical Control Points (CCPs); Critical Points (CPs) or similar, as long as they are appropriately controlled by the Food Business Operator (FBO) by applying general Hazard Analysis and Critical Control Point (HACCP) based procedures.

Recording is as mentioned above essential in order for the FBO to document that the procedure has been correctly followed.

3.5. Health mark application

The FBO is responsible for preventing contamination to the extent possible¹. Any contamination must be removed without delay to prevent cross contamination² according to the Regulation EC/853/2004.

The choice of methods used to satisfy this obligation is up to the FBO within the framework of the legislation.

The FBO must have an internal procedure of management of contamination which is relevant and which ensures the cleanliness of the carcasses. According to the configuration of the slaughter line and particularly the location of finishing operators, the removal of contaminations can occur before or after the Post-Mortem Inspection (PMI). In all cases, health mark is applied after the removal of contamination

¹ Regulation no. 854/2004, Annex I, Section I, Chapter 1, point 1 & 2, litra b).

² Regulation 853/2004, Annex III, Section I, Chapter IV, point 10.

Removal of contaminations before the PMI: this practice, if feasible and within a clear framework and with specified procedure (for example, well-defined contaminations), can, in some cases, decrease the risk of cross-contamination.

Removal of contaminations after the PMI: finishing operators are often located at the very end of the slaughter line to correct everything that may have occurred upstream. This location is relevant on the sanitary level but it implies that the health mark is not applied at the PMI workstation, but further, on the line or out of the line, in the framework of a procedure agreed upon jointly by the FBO and the CA. The removal of contamination out of the line does not imply necessary a detaining of carcasses; on the contrary, an almost immediate trimming should be preferred to limit cross contaminations.

3.6. Commission guidance document on the implementation of certain provisions of Regulation (EC) No. 853/2004 on the hygiene of food of animal origin

Slaughterhouse operators must ensure that animals are clean. Animals sent for slaughter must be clean enough so as not to present an unacceptable risk for slaughter and dressing operations. The objective is to avoid contamination of the meat during slaughter and dressing so as to ensure that the required microbiological quality is achieved. As stated in the Commission guidance document on the implementation of certain provisions of Regulation (EC) No. 853/2004 on the hygiene of food of animal origin the food business operator is tasked with developing procedures to achieve this. The guidance lists different ways of achieving the objective, including:

- The effective cleaning of animals, including ante or post mortem clipping³, or
- The sorting of animals in accordance with cleanliness and developing an appropriate slaughter scheme, or
- Developing procedures for hygienic dressing of animals that must protect carcasses from unacceptable contamination, or
- Other appropriate procedures.

On arrival at the slaughterhouse, the plant operator should assess and categorise the animals (bovine, ovine), as follows:

- Animals that have been assessed as being clean enough to be slaughtered using routine standard hygienic dressing procedures;
- Animals that can only be slaughtered by using extra defined appropriate controls;
- Animals unfit for slaughter as they are too dirty, particularly if wet. These animals should not be presented for ante mortem and the slaughterhouse operator must take the required remedial action.

Post slaughter clipping, or other post-mortem cleaning methods, can be used at the abattoir providing the operator can demonstrate that the clipping or cleaning procedure effectively controls any food safety risks that may arise. Hide clipping, both ante and post mortem, have been shown to be an effective intervention.

On-line clipping facilitates the removal of adherent material, including faecal material, prior to the commencement of carcass dressing.

Its use, in conjunction with good hygiene practice during dressing, can contribute significantly to a reduction carcass contamination.

Taking into account on-line clipping, consideration should be given to the following points:

³ See the peer review paper on post mortem on-line clipping [HERE](#)

- The on-line clipping area should have good extraction facilities and means of disposing of clippings;
- The on-line clipping work station should be positioned between the bleeding and first legging stands;
- A rise and fall stand should be provided to allow ease of access to areas of the hide that require clipping.
- On-line clippers may incorporate suction at the clipping head for the removal of clipped and other material.
- On-line clipping is recommended particularly for the area near the incision line, e.g. the hind quarter, including the tendon region and the midline belly, 15 cm on either side of the intended incision line, down to and including the brisket if the brisket is to be opened.
- Dirtier animals particularly in a wet condition should not be allowed for slaughtering until the hide has dried, and the possibility of cross contamination is significantly reduced.

4. Use of additional hygiene tools

The compliance with good hygienic slaughtering practices is a prerequisite to the production of safe meat. To assist in producing a clean carcass there are additional hygiene tools available to the industry.

These tools are complementary to the good hygiene practices and **not a substitute to them.**

The sanitary added value of these tools is proved but it is limited.

It can be supposed improved by a multi-hurdle approach: use substances authorized by the regulation 853/2004 to reduce surface contamination at several points of the line according to the risk analysis led by the FBO.

At date, the only authorized substances are potable water (to be used when slaughtering all species) and lactic acid (only allowed for use when slaughtering bovine animals).

4.1. Decontamination using a steam vacuum system

(Source: Bieche, IDELE-INTERBEV, 2014)

4.1.1 Context

Several studies on the effect of using steam vacuum systems to treat carcasses have shown significant reductions in the surface contamination of carcasses.

The steam vacuum system involves two actions:

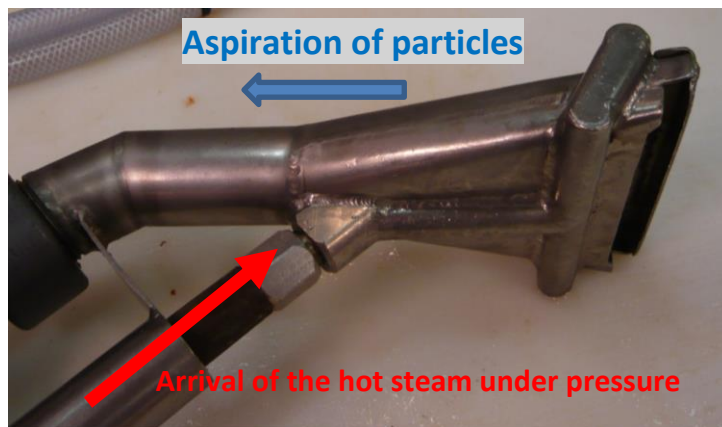
1. The mechanical aspiration of the contamination by vacuum, which results in a visibly clean carcass and removes the major part of the microbiological contaminants.
2. The thermal destruction of microorganisms by using a hot steam jet.

It is a tool used in conjunction with good hygienic practices (GHP), with no adverse affects on hygienic practices employed at plants.

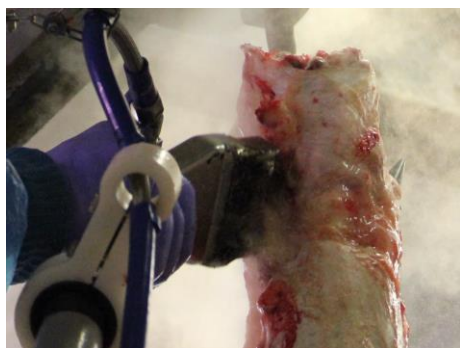
4.1.2 Possible uses

(i) on the slaughter line

- (i) a. Instances of carcasses with well-defined contamination.



Photos: Features of the cleaning head



YES



NO

Photo: Proper positioning of the cleaning head, properly adhering to the surface of the carcass

The steam vacuum system is used to remove the visual contamination. It is recommended to apply the cleaning head over the entire contamination, protruding at least 10 cm beyond the contamination and ensuring at least one passage at any point of the treated area.

In the case where the contamination is trimmed before being treated with the steam vacuum system, the area to be treated must be clearly indicated.

(i) b. Case of systematic treatment of carcasses, known as "grooming" (*"toilette"* in french), to reduce microbiological surface contamination of carcasses.

This general treatment is more or less extended to the carcasses, and it must treat, as a priority, the anatomical zones of the carcasses known to be the most contaminated (e.g. brisket, collar, hocks ...) as defined by each company.

(ii) Use outside the slaughter line

For extended or multiple contaminations, real time corrective action (i.e. on the line) seems to be undesirable. The treatment of these contaminated carcasses can require different interventions: trimming, removal of peritoneum etc., alone or in combination. Steam vacuum system can be used to perfect the compliance of carcasses.

4.1.3 Cleaning the steam vacuum equipment cleaning head during production

The cleaning head is heated by the means of steam and any residual particles are immediately removed; therefore there is no risk of cross contamination between carcasses via the steam vacuum system.

It is not necessary to disinfect the steam vacuum system between two carcasses, but the operator must of course regularly monitor the visual cleanliness of the cleaning head during production; if necessary, any agglutinated particles are removed with a hard brush. The cleaning head can be immersed in hot water to facilitate the removal of particles.

4.1.4 Preliminary requirements

Layout of Steam vacuum systems differs between suppliers. And, as the effect depends both on the layout and the operating conditions (treatment time, type/power of vacuum pump, amount/pressure of steam), the effect under the operation conditions used should be verified by the user or the supplier.

Firstly, the company or supplier must define precise conditions for the use of the steam vacuum system, according to its objectives (treatment of visible contamination, routine grooming of certain anatomical carcass sites etc.).

This is required to:

- Quantify the effect of reducing the bacterial contamination obtained under the real conditions;
- Check that the treatment conditions (temperature and pressure of steam, action of the operator) do not alter the carcasses permanently (risk of cooking).

The operating speed of the cleaning head is important: if speed is too fast it tends to reduce the effect of decontamination; if too slow it may alter and cook mark the treated surface. A medium speed must, therefore, be found.

4.1.5 Monitoring

1. Control of physical parameters of steam

Temperature and pressure of the steam: the values set by the initial qualification must remain constant over time.

2. Monitoring of good practices of use of the steam vacuum system.

The operator must follow the internal procedure, in particular concerning the following points:

1. Compliance with the areas to be treated on the carcass, as defined by the company;
2. If the initial qualifications have not shown that simply removing the visible contamination results in a satisfying reduction of the bacterial contamination, then duration of treatment per surface to be treated and the speed of passage of the cleaning head should be monitored;
3. Proper positioning of the cleaning head, properly adhered to the surface of the carcass;
4. The fact that the operator does not leave the cleaning head stationary on the carcass, because this could scald the surface of the carcass at this point;
5. Regular cleaning of the cleaning head with a hard brush to ensure the effectiveness of the treatment

These checks are visual.



Photo: direct the carcass and hold it to stabilize it during treatment



Photo: brushing the cleaning head with hot water

4.2. Lactic acid

FBOs can use lactic acid to reduce microbiological surface contamination on bovine carcasses or half carcasses or quarters at the level of the slaughterhouse, in compliance with the conditions set out in the Regulation 101/2013.

Each FBO should define the best combination of parameters necessary to ensure a good efficiency, without bringing any irreversible physical modification of the meat.

These parameters are the concentration (between 2% and 5%), temperature (up to 55°C) and applying (spraying or misting).

The efficiency of the lactic acid treatment can be assessed on the decrease of hygiene indicator bacteria or on the decrease of pathogen bacteria.

4.3. Hot water washing



High temperature water (>74°C) is sprayed onto the entire carcass as the last step prior to chilling.

It is authorized to use recycled hot water (in compliance with the conditions set out in the Regulation 1474/2015), which improves the economic profitability of the treatment.

The level of reduction of surface contamination depends on the characteristics of the cabin (nozzle type, in particular) and especially on the conditions of use (spraying time, pressure and water temperature).

This technology is routinely used in many Australian, Canadian, American and, more recently, European slaughterhouses.

4.4. Steam Pasteurisation System (SPS)

(Source: ANSES' opinion of December 10th 2010)

This process, located at the end of the slaughter line, is fully automated. The treatment of carcasses is carried out in three steps.

As a first step, the surface of the carcasses is dried with pressurized air. The objective of this operation is to increase the decontaminating effect of steam which will then be applied. Under the conditions of slaughter in the United States, the necessity of drying is probably amplified by the fact that, upstream the chain, the carcasses are generally showered.

The second step consists in exposing the carcass to steam at 105°C for a period of 6 to 8 seconds in a completely hermetic cabin. The surface temperature of the carcass is instantly increased to 91-94°C.

During the third step, the surface temperature of the carcass is lowered to a temperature inferior to 20°C by sprinkling chilled water ("eau glacée" in French). The objective of this cooling is to prevent the surface cooking of the meat from causing irreversible alterations in the appearance of the carcasses (mainly colour)

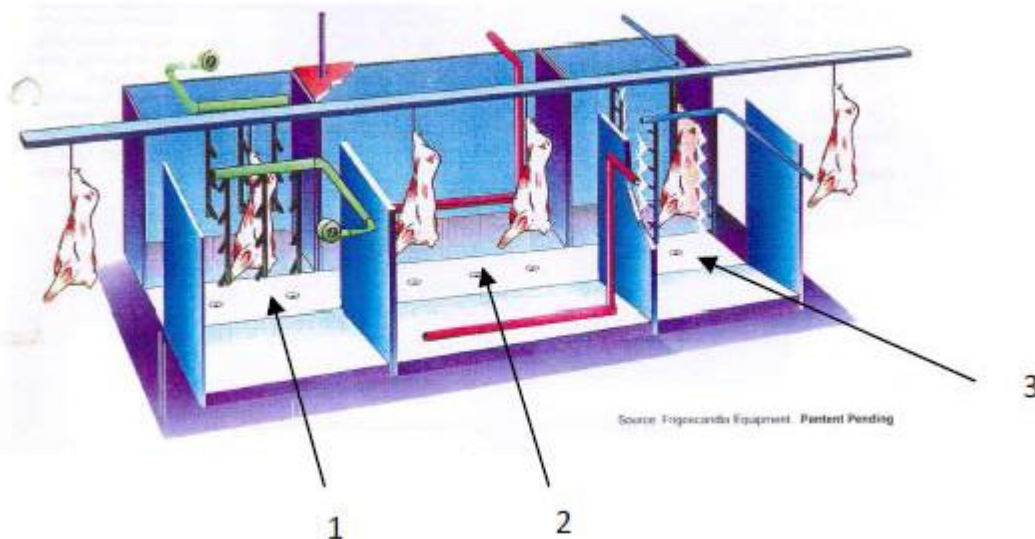


Illustration: Principle of the SPS cabin, based on the spraying of carcasses with steam:

- 1: drying of the carcass (air under pressure)
- 2: steam treatment (6-8 seconds)
- 3: cold shock (sprinkling of chilled water)

The installation of SPS cabins requires space and facilities (entry and exit water etc.). It is easier to put in place when the slaughter line is designed for this equipment.

SPS designed cabins have been integrated into many US and Canadian slaughter chains. However, to our knowledge, these cabins are not marketed in Europe (although their use is allowed by European regulation).

4.5. Flaming

Flaming/singeing is a pork slaughter step. The surface temperature reaches approximately 100°C, which reduces the surface contamination of the carcasses. Normally, the occurrence of gram-negative pathogens is very low on the rind after the operations in the unclean area. This is due to the combined effect of scalding, dehairing, flaming/singeing and scraping/brushing/polishing.

If occurrence of gram-negative pathogens is a problem on the rind after the operations in the unclean area, a second flaming before evisceration can be used to reduce the number of pathogens.

5. Specific good practices per specie

5.1. Specific part for pork



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SHARING GOOD PRACTICES IN SLAUGHTER HYGIENE

- Pork -

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In Europe, use of dehiding is rare when slaughtering pigs. And the following, therefore, only addresses slaughtering employing scalding, dehairing and singeing/flaming.

Practices regarding how operations are carried out and the degree of automation vary a lot between slaughterhouses. Therefore, the descriptions in the following are on an overall level, and it is important that each establishment evaluates the risks associated with the specific setup

1. Identification of faecal/ingesta contamination

Colour: The colour of faecal or ingesta contamination is grey/tan to dark brown.

Texture: In general faecal or ingesta contamination has a fibrous or plant-like texture.

Swine faeces and ingesta may include identifiable grain particles.

1.1 Pre-requisites – porcine

Carcasses should be without visible faecal contamination after the processes in the unclean area (scalding, dehairing, singeing/flaming and polishing).

This is possible to achieve by controlling the physical parameters associated with the processes in the unclean area.

It is important that each establishment verify the effect of processes in the unclean area as one whole process, since the specific operations will vary between establishments and the overall effect will depend on the interaction between the specific processes.

When processes in the unclean area are effectively controlled, they will remove fecal contamination, in which case it is irrelevant, whether pigs are dirty or not at the time of delivery to the slaughterhouse.

A monitoring system should be in place giving the management detailed knowledge about how often faecal contamination occurs and how efficiently it is removed. Furthermore, the results from the monitoring system should be used to define acceptable limits for the frequency of faecal contamination.

1.2 SOPs - porcine

The nature and number of SOPs will highly depend on the size of the operation and to which degree it has been automated. Regarding the unclean area, SOPs must deal with how bristles/hair and dirt are efficiently removed without unnecessary contamination of the rind.

Regarding manual operation, SOPs should deal with how faecal contamination is removed and how the processes are brought back into control in the cases where the frequency of faecal contamination is unacceptably high. Furthermore, it must be clear who inspects the carcasses, and who has the responsibility to react if faecal contamination is out of control.

In those cases where contamination is unavoidable, e.g. adherent intestines, a procedure should be in place to prevent cross-contamination to other carcasses.

If critical operations are automated, SOPs should also deal with maintenance and supervision of equipment during operation.

Automatic equipment is characterized by carrying out operations in a uniform way. If equipment fails, it can be expected that a high frequency of the carcasses passing the equipment will be affected. Therefore, the function of automatic equipment should be supervised, and it should be clear who has the responsibility to deal with malfunctions.

2. Risk events

The risk events on the clean line are bunging, midline opening and evisceration.

2.1 Bunging & Midline opening and evisceration

2.1.1 Bunging

Loosening the rectum from the surrounding tissue can be done manually using a common knife, manually using special tools consisting of a circular knife with a vacuum system attached to it (bung dropper), and automatically.

A very efficient way to prevent visible faecal contamination is to prevent the bung (rectum) from touching the carcass, until it is wrapped in a bag (or until the intestines have been removed). In those cases where the operation is carried out automatically, the bung can be positioned in a rail until an operator can wrap the bung in a bag.

2.1.2 Midline opening and evisceration

Midline opening is to be done with great care in order to avoid puncture of the guts. When removing the stomach and intestines, 2 cm of the oesophagus should be left on the stomach to minimize spilling of stomach content.



2.2 Causes and action taken

When faecal contamination occurs, necessary actions should be taken to prevent spread of the contamination to other carcasses until the contamination has been removed.

Contaminations can be removed either by knife or by the use of steam vacuum systems, see picture below.



Studies have shown that steam vacuum systems can be equal to or better than trimming measured on the numbers of *E. coli* left after removal of faecal contaminations. Layout of Steam vacuum systems differs between suppliers. And, as the effect depends both on the layout and on the operating conditions (treatment time, type/power of vacuum pump, amount/pressure of steam), the effect under the operation conditions used should be verified by the user or the supplier. Furthermore, care must be taken to avoid irreversible colour changes on the treated areas.



If the frequency of contaminated carcasses is above the acceptable, actions should be taken to find the cause and correct it. An example could be an increased frequency of contaminated carcasses, where the contaminations are on the cutline above the sternum, which is found to be due to an operator not being sufficiently trained. In that case, a corrective action would be to retrain the operator.

5.2. Specific part for bovine animals



SHARING GOOD PRACTICES IN SLAUGHTER HYGIENE

- Bovine Animals (adults) -

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I. Clean animals

As mentioned in the general part of the guide, according to Annex I, Part A, point II. 4(c) of Regulation (EC) No 853/2004, farmers must take adequate measures, as far as possible, to ensure the cleanliness of the animals going to slaughter.

Slaughterhouses have to accept the animals and can't send them back. They need to develop procedures so that risks are mitigated. The [EU guidance on Regulation 853/2004](#) explains it is possible to develop procedures for the hygienic dressing of animals that must protect carcasses from unnecessary contamination.

II. Definition of contamination

1. Contamination with faecal/ingesta material

The colour of faecal or ingesta bovine contamination is: green, yellow, or brown/black.

In general, faecal or ingesta contamination has a fibrous or plant-like texture.

Photo 1:

Green bovine contamination:
fibrous particles and corn

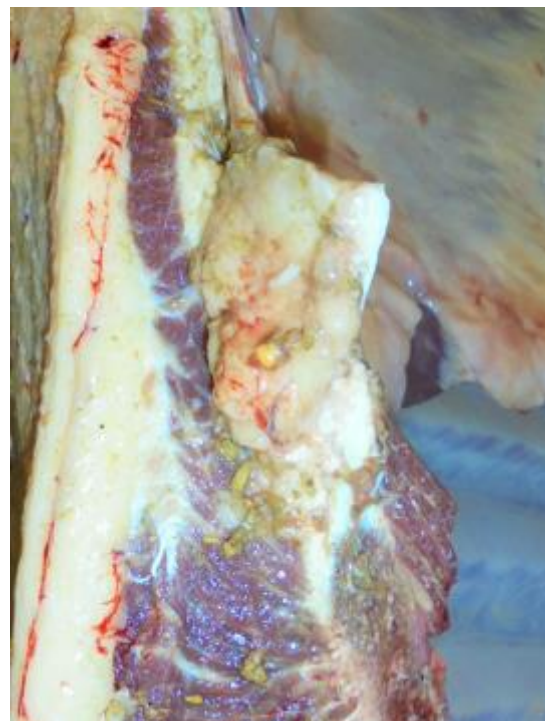




Photo 2:

Yellow contamination



Photo 3:

Brown/black contamination

2. Visible to the human eye

Contamination must be visible to the human eye at routine line speed and adequate illumination.

The sensitivity of visual inspection is never 100%, especially for very small particles.

Contamination can be missed, even by staff that is well trained and rested.

That is why prevention is better than cure to minimize contamination.

3. Contamination from the hide or the digestive tract

Contaminations from the hide are caused by the contact between the hide and the carcass during pre-dehiding and dehiding.

Contaminations from the digestive tract are caused by the rupture of the digestive tract during evisceration.

4. Contamination is minor/well defined

Characteristics of minor/well defined contamination are:

- No flowing
- Ease of trimming = an appropriate action (two appropriate actions in difficult areas)

Example: contamination from the hide...

Photo 4:
Contamination from the hide during
pre-dehiding of the flanks



5. Or contamination is major/diffuse

Major/Diffuse contamination does not fit the characteristics of minor/well defined contamination; particularly,.

Example: contamination from the digestive tract...

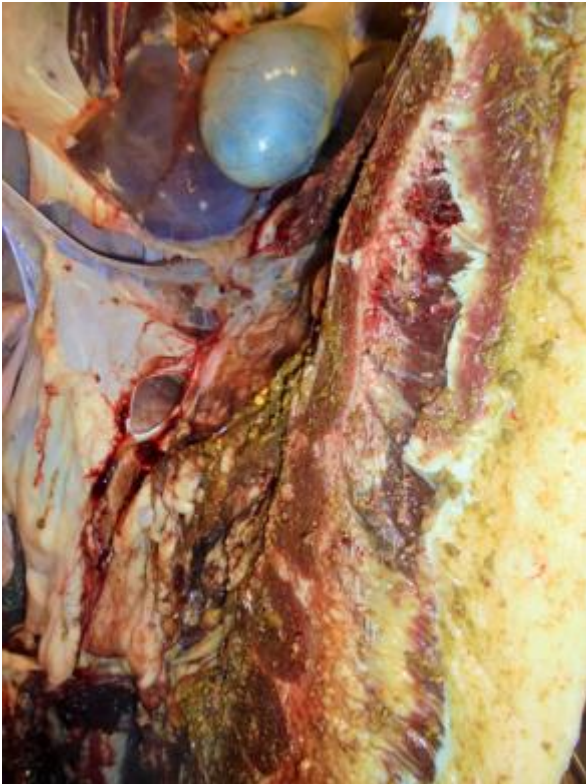


Photo 5:

Contamination from a rupture of stomachs during evisceration (cause: abscess = glued stomachs)

III. Prevention and management of contamination from the digestive tract

1. Workstations at risk on the slaughter line

Four workstations on the slaughter line can cause contamination from the digestive tract. These are “bunging of the rectum”, “brisket opening”, “weasand closure” and “evisceration”.

In this part, for each at-risk workstation, specified good slaughter practices and events which can lead to a deviation from the operating procedure are described.

1.1 Bunging of the rectum

1.1.1 Opening procedure

It is possible to rinse the anus: it has not been proved that this decreases cross contamination from the hide to the carcass, but it offers a better working environment to the operator.

The operator inverts a bag over the forearm and the hand which does not hold the knife.

With this “dirty” hand, he grips the anus.

With his “clean” hand, he cuts around the anus.

He extricates the rectum gradually by cutting membranes with the knife. The operator finishes by using his “clean” forearm and hand to free the rectum in depth.

He uses his “clean” hand to return the inverted bag over the rectum, as high as possible and then he replaces the rectum, as much as he is able to (that is to say, on the length of his arm), in the abdominal cavity.



Photo 6:

Anus of a bovine animal,
view from the operator
“bunding of the rectum”



Photo 7:

The “dirty” hand grips the anus



Photo 8:

The “clean” hand cuts around the anus

Photo 9:
The inverted bag is returned over the rectum, as high as possible





Photo 10:

Rectum bag closed with a link to tighten

Photo 11:
Rectum well replaced deep in the abdominal cavity, *view from the operator's "abdominal evisceration"*



1.1.2 Operating procedure (alternative)

It is possible to cut around and to bung the rectum after the skinning of the carcass. At the hide puller workstation, the operator must cut the hide between the anus and the tail when the hide descends.

Then, the operating procedure to cut around and to bung the rectum is the same as previously described.



Photo 12: Cutting of the hide between the anus and the tail

Photo 13:
At the hide puller workstation, the rectum is not yet cut around and bunged.





Photo 14:

Anus after the skinning of the carcass, *view from the operator's "bunging of the rectum"*

Photo 15:

The "dirty" hand grips the anus and the "clean" hand cuts around the anus.



1.1.3 Events which can lead to a deviation from the operating procedure

a) Inappropriate actions of the operator

- Sticking the knife in the rectum
- Incorrect positioning of the bag

If the bag is not tied high enough over the rectum, it can slide during abdominal evisceration.

- Incorrect positioning of the rectum

If the rectum is not replaced deep enough in the abdominal cavity, it can re-emerge when an electric stimulation is applied to the carcass at the hide puller workstation; this means a higher risk of sliding and removal of the bag.

b) Equipment: bag clamp failure

It is preferable to use a bag with a link to tighten it rather than a bag with elastic (bags with elastic stay less well put in place).

To note, the link could have a manufacturing defect and it may not tighten sufficiently (this defect would concern the whole batch of bags).

1.2 Weasand closure

1.2.1 Operating procedure

For this workstation, it is easier for the operator to be right-handed.

The animal's throat must be clearly cut.

With his left hand, the operator grips the thymus and with his right hand, he removes it.

With his left hand, the operator grips the weasand and, with his right hand, he separates it from the trachea: the weasand must be well extricated (but not cut).

He first uses the clip rodder to free the weasand from sinews and membranes over its entire length.

He puts in place the clip on the extricated weasand with the teeth downwards.

He uses the clip rodder a second time to put in place the clip high on the weasand, close to the stomachs.



Photo 16:

With his left hand, the operator grips the weasand and with his right hand, he separates it from the trachea

Photo 17:

The operator first uses the clip
rodder to free the weasand
from sinews and membranes
over its entire length



Photo 18:

The clip is put in place on
the extricated weasand
with the teeth downwards

1.2.2 Events which can lead to a deviation from the operating procedure

a) Position of the clip

Adjusting the length of the weasand clip rodder: the clip must be pushed along the weasand up to the very end. If the pressure is manual, the operator will feel the stop against the stomachs. If the pressure is pneumatic, controls should be done at the installation, then periodically, thereafter.

The visual mark is that the clip must be close to the stomachs; this can be checked after the evisceration.



Photo 19:

The “digestive mass” after evisceration: the clip must be close to the stomachs

If the clip is not sufficiently high on the weasand, there will be a problem during evisceration.

If the clip is high, it means that it crossed the diaphragm; so there will be no barrier during the evisceration; the weasand will slide and follow the descent of the stomachs.

If the clip is not high enough, it will be trapped under the diaphragm and it will prevent the weasand from sliding and following the descent of the stomachs during evisceration: there will be a tearing of the weasand and a risk of contamination.



Photo 20:

View from the operator's
“abdominal evisceration”



Photo 21:

Zoom of the photo 20 on the weasand and the clip

The clip is high: the weasand slides and follows the descent of the stomachs

Extra attention to be paid when a pneumatic weasand clip rodder is used: the length must not be set too high to avoid impacting the stomachs; the risk is to tear the reticulum.

b) Quality of the clips

The clip could have a manufacturing defect and it could break (this defect would concern the whole batch of clips).

c) Orientation of the clip

The clip must be put in place with the teeth downwards to stay in place.

d) Size of the weasand

If stomachs are full (problem of animals eating before being slaughtered), sizable regurgitations are possible. In this case, it is difficult to ensure a good closing of the clip. A solution can be to put in place a second clip.

e) Inappropriate actions of the operator

1.2.3 Operating procedure with a plug

A weasand plug system enables the sealing of the oesophagus through the animal's mouth without entering the hide cut.

The operative holds the applicator that is connected to the machine with a high tech multi hose. The machine delivers vacuum, hydraulic force and water to the applicator.

The operative places an oesophagus plug onto the applicator. By using a remote control the operative activates the machine. The system is now inserted into the animal's mouth.

The applicator passes through the gullet pushing any accumulation of feed towards the rumen. The operator inserts the multi hose further into the carcass. The insertion is done manually in order for the operator to feel it's way towards the rumen entrance and stop when this point is reached. By applying vacuum in the centre of the plug the oesophagus is instantly sucked into the plug. The plug now acts as a watertight seal, preventing any leakage from the rumen. The plug is left attached to the entrance to the stomach sealing the weasand.

The applicator automatically disconnects from the plug and sprays rinsing water into the oesophagus, just below the plug. Any remaining content is rinsed out while the applicator is retracted from the carcass. The procedure of sealing the oesophagus is now complete.

Further on the slaughter line, the operator at the evisceration workstation cuts the weasand just below the plug. As the lower part of the weasand has been rinsed beforehand, this cut can be undertaken without any adverse effects or contamination.



Photo 22:

The operator inserts the applicator in the animal's mouth and he goes up into the weasand; the water pushes any accumulation of feed towards the rumen and rinses the weasand

Photo 23:

During the evisceration, the operator cuts the weasand just below the plug

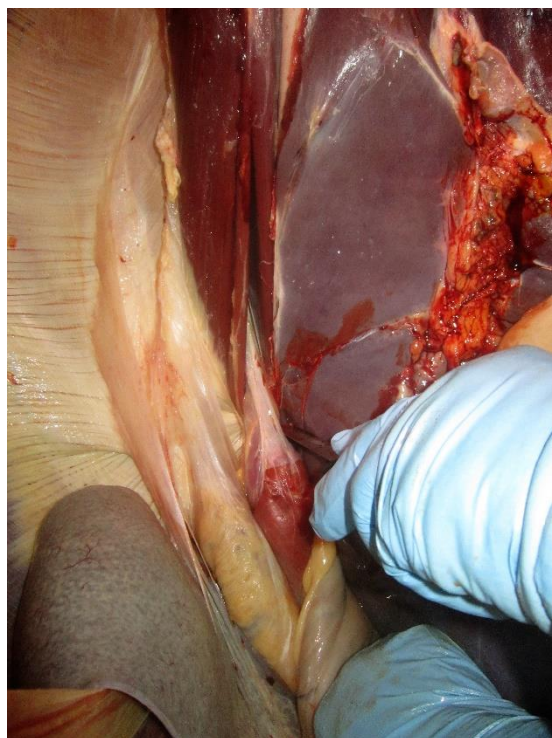


Photo 24:

The “digestive mass” after evisceration: the plug is at the entrance of the rumen and the weasand is cut below the plug

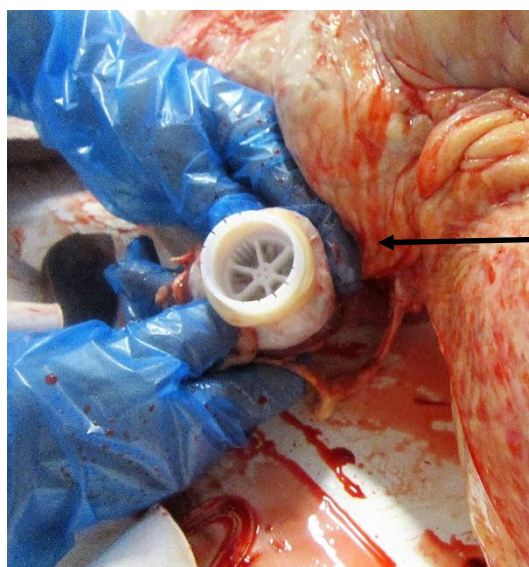
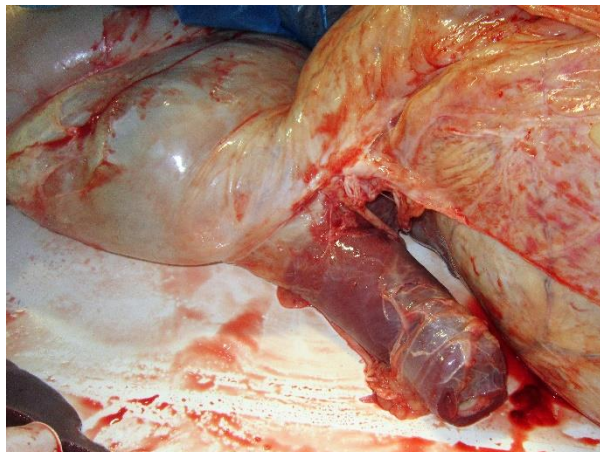


Photo 25:

View into the plug of photo n° 24:
The weasand was sucked in and blocked in the windows of the plug

1.2.4 Events which can lead to a deviation from the operating procedure

a) Position of the plug

As for the clip, the plug must be placed just before the rumen:

- Not too high, otherwise it falls into the rumen and the weasand is not sealed (the operator knows that the plug has fallen into the rumen because of the presence of digestive content in the rinse water).
- High enough to avoid cutting in the higher part of the weasand, which is full of digestive content

b) Size of the weasand

If stomachs are full (problem of animals eating before being slaughtered), the weasand can be dilated and it can be difficult to put in place the plug.

1.3 Brisket opening

1.3.1 Operating procedure

It is a two-step procedure which takes place after skinning.

The operator cuts the sinews in the median plane, then he uses the brisket opener saw respecting angle (45°C) and depth recommendations.



Photo 26:

The operator uses the brisket opener saw respecting angle (45°C) and depth recommendations

1.3.2 Events which can lead to a deviation from the operating procedure

a) Inappropriate actions of the operator

If the angle or the depth of penetration of the saw is not respected, there is a high risk of the perforation of the abomasum.

b) Equipment

It is advised to blunt the tip of the saw blade to avoid gripping the abomasum.

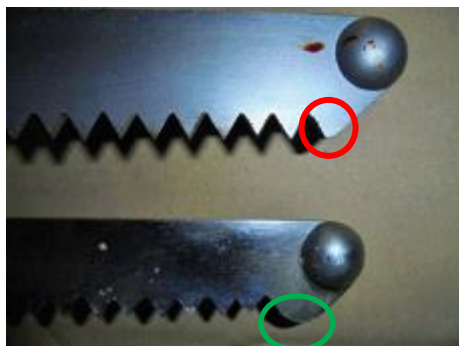


Photo 27:

New saw blade: not blunt first teeth

Photo 28:

Used saw blade: blunt first teeth

c) Size of the abomasum

If the stomachs are full (problem of animals eating before being slaughtered), the abomasum can stick out once with the opening of the brisket, and there is a higher risk of perforation of the abomasum by the saw.

1.4 Abdominal evisceration

1.4.1 Operating procedure

The operator cuts the sinews above the sacrum in the median plane and begins cutting the white line.

He continues to cut the white line from top to bottom, keeping the point and edge of the knife outside the carcass.

Then, it is advised to put in place a “belly spreader” to open the abdominal cavity.

The operator extricates the colon towards himself by cutting the membranes.

Then, the extrication of the abdominal mass is facilitated by gravity: when the top membranes are cut, the abdominal mass begins to fall. The operator has to accompany the descent by cutting the membranes at the right places in due time to prevent the tearing of stomachs or intestines (with the peritoneum, the liver and the pancreas).

Photo 29:

The operator cuts the sinews above the sacrum in the median plane and begins cutting the white line



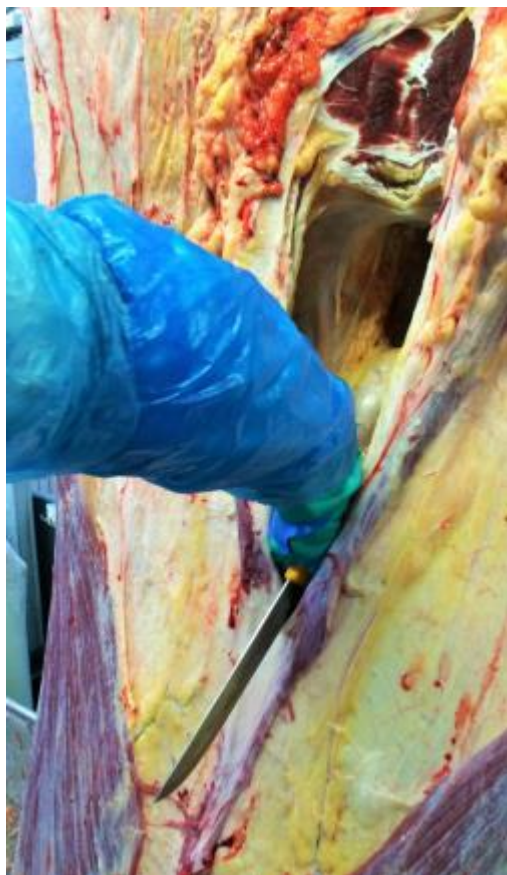


Photo 30:

The operator cuts the white line from top to bottom, keeping the point and edge of the knife outside the carcass

Photo 31:

It is advised to put in place a “belly spreader” to open the abdominal cavity





Photo 32:

The operator extricates the colon towards himself by cutting the membranes



Photo 33:

The operator cuts the membranes with the peritoneum



Photo 34:

The operator cuts the membranes with the liver and cuts into the pancreas



Photo 35:

The abdominal cavity after abdominal evisceration, *view from the operator's "abdominal evisceration"*

1.4.2 Events which can lead to a deviation from the operating procedure

a) Size of stomachs

If the stomachs are full (problem of animals eating before being slaughtered), they are heavy and they fall very fast. So the operator does not have the time to accompany the descent; particularly, he does not have the time to cut the membranes at the right places and there is a serious risk of tearing the weasand, stomachs or intestines.

b) Presence of peritoneal accretions, an abscess or a tumour

In the three cases, the operating procedure is more difficult, particularly because it can be impossible to cut the membranes at the right places. So, there is a risk of contamination.

Concerning abscesses, there is an additional risk of the perforation of the abscess and the contamination of the carcass by pus.

c) Inappropriate actions of the operator

2. Characteristics of contamination in case of a loss of control on a workstation at risk

The objective of this part is to characterize the contaminations which can be caused by the events leading to a deviation from the operating procedure (and previously described in this document).

2.1 Deviation from the operating procedure “Bunging of the rectum”

Clear perforation of the rectum

Detection of risk event	Operator “bunging of the rectum”
Presence of faecal contamination	Always
Type of contamination	Diffuse and extended
Possible places	Rump Abdominal cavity
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

Light perforation of the rectum

Detection of risk event	Difficult for the operator “bunging of the rectum” to see and may only be visible when observing the visceral mass
Presence of faecal contamination	Possible, but not always. The bag can cover the perforation of the rectum and contain some spillage (when the bag is well back on the rectum, the bagging area covers the cropping area)
Type of contamination	Diffuse
Possible places	Rump Abdominal cavity
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

Removal of the bungbag during the evisceration operation

Detection of risk event	Operator “evisceration”
Presence of faecal contamination	Possible, but not always. If, at the moment of the removal of the bag, the rectum is already well separated, eventual spillage can fall on the visceral mass, without contact with the carcass
Type of contamination	Diffuse
Possible places	Abdominal cavity
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

Sliding or perforation of the bungbag during the evisceration operation

Detection of risk event	Operator “evisceration”
Presence of faecal contamination	Possible, but not always. The risk emerges if there has been a perforation and if the perforation is now uncovered: there is a risk of spillage on the carcass. The risk is less if the separated rectum falls on the visceral mass, without contact with the carcass.
Type of contamination	Diffuse
Possible places	Abdominal cavity
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

2.2 Deviation from the operating procedure “Weasand closure”

Extraction of weasand during the evisceration operation

Detection of risk event	Operator “evisceration”
Presence of faecal contamination	Possible, but not always
Type of contamination	Diffuse
Possible places	Abdominal cavity Thoracic cavity
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

Open weasand during the evisceration operation

Detection of risk event	Operator “weasand closure”
Presence of faecal contamination	Possible, but not always
Type of contamination	Diffuse
Possible places	Thoracic cavity Forelegs
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

2.3 Deviation from the operating procedure “Brisket opening”

Clear perforation of the abomasum with the brisket opener saw

Detection of risk event	Operator “brisket opening”
Presence of faecal contamination	Always
Type of contamination	Diffuse and extended
Possible places	Breast Thoracic cavity
Detection of visible contamination and identification of the carcass (example)	Operator “brisket opener saw”

Light perforation of the abomasum with the brisket opener saw

Detection of risk event	Operator “brisket opening” or nobody
Presence of faecal contamination	Always
Type of contamination	Diffuse, but very localised
Possible localisations	Breast
Detection of visible contamination and identification of the carcass (example)	Operator “finishing”

2.4 Deviation from the operating procedure “Abdominal evisceration”

Perforation of stomachs or intestines during the evisceration operation	
Detection of risk event	Operator “evisceration”
Presence of faecal contamination	Possible, but not always
Type of contamination	Diffuse and extended
Possible places	Abdominal cavity Thoracic cavity Breast
Detection of visible contamination and identification of the carcass (example)	Operator “evisceration”

3. Procedure of the management of contamination from the digestive tract

3.1. Elements to be included in the procedure

The person in charge of the management of contamination should remember the key points previously described in the document:

- The definition of contamination
- The workstations at risk
- In the case of contamination from one of the workstations, which explanations are possible, which event could cause contamination at the slaughter step?

The procedure should specify the treatment of contamination:

- A systematic identification of contaminated carcasses according to the origin (the workstation)
- A different treatment according to the characteristic of the contamination: minor/well-defined or major/not-well defined
- This treatment should describe: who, when, how
- The cleaning of work station if contaminated (with attention to the risk of splash on carcasses), rinsing and sterilisation of utensils (knives etc...), cleaning of hands and forearms)

Then, the procedure should introduce the record which allows documentation of detection and correction of hygiene during slaughter.

This document presents an example of such record.

3.2. Other elements to take into account in the developing of the procedure

It is difficult, in light of the available literature, to rule on the sterile/not sterile property of the bile. In any case, the induced green coloration may require the removal of a part of the pleura or peritoneum.

According to current studies, urine is sterile. The spillage of urine is not a microbiological danger.

Immediate trimming is recommended: for better visibility, easier trimming (soft fat) and to avoid cross contamination.

In practise, trimming is the most used means to remove visible contamination (trimming by a knife or a circular cutter), but any alternative means having an equivalent effect can also be used (for example, use of a steam vacuum system).

For minor/well defined contamination, a real time trimming on the line is possible and desirable. This trimming should take place at the most appropriate workstations; this can be before or after the PMI.

For extended or multiple contaminations, real time corrective action (i.e. on the line) is undesirable. But a system of shunt or allowing working out rate can allow immediate treatment for this type of contaminations.

4. Baseline recording

4.1. Objective

An efficient record should be put in place to correct bad practices faster and better, therefore, avoiding a decrease of the day slaughter hygiene.

To satisfy this objective, the record should be accurate enough to identify the origin of contamination and, hereby, focus on the bad performing operator or the defective equipment.

Following points (4.2 to 4.7) are given as examples.

4.2. How to meet this objective?

Distinctive physical signs allow the identification of carcasses according to the origin of the contamination: bagging of the rectum, weasand closure, slit of the brisket, abdominal evisceration (concerning evisceration, to distinguish between an animal origin – full stomachs, peritoneal accretions – or an operator origin – inappropriate actions...)

Marking with an alimentary pencil seems to be good means of identification, as it is easy to make that available to workstations.

4.3. Who should recognize these distinctive signs?

All the operators should be able to correctly identify contaminated carcasses: whether they have caused the contamination or whether they have only detected the contamination.

4.4. Who could record these distinctive signs?

An operator at the end of the line who has the ability to write (*example: the operator of the tax weighing*).

4.5. Who takes responsibility for the results?

The line manager, ideally during the slaughter; if not just after the slaughter.

4.6. What action should be taken?

The record allows identifying the problematic workstation.

The line manager can review events which can lead to contamination at the slaughter step (previously described in this document).

When the problematic event is identified, the corrective measure can be put in place.

Looking at the record during slaughter allows alerting the line manager of contamination at an essential step.

For example:

Two “rectum” accidents in half a day ask that corrective actions be put in place without delay because, in a controlled slaughter process, these accidents are uncommon.

On the contrary, several “evisceration” accidents due to an “animal” cause will not require an alert (too full stomachs, peritoneal accretion etc....)

4.7. Example of record

	Rectum	Weasand	Brisket	Evisceration	
				Operator	Animal
Operator name					
Carcass number					
Percentage/total number of slaughtered animals					

4.8. Clarification concerning the operation of this daily record

Each company should define a target range for the percentage of carcasses with contaminations from the digestive tract. The range should depend on the history of the company and animal constitutions (dairy cows and peritoneal accretions, cattle with full stomachs etc....).

This range should allow each company to be alert as soon as the daily percentage of contaminated carcasses exceeds this range. Above this range, actions should be taken on controllable factors (training of operators, equipment...). Below this range, suspicion of an identification failure will arise.

This percentage should include all contaminated carcasses, whether the contamination is minor/well defined or major/not well defined. Indeed, in an ideal slaughter, no “evisceration incident” (in the broadest sense of the term) should happen. In reality, “evisceration incidents” happen; the objective is, therefore, to implement the best prevention. It is necessary to monitor and, to the extent possible, prevent accidents, no matter the type of contamination.

The daily recording should be evaluated every evening by the line manager (defective equipment, types of slaughtered animals, inexperienced operator, full stomachs etc....)

It is a key point: the line manager must be very involved; he must be able to explain all the incidents of the day as part of a continuous improvement approach.

IV. Prevention and management of contamination from the hide

1. Specific good hygiene practices and characteristics of contamination

1.1. At-risk workstations

At-risk workstations are:

- Skinning of the first hind shank
- Skinning of the second hind shank
- Transfer
- Skinning of flanks
- Hide puller workstation

The risk is upon contact between the hide and the carcass.

1.2. Specific good hygiene practices

1.2.1. Specialisation of hands

A “dirty” hand which grips the hide, a “clean” hand which holds the knife or the downward hide puller.

Careful to keep the clean hand clean because it often has contact with the carcass when using the downward hide puller.

It is not possible to strictly apply this recommendation for the skinning of flanks because the operator has to hold the downward hide puller with the right hand to free the left flank and with the left hand to free the right flank.

1.2.2. Use of utensils

The knife is used to cut the hide, with the point and edge of the knife outside the carcass.

The downward hide puller is preferably used to cut membranes between the internal (=clean) side of the hide and carcass.

This uses the two-knife technique: a “dirty” knife to cut, a “clean” knife (or a downward hide puller) to free the hide.



Photo 36:

The knife is used to cut the hide, with the point and edge of the knife outside the carcass

Photo 37:

The downward hide puller is preferably used to cut membranes between the internal (=clean) side of the hide and carcass



It is preferable to use a downward hide puller rather than a knife to accompany the descent of the hide at the hide puller workstation (the use of a downward hide puller reduces the intervention during the dressing procedure).



Photo 38:

Use of a downward hide puller to accompany the descent of the hide at the hide puller workstation

1.2.3. Clean outward opening of the hide

It is necessary to sufficiently open the hide to avoid its falling back on the carcass.

Photo 39:

Clean outward opening of the hide



1.2.4. Management of neighbouring carcasses

Care must be taken when carcasses are close to each other, particularly in the buffer zone before the transfer workstation: contact between a skinned part and a not-skinned part has to be avoided.

1.2.5. Cut of metacarpus

If the metacarpus is cut before being skinned, it is advised to dislocate the carpus when the carcass is skinned in order to clean up the section.

Photo 40:

Contaminated section of the metacarpus because it was cut before being skinned

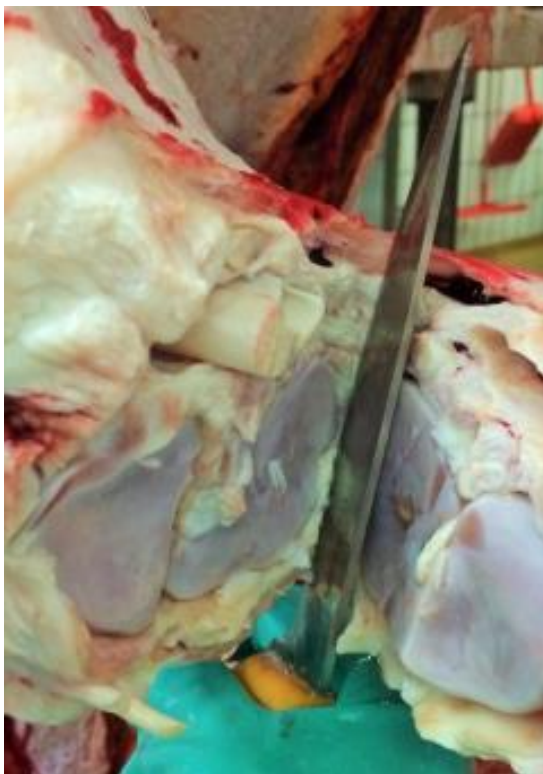


Photo 41:

Dislocation of the carpus

Photo 42:
Clean section of the carpus



1.2.6. Cut of metatarsus

Cut must be done on a skinned shank.



Photo 43:
Cut of the metatarsus on a
skinned shank

1.2.7. Cut of ears

If the traceability system allows it, the best practice is to cut the ears no later than at the hide puller workstation.

If the ears remain on the carcass and are removed further along the slaughter line, it is advised to slow down the hide puller at the end to avoid a cross contamination between the ears and the neck, and then to bag them.

1.2.8. Skinning of the tail

The longitudinal incision must be done along the tail up to the very end. Otherwise, the tail will be badly skinned and it will contaminate the carcass.



Photo 44:

The tail must be skinned over its entire length in order to avoid contaminating the carcass

1.3. Characteristics of contamination

The contaminations from the hide are localised on the incision areas and on the areas where the hide can fall back and touch the carcass (particularly the ventral side).

These contaminations are normally well defined, but the size can vary.

2. Procedure of the management of contamination from the hide

2.1. Objective

All the contaminations should be detected and heat treated (trimming by a knife or a circular cutter; use of a steam vacuum system).

Following points (2.2 to 2.5) are given as examples.

2.2. How to meet this objective?

The management of contaminations should be the subject of a procedure developed by the abattoir.

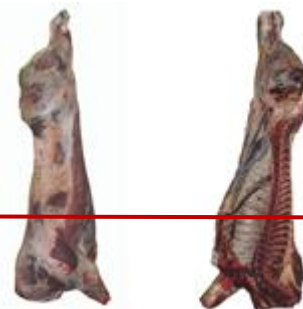
The whole carcass should be the subject of a visual control.

A carcass mapping should assign to the operators parts of the carcasses that should be systematically controlled.

Extracts of the procedure should be included in the appropriate job descriptions.

Example: visual control assigned to two operators

Finishing operator 1:



Finishing operator 2:

2.3. Working instructions for finishing operators

To systematically check the carcass areas which are assigned to them.
To inform, without delay, the line manager on any drift (the same contaminated area on several following carcasses).

2.4. Checking whether the working instructions have been respected

According to a frequency defined by the company, the line manager could stand at the end of the line and check the absence of contamination. If he detects contamination, he should remind the finishing operator of the working instructions.

2.5. Suggested selection criteria for the finishing operators

Selection criteria could be:

- Available time to observe and trim, if necessary;
- Preferably, after the split of the carcass into two parts, for the operator to be able to look all around the carcass;
- Preferably, a circular cutter is available, as this tool allows for easily trimming at the surface, without excavating in depth.

2.6. Comments

The identification of carcasses does not seem to be necessary to manage contamination from the hide.

The best handling is visual control of the whole carcass and immediate trimming.

Furthermore, contaminations from the hide are minor/well defined and a local treatment is enough. A specific traceability of these carcasses is, therefore, not necessary.

V. Additional records as part of the implementation of good practices (example)

1. Recording of actions by the line manager during the slaughter

The line manager (the middle management) is responsible for the smooth running of the slaughter. He must intervene when needed and provide proof of his daily actions (HACCP).

That is why it is advised to add an insert function at the bottom of the daily record proposed previously in this document. The objective would be to centralize, in one document, all the important events of the day (to limit paperwork).

Via this insert function, the line manager could record everything that has impacted the slaughter (breakdown, bad performing operator or defective equipment, repeated contamination from the hide etc....) and could specify what corrective actions have been put in place.

An example of the daily record could be:

Date of slaughter	
Number of slaughtered animals	

Identification of carcasses containing contaminations from the digestive tract					
	Rectum	Weasand	Brisket	Evisceration	
				Operator	Animal
Operator					
Carcass number					
Percentage/total number of slaughtered animals					

Comments

2. Checking that working instructions have been respected

2.1. Objective

To check the implementation of working instructions specified in job descriptions.

2.2. How to create this record

Identify for each workstation working instructions which are essential to minimize/prevent contamination → definition of a list of items (a range could be 3-4 items per workstation).

All workstations should be reviewed, not only the workstations at risk for contamination from the hide or the digestive tract.

2.3. Who controls and takes responsibility for the results?

The manager who is responsible for the implementation of the working instructions; according to a defined frequency (a weekly frequency means that all items are checked once a week, but not inevitably all the same day of the week).

2.4. A strong interest to justify the relevance of the sanitary control plan

For a lot of slaughter steps, good practices are pointed out to justify the control of dangers; the follow-up of this record allows for the justification of the proper implementation of good practices.

An example of record could be:

Checking that the working instructions have been respected				
Date(s)				
Workstations	Name of operator	Items	Conform	Non conform = Immediate corrective action
Workstation 1		1		
		2		
		3		
Workstation 2 (...)		1		
		2		
		3		

5.3. Specific part for ovine animals



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SHARING GOOD PRACTICES IN SLAUGHTER HYGIENE

- Ovine Animals -

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I. Definition of contamination

1. A contamination is faecal/ingesta material

The colour of ovine faecal contamination is generally brown/black and may be tarry in texture.



Photo 1:
brown/black faecal
contamination

The colour of ovine ingesta contamination is generally green/brown and may be looser in texture.



Photo 2:
Intestinal content contamination

2. Visible to the human eye

The sensitivity of visual inspection is never 100%, especially for very small particles.

Contamination can be missed, even by trained experienced staff.

Therefore, prevention or minimisation of contamination is the objective.

3. Contamination from the fleece or the digestive tract

Contamination from the fleece is caused by the contact or splash from the fleece onto the carcass during de-fleecing.

Contaminations from the digestive tract are caused by the rupture or spillage of the digestive tract during or after evisceration.

Dirty and wet animals presented for slaughter

In the case of ovine and caprine, the condition of the fleece of animals before slaughter is important, particularly if the fleece/skin of animals that arrive for slaughter is dirty and wet/damp.

It could happen that the animals are slightly dirty, but, if they are wet, it is more likely that carcasses get contaminated.



Photo 3:
Example of dirty, damp fleece

It is useful for the food business operator to categorise the cleanliness of sheep in order to decide on how they are to be managed.

- Animals that have been assessed as being clean enough to be slaughtered using routine standard hygienic dressing procedures;
- Animals that can only be slaughtered by using extra defined appropriate controls;
- Animals unfit for slaughter as too dirty, particularly if wet. These animals should not be presented for ante mortem and the slaughterhouse operator must take the required remedial action.

Handling of animals during slaughter

During the slaughter, several situations could jeopardize the cleanliness of the carcasses, for example, the spillage of gastrointestinal contents onto the carcass or contact of the outer layer of the fleece with the carcass of the animal itself or with other carcasses.

II. Prevention of contamination from the fleece and from the digestive tract

1. Clean animals

1.1. Primary Producers

Farmers must take adequate measures, as far as possible, to ensure the cleanliness of animals going to slaughter (Annex I, Part A, point II. 4(c) of Regulation (EC) No 852/2004).

Clean, dry sheep will ultimately reduce the risk of carcass contamination.

Cleanliness of animals at slaughter is influenced by many factors, including diet, housing, bedding, clipping, feeding and transport.

To ensure that animals arrive clean at slaughter means giving attention to these and other factors.

The aim should be to prevent animals from becoming dirty in the first place, but some degree of cleaning prior to slaughter may be necessary.

- Every animal should be regularly inspected during finishing and before it leaves the farm and appropriate corrective actions taken.
- Animals may self-clean sufficiently if moved to a suitable area with adequate bedding. Sufficient time should be allowed within this area for animals to clean up. Animals should be housed at the correct stocking density. Animals that are simply wet or slightly dirty may then be fit for slaughter within a day or so; but, if sheep are very dirty, they could require 3 to 4 weeks to clean up.
- Consideration should be given to the finishing diet. It has been shown that animals fed on straw and water only 1-2 days prior to transport have reduced faecal contamination during transport.
- Skin/fleece should be completely dry before the animal leaves the farm.
- If animals remain dirty, it may be necessary to clip them just prior to slaughter. Those areas from which the risk of contamination transfer to the carcass is high should be clipped to remove excessive dirt, particularly on the brisket, flanks, belly, legs, knee and hock joints.

1.2. Transporting slaughter animals

Vehicles should be cleansed and disinfected between loads.

Stocking rates should follow recommendations and partitions should be used to prevent injuries as a result of under-stocking.

Evidence suggests visible cleanliness declines with increasing transport time and distance, so these should be minimised.

It is advisable to modify the diet or withdraw food for a short time before transport to reduce faecal soiling.

Mixing of animals should be avoided.

1.3. Pre/Post slaughter clipping or other post mortem cleaning methods

Slaughterhouse operators must ensure that animals are clean (Annex III, Section I, Chapter IV, point 4 of Regulation (EC) No 853/2004).

Animals sent for slaughter must be clean enough so as not to present an unacceptable risk for slaughter and dressing operations.

The objective is to avoid contamination of the meat during slaughter and dressing so as to ensure that the required microbiological quality is achieved.

The food business operator is to develop the means for achieving this.

As advised in the Commission guidance document on the implementation of certain provisions of Regulation (EC) No 853/2004, there are different ways of achieving this objective, including:

- The effective cleaning of animals, including ante or post mortem clipping, or
- The sorting of animals in accordance with cleanliness and developing an appropriate slaughter scheme, or

- Developing procedures for hygienic dressing of animals that must protect carcasses from unnecessary contamination, or
- Other appropriate procedures.

On arrival at the slaughterhouse, the plant operator assesses and categorises animals, as follows:

- Animals that have been assessed as being clean enough to be slaughtered using routine standard hygienic dressing procedures;
- Animals that can only be slaughtered by using extra defined appropriate controls;
- Animals unfit for slaughter as too dirty, particularly if wet. These animals should not be presented for ante mortem and the slaughterhouse operator must take the required remedial action.

Fleece clipping, both ante and post mortem, has been shown to be an effective intervention.

Its use, in conjunction with good hygiene practice during dressing, can contribute significantly to a reduction in contamination of the carcass.

When taking into account post mortem on-line clipping, consideration should be given to the following points:

- The on-line clipping area should have good extraction facilities and means of disposing of clippings;
- The on-line clipping work station should be between the bleeding and first dressing positions;
- Facilities should be provided to allow easy access to all areas of the fleece requiring clipping;
- On-line clippers should incorporate suction at the clipping head for the removal of clipped and other material;

- On-line clipping is recommended for those parts of the skin to be opened, e.g. the midline belly, a minimum 15 cm either side of the intended opening line, down to and including the brisket if the brisket is to be opened;
- Dirtier animals in wet conditions should not be allowed for slaughter until the fleece has dried, and the possibility of cross contamination is significantly reduced.

Photo 4:

Example of midline
clipping of dirty fleece



2. Work stations at risk on the slaughter line

Work stations on the slaughter line can cause contamination from the digestive tract and/or the fleece.

In this part, for each at-risk workstation, there are specified good slaughter practices and events which can lead to deviation from the operating procedure.

2.1 Fleece removal

There are many different methods of fleece removal.

But fleece removal can be considered as a two-stage operation, first working with knives to split the pelt and remove from extremities, followed by mechanical pulling away from the carcass.

The next section provides a non-exhaustive list of examples of good practices. The examples displayed below are not necessarily in a chronological order.

2.1.1. Good hygiene practices common to all workstations of fleece removal

Procedures must prevent contact between the outside of the skin and the carcass.

Operators and equipment that have come into contact with the outer surface of fleece must not touch the carcass.

Specialisation of hands: a “dirty” hand, which holds and grips the fleece, and a “clean” hand, which holds the inner face of the fleece and/or the carcass. The hand that touches the skin should never touch the carcass without washing first. The operators situated on the workstations at risk must be careful to keep the clean hand clean.

Mechanical methods (e.g. crocodile clips and papers) may be used to reduce the risk of the carcass being contaminated from the in-rolling of the hide/fleece during its removal.

After the initial cut through the skin, a second clean knife should be used for further skinning.

Whenever the knife cuts through the skin, there is a risk of contamination from the fleece to the carcass.

This contamination can be minimised by using spear cuts when opening the skin.

The fleece must never touch the exposed carcass and the operator must never touch the carcass with a hand that has touched the fleece.

Any contamination that occurs at a workstation should be removed by the operative at that station, by adequate knife trimming or by an equivalent method, such as steam vacuum.

2.1.2. Head removal/tail docking

The head may be removed before or after fleece removal.

Heads can be partially removed by using a sterilised 'head chopper'.

Complete head removal is carried out using sterilised two knives system.

Tail is removed using sterilised two knives system.

2.1.3. Leg/feet removal

Leg removal before fleece removal should be considered as a dirty cut.

Once the fleece is removed, a second clean cut should be carried out.

The operative partially removes the hind legs by using a pneumatic leg cutter.

2.1.4. Insufflation

If air or gas is used as an aid to facilitate fleece removal, the process needs to be carried out hygienically.

This should consider preventing contamination at the injection site, sanitising needles to prevent contamination between carcasses, the type of gas, which must either be food grade or filtered compressed air.

If air is used, it should not be drawn directly from the abattoir environment.

2.1.5. Legging/cutting of carpus/tarsus

In this procedure, the operator holds the leg with one, dirty hand and with the clean hand and/or knife he separates the skin from the carcass.

This cut must be performed with the edge of the knife turned away from the carcass.

The operator should be aware all the time whether his hands are clean or not, and when it is necessary to wash them before touching the clean surface of the carcass. In many cases, the operator could need to touch clean and dirty surfaces of the carcass with the same hand, and then he would need to wash hands very often.

2.1.6. Skin cut along the midline

This cut must be performed with the edge of the knife away from the carcass.

Photo 5:

The cut must be performed with the blade of the knife turned away from the carcass.



2.1.7. Y cut/patching

The operative removes a patch of fleece from the sternum using a sterilised two knives system.

Using a different blunt knife located at the incision of either side of the brisket, the operative grips the fleece and applies downward pressure in order to remove a 'patch' of fleece.

The operative using a clean sterilised knife from the two knives system makes an upward incision in order to remove a piece of fleece from the right foreleg.

Using a different sterilised knife the operator repeats the procedure for the left foreleg.

2.1.8. Breast roll

The operative using a clean sterilised knife from the two knives system makes an opening incision down the neck area. Using a different sterilised knife, the operative joins the incision at the leg opening with the incision made in the neck area using an 'in to out' action.

The fleece is worked away from the carcass avoiding cross contamination. The operator places blue greaseproof paper along the shoulder fleece junction on the right hand side, neck fleece junction of the right hand side and the neck fleece junction of the left hand side and the shoulder fleece junction of the left hand side.



Photo 6: mechanical rollers can roll the breast pack hygienically



Photo 7: greaseproof paper placed on the brisket to protect

2.1.9. Fleece punching

The operative partially removes the hide from the carcass.

The operative uses a pneumatic flanker in downward movement to remove the skin from either side of the carcass.

Greaseproof paper may be placed between the carcass and the skin to prevent any contamination.

2.1.10. Pelt puller

The operative removes the fleece from the back of the carcass using an automatic shoulder puller.

Greaseproof paper may be applied to the flank regions in order to minimise contamination from any in-rolling of the fleece.

The operative places the fleece from the shoulder area into the jaws of the machine which is then activated by the operative.

The shoulder puller moves backwards removing the fleece from the back of the carcass.

2.2. Evisceration

The risk of faecal contamination may be reduced by rodding and/or bunning.

2.2.1. Oesophageal closure/rodding

The oesophagus/weasand can be sealed by mechanical methods, such as tying, elastic/rubber rings, plastic clips or starch cones.

Rodding is usually carried out after bleeding is completed to prevent the escape of ruminal fluid or contents, which would contaminate the tissues of the head and neck.

Alternatively, this may be carried out after hide/fleece removal to minimise contamination of the throat.

2.2.2. Brisket cut

Brisket sawing generally performed on ewes only.

2.2.3. Bunning

For sheep, the rectum can be:

- Bunged with a plastic bag and elastic band;
- Milked/not milked and the anus closed with a cone;
- Milked and tied;
- Milked and clipped;
- Milked, stretched and cut.

2.2.4. Removal of green offal

The anus is drooped into the body cavity.

The body cavity is opened to facilitate total withdrawal of rumen and intestines.

The operative first cuts and opens the white line from top to bottom, putting the finger of the left hand inside the abdominal cavity, protecting the digestive organs from the knife (photo 9). It is advisable to wear a knife proof glove on the hand that does not hold the knife.

The operative then extricates the colon towards himself, by cutting the membranes, and releases the digestive mass.

It is important to accompany the descent with one hand to avoid tearing (Photo 10).



Photo 9



Photo 10

At the same workstation it is possible to open the brisket and remove heart, lungs and thymus.

III. Management of the contamination

The contamination comes mainly from the fleece and ovine carcasses are contaminated in a general way.

That's why, the management of the contamination should be based on a systematic visual control, an immediate detection of contamination and an immediate trimming.

The systematic visual control could be focused on the most common places for contamination.

In all cases, a second level control could be put in place according to a frequency defined by the company.

A supervisor could stand at the end of the line and check the absence of contamination. If he detected contamination, then he should remind the operators of the working instructions. He could also ask a control of the whole carcass, and not a control limited to certain at risk parts of the carcass. This verification should be recorded.

6. Track and trends

Track and trending are tools that can be used to assess whether the frequency of faecal and ingesta contamination is in control.

These tools support a system-based approach. Such tools can also be used in collaboration and regular communication between FBO and the Competent Authority and raise awareness of contamination levels over time.

6.1. Recording

Where records of contaminations are used for control purposes by the slaughterhouse, it is important that there is a standardised recording of contaminations based on the definitions in 2.2. and 2.3. (colour and texture).

Recording can be performed manually or electronically along the slaughter line, where it is most practical. Recording can be performed as a 100% recording or by collecting representative samples to calculate the prevalence of contamination.

6.2. Baseline

When using interventions to reduce and minimize the faecal/ingesta contamination, it will be useful to know the level of contaminations before the interventions are implemented or to know the level, for example, at the post mortem inspection.

This is where a baseline can be useful. A baseline can be used as a standard against which all subsequent changes are measured.

Baselines are often shown as lines in graph form to easily show changes over time. In some cases, depending on species and method of slaughter, it can be beneficial to have separate baselines for the origin of the contamination (for example, faecal and ingesta).

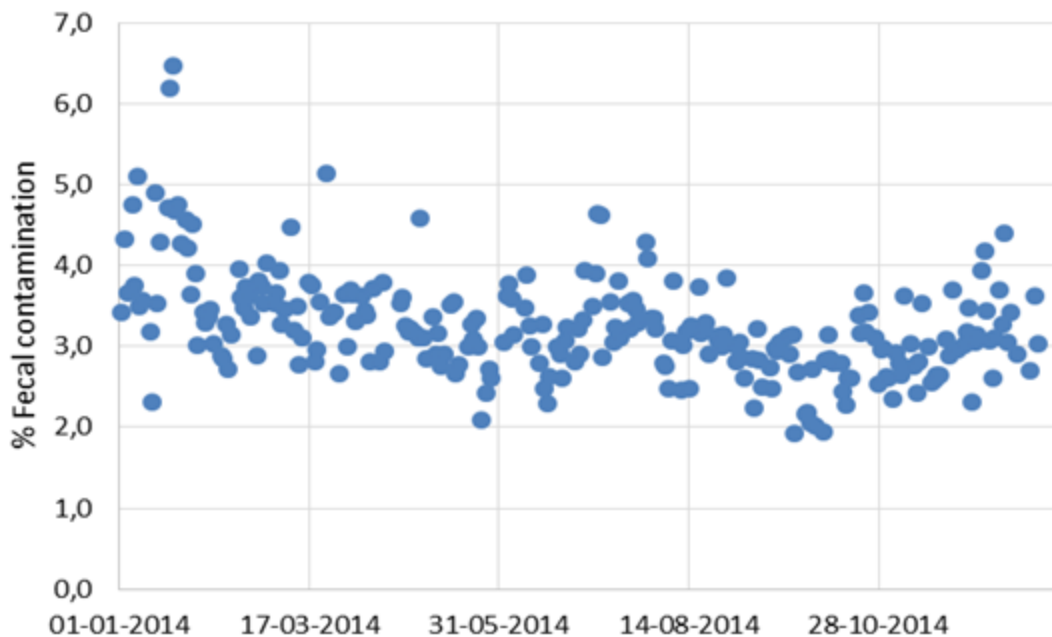
Experience has shown that, even though most contaminations are found and removed, the sensitivity of visual inspection is not 100%. Small particles, in particular, can be overlooked. Also experience from well performing pig slaughterhouses shows that faecal and ingesta can be missed even by well-trained staff.

Experience also shows that the efficiency of the staff regarding finding faecal/ingesta contamination varies a lot on a day-to-day basis and between slaughterhouses. This implies that findings from different slaughterhouses should be compared with caution.

A baseline consists of recordings of faecal/ingesta contaminations in a defined time period. A baseline is a useful tool as a reference for the development of faecal/ingesta contaminations over time.

Example

Below, an example is shown based on data from an average performing pig slaughterhouse covering one year (2014). Each dot represents % faecal/ingesta contamination for one day. Average for the entire year +/- standard deviation was 3.25 +/- 0.64%. Inspection for faecal/ingesta contamination was carried out by the competent authority. No faecal/ingesta contamination had been removed prior to inspection (and recording).



A relatively big variation between days is to be expected.

The variation arises from i.e.:

- differences between the condition of the incoming animals (e.g. adherent intestines),
- differences regarding personnel inspecting the carcasses, and
- deviations due to malfunctions on the production line that are corrected during the day.

It is not realistic to fully avoid contamination; however, experience shows that the overall prevalence of contaminations can be reduced by the use of good practices.

6.3. Trend analysis (assessing deviations and verification based on statistical approach)

As fore mentioned, trend analysis is a tool that can be used to assess whether the frequency of faecal and ingesta contamination is in control. Typically, a company will keep records showing the frequency of contamination from the digestive tract or hide, i.e. before measures have been taken to remove the faecal and ingesta contamination.

Example

An example of how trend analysis can be used is shown below using data from a European pig slaughterhouse. % faecal denotes the percentage of carcasses with faecal contamination per day and it is assumed that % faecal contamination is normally distributed.

The average for % faecal at the pig slaughterhouse X has been 3.25 % with a standard deviation of 0.64 % during the last year.

Slaughterhouse X has decided to evaluate the results from their daily recording on two levels, where the first level deals with the average contamination from one day and the second level deals with the average contamination over a number of days.

6.3.1 Evaluation of the daily average

On a daily basis, slaughterhouse X calculates % faecal in order to evaluate whether the parameter evaluated on a day-to-day basis is deviating from last year's average. The % faecal for a single day should be within the 99.74% interval i.e. $3.25 \pm 1.92\%$. If % faecal is above the upper limit, i.e. 5.17%, actions are taken to lower the percentage of faecal contamination. If % faecal is below the lower limit, i.e. 1.33%, it should be ensured that the systems for detection and registering of faecal contamination are in place and working.

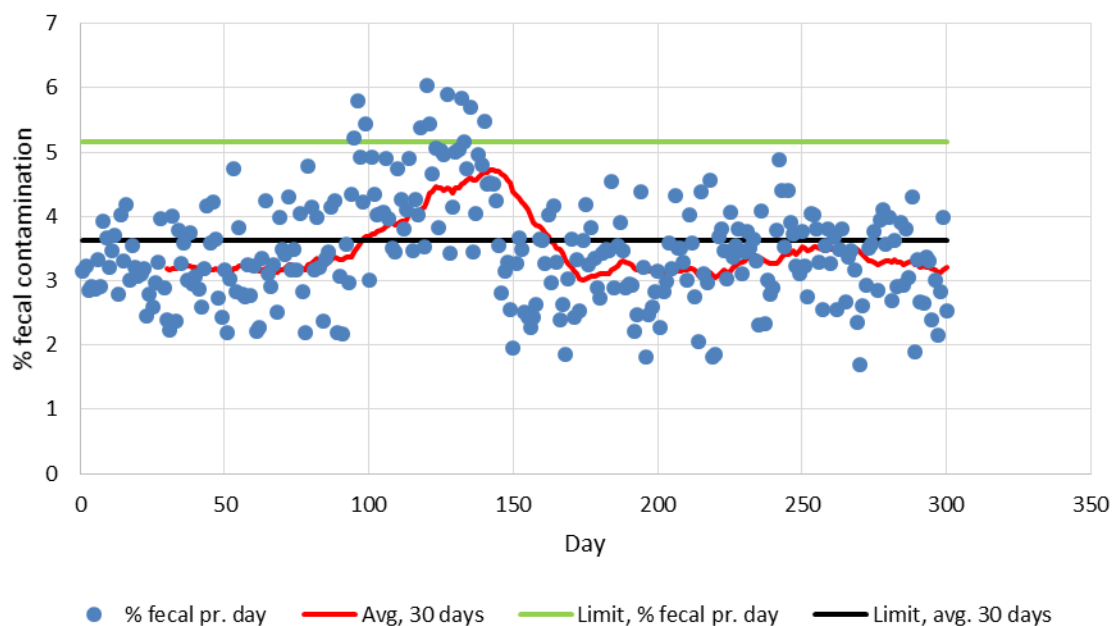
6.3.2 Evaluation of the average faecal contamination for the last 30 working days

The slaughterhouse X also calculates the average % faecal on a continuous basis covering the last 30 working days. Assuming a standard deviation of 1 the 95% confidence limit for an average (avg.) calculated on the basis of 30 observations is average $\pm 0.36^1$. If the average calculated on the basis of the last 30 days is 3.0, and the contamination exceeds 3.36, then actions are taken to lower the faecal contamination. This is to ensure that the % faecal is not following an upward trend, that the % faecal is below 3% on average, and that the standard deviation is $\leq 1\%$. Using 30 working days is a choice which balances considerations regarding the precision for the estimate of the average, the period passing before an upward trend is found, and the risk of doing corrective actions due to random events.

Examples

Below are the above mentioned two examples shown graphically, where corrective actions are initiated by either the daily average exceeding the limit or the average for the last 30 working days exceeding the limit.

Example 1



¹ $(1,96 * 1 / \sqrt{30})$.

Example 2

