# Appendix 4 to the Community Guide to good practice for the manufacture of safe feed materials: FEDIOL sector reference document

## a) Introduction

FEDIOL members crush over 30 million tonnes of oilseeds per year and produce 9 million tonnes of vegetable oils. On top of that, they process 4 million tonnes of imported oils. FEDIOL members also produce 20 million tonnes of meals and are a major player on the EU market, which is the world largest with 51 million tonnes of meal consumption. More statistics can be found on: http://www.fediol.eu/.
There are some 150 oilseeds processing and vegetable oils and fats production facilities across Europe, employing approximately 20,000 people.

The EU Proteinmeal and Oil Industry processes different kinds of oleaginous seeds, beans, fruits and nuts for the production of vegetable oils — for human consumption but also for animal feeding and for technical purposes — and for the production of oilseed meals which are used as protein rich feeding stuffs. Usually crushing plants have integrated refining facilities that produce fatty products which can be intended for food, feed or technical usages. Sections b and c below provide further detail on the feed materials produced and the processes applied by the sector.

To support companies in delivering safe products, FEDIOL has conducted risk assessment of the chains of feed materials from the main crops processed by its industry (see also section d). These assessments offer a tool to oilseed crushing and oil refining companies for evaluation of their own feed safety management system. They also support these companies in their dialogue on chain control with their customers, suppliers and other stakeholders. The risk assessments will thus help strengthening the safety of the feed chain. FEDIOL stresses that companies remain primarily responsible for providing safe feed and that these assessments cannot replace any of this responsibility. The risk assessments mentioning control measures is a further detailing of the concept of Prerequisite Programmes (PRP's) as mentioned in Chapter 5 of the accompanying Community Guide.

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**Content:**

**b) Listing of feed materials**

The main raw materials processed by the EU Proteinmeal and Oil Industry are rape seeds, soybeans, sunflower seeds, crude palm oil, crude palm kernel oil and crude coconut oil.

Crushing of these oilseeds and beans delivers the following feed materials:

- (rape seed) expeller
- soya (bean), sunflower seed and rape seed meal
- soya (bean) and sunflower seed hulls

vegetable oils (crude degummed soya (bean), rape seed, sunflower seed oil)
Soya (beans) and sunflower seeds may be dehulled, resulting in meal with a low fibre and hence high protein content ("hi-pro" versus "low-pro" meal).

Refining of oils delivers:

- refined vegetable oils (refined soya (bean), rape seed, sunflower seed, palm, palm kernel and coconut oil)
- soy, rape, sun, palm, palm kernel, coconut fatty acids
- soy, rape and sun fatty acid distillates

Down stream processing of oils delivers:

- hydrogenated oils
- interesterified oils
- pure fatty acids
- fractionated vegetable oils and fats (oleins and stearins)
- glycerine

Other oilseeds processed include linseed, sesame seeds, maize germs and poppy seeds. Other oils processed include shea, illipe, safflower seed and groundnut oil.

**c) Overview of main processes**

**1) OILSEED CRUSHING**

**1.1. Cleaning, Drying and Preparation of the seeds/beans**

As a first step the seed/bean is cleaned and dried. Foreign material (like stones, glass and metal) is taken out by sieving and magnets and disposed of outside the feed chain.
Drying is performed by avoiding contact with combustion gasses unless natural gas is used.
The preparation of the seeds before an extraction step depends on the kind of seed/bean and the required quality of the meal.
Some oilseeds, like soybeans and sunflower seed, may be dehulled after the cleaning step. After dehulling, the meal has a lower crude fibre content, and hence a higher protein content. The soya hulls can also be used for feeding purposes, as such or in pelletized form.

### 1.2. Crushing and Heating

Seeds with high oil content, like rape seed and sunflower seed, are usually mechanically pressed in worm conveyors after a preheating step in indirectly heated conditioners. The pressed cake will contain up to 18% of oil and will be further treated in the extractor. In some cases the pressed cake undergoes deep expelling. This brings down oil levels to below 10% and will result in an expeller sold for feed purposes. Soybeans, with relatively low oil content, are thermally treated, mechanically crushed and used as raw material/flakes for further extraction.

Sometimes the raw material is pressed without heating; such oils are known as cold-pressed oils. Since cold pressing does not extract all the oil, it is practiced only in the production of a few special edible oils, i.e. olive oil.

### 1.3. Solvent extraction

Solvent extraction is used to separate oil from seeds/beans. The pre-processed seeds/beans are treated in a multistage counter-current process with solvent until the remaining oil content is reduced to the lowest possible level. The common solvent used by crushers is hexane.

The miscella, a mixture of oil and solvent, is separated by distillation into two components, oil and solvent. The solvent is recycled into the extraction process.

### 1.4. Desolventing and toasting

The hexane-containing meal is treated in the desolventising toaster with the help of indirect heating and steam. The desolventising toasting process serves three purposes. Firstly, to win back the solvent from the meal, secondly to increase the nutritional value of the meal e.g. by reducing the content of glucosinolates or trypsin inhibitors, and thirdly to minimise the risk of biological contamination.

### 1.5. Drying, cooling, storage

To obtain a stable and transportable feed material that is fit for storage, the meal is subsequently dried and cooled. In general, oil meals are stored in silos. At present, the packing in bags is limited to exceptional cases. In order to avoid the sticking of the oil meals to the wall of the silo, it is common practice that an anti caking agent (amongst others mineral clays like is added. This is particularly necessary when the silos reach considerable heights. The anti caking agents used are those permitted by feedstuff legislation.

## 2) REFINING

Crude oils obtained by pressing and/or extraction are sometimes used directly for food and feed purposes. In most cases, however, the crude oils are refined in a multistage process.

Crude oils might contain substances and trace components, which are undesirable for taste, stability, appearance, and odour or may interfere with further processing. These substances and trace components include seed particles, phosphatides, carbohydrates, proteins, and traces of metals, pigments, waxes, oxidation products of fatty acids, polycyclic aromatic hydrocarbons and pesticide residues.

Internal specifications developed by the oils and fats sector stipulate that crude oils should meet certain quality requirements. In fact, this is a key step in ensuring that when refining is applied to this raw material, the fully refined oil is suitable for human consumption.

The purpose of refining edible oils and fats is to remove free fatty acids and the other substances while maintaining the nutritional value and ensuring the quality and stability of the end product. Chemical/alkali and physical refining follow similar processing steps, but differ in the way free fatty acids are removed (see below).

### 2.1. Degumming

Crude oils having relatively high levels of phosphatides may be degummed prior to refining to remove the majority of those phospholipid compounds. During the degumming process the crude oil is treated with a limited amount of water and acids in order to hydrate the phosphatides and then separate them by centrifugation. After the degumming process, the crude oil is dried. Soybean oil is the most common oil to be degummed. Gums (or crude lecithins) can be added to the meal.

### 2.2. Neutralisation

Alkali neutralisation reduces the content of the following components: free fatty acids, oxidation products of free fatty acids, residual proteins, carbohydrates, traces of metals and a part of the pigments.

The oil is treated with an alkali solution (caustic soda) that reacts with the free fatty acids present and converts them into salts of fatty acids (soap). The mixture allows then to separate the oil phase freed from fatty acid that floats on top from a layer phase of salts, alkali solution and the other substances, which is drawn off. The oil is then washed with water to remove the salts , alkali solution and the other substances, when it is ready for the decolorizing or deodorising process.

The under layer of salts and other substances, which is drawn from the oil, is a solid material mixed with some water. A large proportion of it is salts of fatty acids , which may be added to the meal (before toasting, inclusion levels 1.5% typically) sold to soap manufacturers or it may be treated with an acid treatment (sulphuric acid) to set free the fatty acids contained in it. These are used for feed purposes but also for soap or candle manufacturing. Neutralisation as a way to remove free fatty acids is unique for chemical refining and is lacking with physical refining.

### 2.3. Winterisation

Winterization is a process whereby waxes are crystallised and removed in a filtering process to avoid clouding of the liquid fraction at cooler temperatures. Kieselguhr, normally used as a filter aid, (is a biogenic sedimentation mineral from which the organic components are removed by thermal treatment). The filter cake that remains after the filtering process consists of oil, waxes and filter aid. The filter cake can be recycled to the toaster and added to the meal (integrated crushing/refining plant) or sold as such as a feed material (refining stand alone). The term winterization was originally applied decades ago when cottonseed oil was subjected to winter temperatures to accomplish this process. Winterization processes using temperature to control crystallization are carried out on sunflower and maize oil. A similar process called dewaxing is utilized to clarify oils containing trace amounts of clouding constituents.

### 2.4. Bleaching

The purpose of bleaching (or decolorizing) is to reduce the levels of pigments such as carotenoids and chlorophyll, but this treatment also further removes residues of phosphatides, soaps, traces of metals, oxidation products, and proteins. These trace components interfere further processing. They reduce the quality of the final product and are removed by adsorption with activated clay and silica. In integrated crushing / refining plants the used bleaching earth is brought back into the meal. Bleaching earth originating from pure refining plants and / or hardening plants, which can contain nickel is excluded from recycling into the feed materials and is disposed of outside the feed sector. If heavy polycyclic aromatic hydrocarbons are present, activated carbon shall be used for their removal. Dosage of these adsorption agents should be adapted to ensure the removal of the specific substances. The bleaching clay containing all these substances is separated by filtration and is disposed of outside the feed sector.

### 2.5. Deodorisation

Deodorization is a vacuum steam distillation process that removes the relatively volatile components that give rise to undesirable flavours, colours and odours in fats and oils. This is feasible because of the great differences in volatility between these undesirable substances and the triglycerides.

The purpose of deodorisation, in case of no previous chemical refining step, is to reduce the level of free fatty acids and to remove odours, off-flavours and other volatile components such as pesticides and light polycyclic aromatic hydrocarbons by a stripping media. Careful execution of this process will also improve the stability and the colour of the oil, whilst preserving the nutritional value.

Depending on the residence time in the deodoriser, the process is carried out under vacuum (0.5 – 8 mbar) and at temperatures between 180° - 270°C, and using a stripping media, such as steam or nitrogen, since the substances responsible for odours and flavours are usually volatile. Conditions are adapted within these ranges as appropriate to ensure the removal of specific substances. Further removal of the proteins is achieved at this step.

Careful execution of these four processing steps ensures that fully refined oils possess good organoleptic and physicochemical qualities. The extent of protein removal is of critical importance to absence of allergenicities.

## 3) MODIFICATIONS ON OILS AND FATS

### 3.1. Hydrogenation

Hydrogenation is the process by which hydrogen is added directly to points of unsaturation in the fatty acids. The purpose of hydrogenation is to obtain oils and fats with specific melting profiles or oxidative stability by reducing unsaturated double bonds in the oil system. Since hydrogenation converts unsaturated triglycerides into saturated ones, thus it converts liquid oils to the semi-solid form for greater utility in certain food uses.

Hydrogenation is accomplished by reacting oil with hydrogen gas and in the presence of heat and metal catalysts, e.g. nickel. The input oil quality into a hydrogenation step must be clean, since impurities may interfere with catalysts during process. The minimum quality requirement of oils used in the hydrogenation process is neutralised and bleached oil, but some processors even utilise fully refined oils as input oil.

### 3.2. Interesterification

A better melting profile of oil/fat system can also be achieved via interesterification, which is defined as the interchange of fatty acids from different fats/oils on the glycerol backbone. There are two types of interesterification processes: chemical and enzymatic. Chemical interesterification in the presence of basic catalysts, e.g. sodium methoxide, results in non-selective or random rearrangements of fatty acids. Interesterification using immobilised lipases is more commonly done in the industry due to its selective modification of position of fatty acids in the triglycerides.
After hydrogenation or interesterification, the output product is bleached (if necessary) and (re-) deodorised.

### 3.3. Fractionation

The fractionation process consists on the removal of solids by controlled crystallization and separation techniques involving the use of solvents or dry processing. Dry fractionation encompasses both winterization and pressing techniques and is the most widely practiced form of fractionation. It relies upon the differences in melting points and triglyceride solubility to separate the oil fractions.

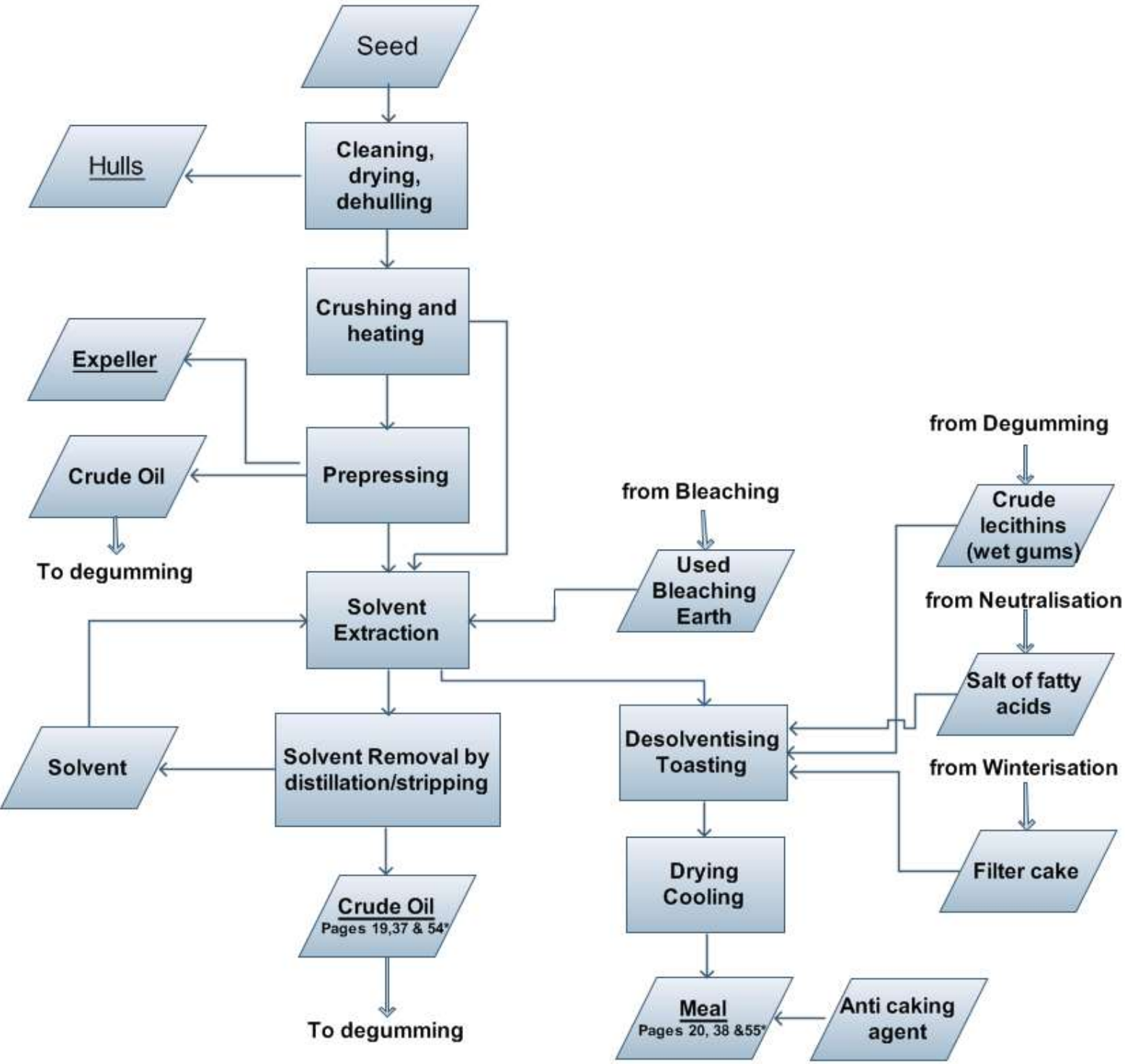
**3.4. Pressing** is a fractionation process sometimes used to separate liquid oils from solid fat. This process presses the liquid oil from the solid fraction by hydraulic pressure or vacuum filtration. This process is used commercially to produce hard butters and specialty fats from oils such as palm and palm kernel.

The flow charts below represent the following main processes applied:

- crushing
- refining
- downstream processing

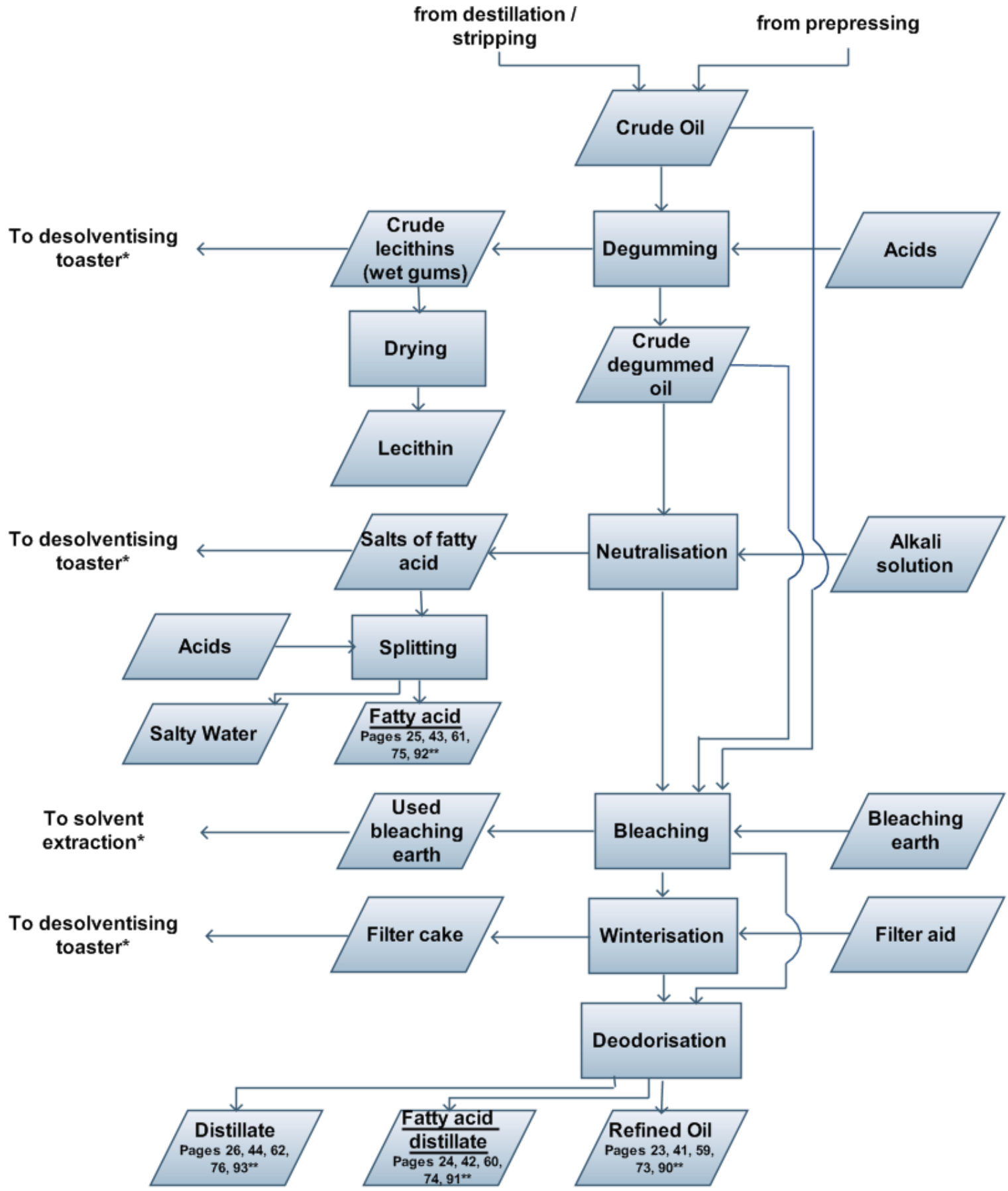
Specific feed materials are underlined in the flow charts. However, food products such as lecithins and refined oils are not albeit they can be used for feed as well.

## Flow chart Oilseed Crushing



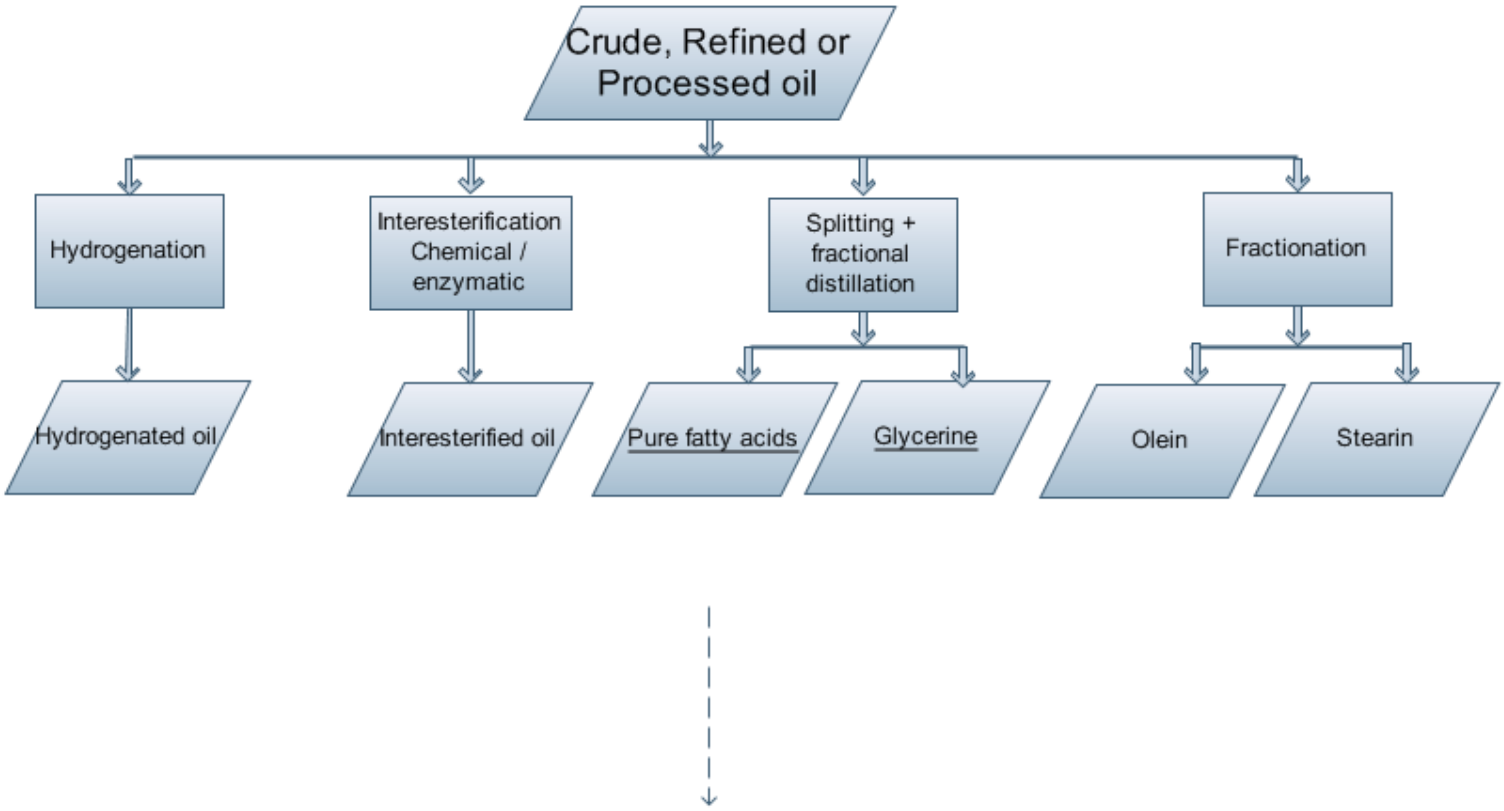

* These page numbers refer to safety evaluations in this appendix

## Flow chart Refining




* Only applies to integrated crushing / refining plants (see C.4.2. on page 5 of this appendix)
** These page numbers refer to safety evaluations in this appendix

**Flow chart down stream processing***




**to refining (potentially)**

* Biodiesel production is outside of the scope of this guide

## d) Risk assessments

**1. FEDIOL made the following crops subject to a food and feed safety chain risk assessment:**

soybean
rape seed
sunflower seed
palm fruit and palm kernel
coconut

**2. FEDIOL conducted the chain risk assessments as follows:**

2.1. Per oil containing crop, FEDIOL constructed a flow chart covering the following chain elements: the cultivation of the crop, the storage and transport of the harvested oilseed or oil fruit, the processing of these into various oil and protein rich products, and the storage and the final transport of these to the food/feed industry. The feed materials palm kernel meal and copra fall outside the scope of these assessments as they are produced by companies that are not a member of FEDIOL.

2.2. Per chain element, FEDIOL described the food/feed safety hazards that may be reasonably expected to occur at that point in the chain, provided no safety measures are in place. For the processing steps (crushing and/or refining and further processing) utilities-related hazards were commonly described. A safety hazard is a biological (B), chemical (C) or physical agents (P) in, or condition of, a product that makes it injurious to human or animal health.

2.3. In the elements of the chain that cover agricultural activities such as the cultivation of crops, the transport and storage of the harvested oil seeds or oil fruits and the drying of the oil seeds and the crushing of the oil fruits, the control of hazards is the responsibility of the operators active in that part of the chain. This is why the hazards occurring there were only identified, but their risks were not further assessed (no chance and seriousness assessment). The hazards having been listed in the FEDIOL risk assessments, however, will allow the local operator to take the necessary measures. FEDIOL members are to verify thiswhen they are active in these chains. But control measures for these hazards could eventually be taken at the level of crushing or refining as well.

2.4. In the elements of the chain that directly relate to the professional activity of the FEDIOL members, i.e. the crushing of oilseeds and the refining and further processing of oil and the storage and transport of these, per hazard, FEDIOL sets the risk as follows:

2.4.1. On the basis of expert's experience assessed the likelihood of the hazard occurring or "chance" as very low, low, medium or high. These chance classes can be quantified as follows:

very low: the hazard has never occurred, but may occur
low: the hazard may occur once in 5 years

medium: the hazard may occur once a year
high: the hazard may occur more often than once a year

2.4.2. Seriousness should relate to the risk of the molecule/substance for the animal or human health. It subdivides as follows:
little: small injuries, little illness
medium: substantial injuries or illness, immediate or on longer run
high: fatal effects, serious injuries or illness, immediate or on the longer run

2.5. Classified the risks according to following table:

| **Seriousness** | Little | Medium | High |
|---|---|---|---|
| **Chance** | | | |
| Very low | 1 | 1 | 2 |
| Low | 1 | 2 | 3 |
| Medium | 2 | 3 | 4 |
| High | 3 | 4 | 4 |

2.6. Justified the risk assessment.

2.7. Checked whether EU legislation or trade standards such as those of FEDIOL and FOSFA set limits for the respective hazard, and if so, listed them.

2.8. Formulated control measures based on the following table:

| **Risk class** | **Action** |
|---|---|
| 1 | No control measures needed |
| 2 | No control measures needed, but periodically evaluate if control measures are necessary |
| 3 | Risk to be controlled by generally verifiable measures such as good operation practices (Prerequisite Programmes or PRP) |
| 4 | Risk to be controlled by a measure that is specifically designed to control the risk (CCP) |

2.9. The packing of goods is outside the scope of this methodology for assessing chain risk analyses. Transport of ex-works deliveries is outside the scope of this methodology as well.

**3.** The safety risk assessment of the food and feed chains of soybeans, rapeseeds, sunflower seeds, palm/palm kernel oil and coconut oil are attached below and they are also available on the FEDIOL website: www.fediol.eu.
As described above, each risk assessment is made up of the following sections:
a flow chart depicting the full supply chain
sheets discussing risks per step in the supply chain, ie cultivation, drying, crushing, refining, storage and transport.

For the storage and transport sheets of the sunflower, rapeseed, palm (/kernel) and coconut chains, please refer to those of soybeans.

4. **FEDIOL discussed the non-relevant hazards in a separate document**
   A particular contaminant may have an EU legal limit applying to an oil or fat or protein product that in practice does not represent a hazard to that product. The contaminants for which this is the case have been listed in a separate document, ("considerations" document), which can be found on this website as well.

5. **FEDIOL will evaluate the food and feed safety assessments of the chains of oilseed and oil fruit products on a yearly basis.**

*  *  *

## CONSIDERATIONS FOR NON-INCLUSION OF CERTAIN CONTAMINANTS INTO THE FEDIOL FOOD AND FEED SAFETY CHAIN RISK ASSESSMENTS

The FEDIOL food and feed safety chain risk assessments (www.fediol.eu) indicate how to control the hazards that may occur throughout the chains of food and feed products derived from oilseeds and oil fruits. EU legal contaminant limits may apply to some of these products, which in practice represent no risk to these products. These are listed below.

### 1) CHAIN OF OILSEED PRODUCTS

**Aflatoxins: Aflatoxins are considered of no risk for seed oils intended for further crushing and refining and neither for refined seed oils. Regulation 459/2010 has legally granted an exemption for these oilseed products.**

**Heavy metals: Arsenic, lead, cadmium and mercury (Regulation 1881/2006 and Directive 2002/32).** Levels exceeding the legal limits of these contaminants have never been observed, apart from cadmium in sunflower seed meal as addressed in the risk assessments.

**Hexane:** Council Directive 88/344/EEC on extraction solvents used in the production of foodstuffs and food ingredient limits the level of hexane in oils and fats. Hexane is present in crude oil, but evaporates from that oil during refining.

**Other contaminants of Regulation 1881/2006 and Directive 2002/32** than those mentioned above are considered to be irrelevant for the chains of oilseed products for food and feed application.

### 2) CHAIN OF PALM OIL AND PALM KERNEL OIL PRODUCTS AND COCONUT OILS

Dioxin and dioxin–like PCB's (Regulation 1881/2006 and Directive 2002/32) are considered to be a very low risk for palm (kernel) oil as levels of these found in these products do not exceed the detection limit.

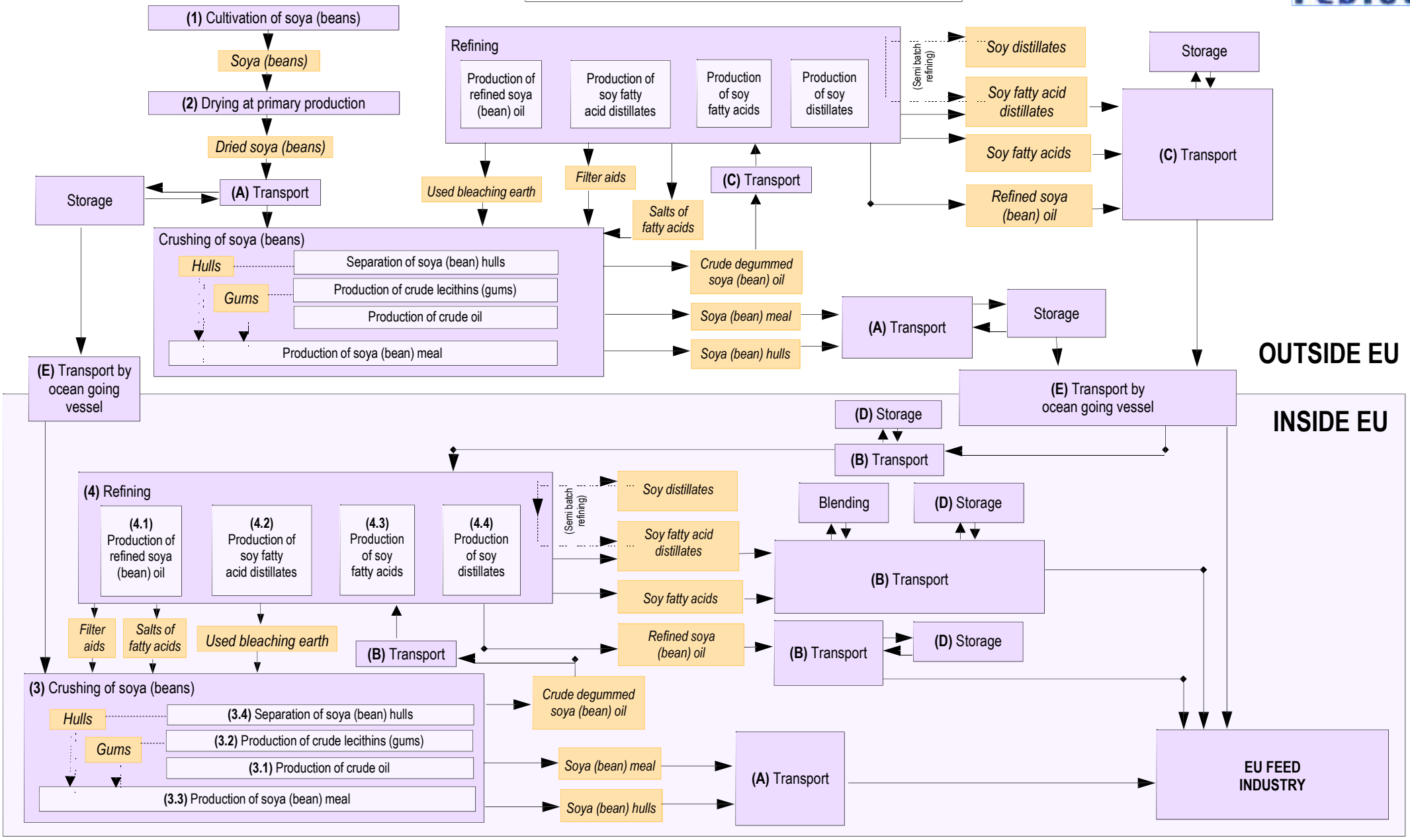
**Heavy metals (Regulation 1881/2006 and Directive 2002/32).** Levels exceeding the legal limits of these contaminants have never been observed.

**Other contaminants of Regulation 1881/2006 and Directive 2002/32** than those mentioned above are considered to be irrelevant for the food and feed chain of tropical oils products for food application.

* * *

# Flow chart of the production chain of soya (bean) meal and oil products for feed application in the EU

Characters between brackets refer to those on the following sheets



| | | | 1. Cultivation of soya (beans)* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | The countries of export of soya (beans) (USA, Brazil, Argentina and Paraguay) work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation. Regular monitoring of pesticides on soya (beans) shows that residue levels remain within legal limits. | EC Regulation 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products. | | |
| **Phytotoxins** | C | | | | | Soya (beans) may contain weeds. | Directive 2002/32/EC limits the maximum content of toxic weed seeds. | | Visual inspection of soya (beans) is recommended as a control measure. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document paragraph 2.3 for more information.

## 2. Drying of soya (beans) at primary production*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contaminants caused by drying**<br><br>- dioxin | C | | | | | Burning of waste may result in dioxin formation. Up to now the crushers have found dioxin levels in crude soya (bean) oil to be lower than detection limit. | Code of Practice for the prevention and reduction of dioxin and dioxin-like PCB contamination in foods and feeds (Codex CAC/RCP 62-2006). | | Good Manufacturing Practices recommend using fuels which are not generating dioxins and dioxin-like compounds and other harmful contaminants.<br><br>In case of direct heating, proper burners should be used. Monitoring is regarded necessary to ensure that drying or heating processes do not result in elevated levels of dioxins and dioxin-like PCBs. No use of waste products as a fuel for direct drying.<br><br>Feed materials derived from soya (beans) have to comply with the limits for dioxin and dioxin-like PCBs of the Directive 2002/32/EC. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

| | | | Utilities: soya (beans) crushing, oil refining and processing. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Hydraulic oils or lubricants from equipment** | C | low | high | 3 | PRP | Hydraulic oils and lubricants may contain toxic compounds. | | The prerequisite programme should assure that the contamination of product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used. | |
| **Quality of water** | C | low | high | 3 | PRP | Water is used in the crushing and refining process. | For manufacture of feed, according to Regulation 183/2005/EC water used during shall be of suitable quality. | Apply water of suitable quality. | |
| **Cleaning agents and boiler chemicals** | C | medium | medium | 3 | PRP | Cleaning agents and steam (using boiler chemicals) come into contact with the product. | | Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry. | |
| **Thermal heating fluids (THF) from equipment** | C | medium | high | 4 | CCP | THF may still be used by non-FEDIOL members. | According to the FEDIOL Code of Practice on the Heating of Edible Oils during Processing, the use of THF is not allowed. | Use hot water or steam heating. Otherwise, a control measure should assure that the contamination of product with thermal heating fluids is avoided. | |

## 3. Crushing of soya (beans)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxins from pest control materials** | C | low | high | 3 | PRP | Poisoned grain from open boxes could end up in the food chain. | | A pest control programme must be applied that is suitable for use in the food chain. | |
| **Toxic compounds from hexane** | C | low | high | 3 | PRP | Industrial hexane may contain toxic compounds. | Directive 2009/32/EC sets purity criteria for the use of hexane during the crush of oilseeds. | Food grade hexane must be used. | |
| **Foreign material like glass, wood, metals, etc.** | P | medium | medium | 3 | PRP | Foreign material may be present. | | A system should be in place that removes foreign material. | |

## 3.1 Production of crude oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contaminants from filter aids** | C | low | high | 3 | PRP | The crude oil can potentially wash contaminants out of the filter aid. | | Use of filter aids that are suitable for the food industry. | |
| **Mineral oils from a failing recovery system** | C | low | high | 3 | PRP | Mineral oils may contain toxic compounds. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well. | | Mineral oil of the recovery system must be of food grade quality. The prerequisite programme should assure that the contamination of product with non-food grade oils is avoided and that the risk of contamination of the product with food grade oils is minimised. The prerequisite programme could involve recording of the quantities used. | The Dutch GMP-limit for C (10-40) in oils is 400 mg/kg. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on soya (beans) shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude soya (bean) oil, however, is very low. The use of endosulfan is allowed on soya (beans). Monitoring data show that its residue in crude oil remains within the legal limit. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Hexane that resides in the crude oil after recovery** | C | high | little | 3 | PRP | After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil. | FOSFA flash point limit at 121°C. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |

## 3.2 Production of crude lecithins (wet gums)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Mineral oils from a failing recovery system** | C | low | high | 3 | PRP | Mineral oils may contain toxic compounds. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well. | | Mineral oil of the recovery system must be of food grade quality. The prerequisite programme should assure that the contamination of product with non-food grade oils is avoided and that the risk of contamination of the product with food grade oils is minimised. The prerequisite programme could involve recording of the quantities used. | The Dutch GMP-limit for C (10-40) in oils is 400 mg/kg. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on soya (beans) shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude soya (bean) oil, however, is very low. The use of endosulfan is allowed on soya (beans). Monitoring data show that its residue in crude oil remains within the legal limit. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Hexane that resides in the crude oil after recovery** | C | high | little | 3 | PRP | After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil. | FOSFA flash point limit at 121°C. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |
| **Microbiological deterioration** | B | | | | | Wet gums that are dried insufficiently may deteriorate. | | | |

## 3.3 Production of soya (bean) expeller and meal

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin from anti-caking agent** | C | low | high | 3 | PRP | Anti-caking agent is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals. | Regulation 2439/1999/EC sets quality criteria for anti-caking agents. | Purchase anti-caking agent of feed grade quality. | |
| **Salmonella** | B | medium | medium | 3 | PRP | Salmonella is the major hazard for microbiological contamination of feed. Salmonella are widespread in the environment and each link in the food chain, from the producers up to and including the consumers has a role to play in reducing the risk of Salmonella harming animals or humans. Animal feed is acknowledged to be one possible route by which Salmonella can enter the food chain. | FEDIOL Code of Practice for the Control of Salmonella in Oilseed Crushing Plants. | Apply the PRPs of the FEDIOL Salmonella Code such as cleaning of dust collectors and coolers, condensation prevention in process lines and silos, training of personnel. | All links of the feed chain have to reduce to a minimum the occurrence of Salmonella in their products. The EU oilseed crushing industry has already made strenuous efforts, through voluntary measures, to reduce the contamination rates of their feed materials. Substantial progress has been made since the introduction of the FEDIOL GMP code for the seed crushing industry in 1993 (replaced by this Guide). |
| **Dioxin from used bleaching earth** | C | low | high | 3 | PRP | Bleaching clay is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | The risk only applies to integrated crushing/refining plants. |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | upperbound value. | | |
| **Hexane residue** | C | high | little | 3 | PRP | Hexane residue is present in oilseed meals. | ADR 400 ppm. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |

## 3.4 Separation of soya (bean) hulls

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Salmonella** | B | low | high | 3 | PRP | Salmonella is the major hazard for microbiological contamination of feed. Salmonella are widespread in the environment and each link in the food chain, from the producers up to and including the consumers has a role to play in reducing the risk of Salmonella harming animals or humans. Animal feed is acknowledged to be one possible route by which Salmonella can enter the food chain. | FEDIOL Code of Practice for the Control of Salmonellae in Oilseed Crushing Plants. | Apply the preventive measures as listed in the FEDIOL Code of Practice for the Control of Salmonellae in Oilseed Crushing Plants. | |

## 4. Refining

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Processing aids (alkali solution, acids)** | C | medium | medium | 3 | PRP | Processing aids come into contact with the product. | | Processing aids that directly come into contact with the oil must be for food use or of food grade quality. | |
| **Foreign materials** | P | medium | medium | 3 | PRP | Foreign materials may be present. | | Filter before loading. | |

## 4.1 Production of refined soya (bean) oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin and dioxin-like PCBs** | C | low | high | 3 | PRP | A potential source of dioxin contamination for the oil is drying of soybeans and bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on soya (beans) shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude soya (bean) oil, however, is very low. The use of endosulfan is allowed on soya (beans). Monitoring data show that its residue in crude oil remains within the legal limit. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |

## 4.2 Physical refining: production of soy fatty acid distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | low | high | 3 | PRP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | No deliberate admixture of soya distillates. | |
| **Dioxin from bleaching earth** | C | low | high | 3 | PRP | A potential source of dioxin contamination during refining of the oil is bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on soya (beans) shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | low | high | 3 | PRP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude soya (bean) oil, however, is very low. The use of endosulfan is allowed on soya (beans). Monitoring data show that its residue in crude oil remains within the legal limit. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | Non-complying product should not be applied to feeding stuff. | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 4.3 | Chemical refining: production of (salts of) soy fatty acids free from distillates | | | | | |
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on soya (beans) shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude soya (bean) oil, however, is very low. The use of endosulfan is allowed on soya (beans). Monitoring data show that its residue in crude oil remains within the legal limit. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |

## 4.4 Chemical refining: production of soy distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | medium | high | 4 | CCP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | According to FEDIOL, distillates from chemical refining may not be used for feed purposes. Fatty products obtained from batch refining processes combining physical and chemical refining steps in one and the same equipment may be used for feed purposes, provided that there is analytical proof showing that limits for dioxin and pesticide residues are respected. | |
| **Dioxin from bleaching earth** | C | medium | high | 4 | CCP | A potential source of dioxin contamination during refining of the oil is bleaching earth. During chemical refining, dioxins concentrate into the distillates. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on soya (beans) shows that residue levels remain within legal limits. However, during chemical refining, dioxins concentrate into the distillates. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | See above under “general”. | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | medium | high | 4 | CCP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude soya (bean) oil, however, is very low. During refining, endosulfan may partly end up in the distillate. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | See above under “general”.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes. | |

## A. Storage and transport of oilseeds and oilseeds meal and hulls

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxins from pest control materials** | C | low | high | 3 | PRP | Poisoned grain from open boxes could end up in the food chain. | | A pest control programme must be applied that is suitable for use in the food chain. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Post-harvest use of pesticides on oilseeds is critical due to the limited time that is available for the pesticides to break down. The countries of export of oilseeds work with positive lists for the use of pesticides which, for some substances, may conflict with European legislation, particularly in the case of soft seeds such as those of sunflowers. | Regulation 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annex of this regulation. | Transport and storage companies must use pesticides correctly and document this. Otherwise they must verify that the levels of the residues of the pesticides used during transport and storage comply with EU legislation. | |
| **Contamination by the previous cargo during the transport by farm cart, truck or barge or ocean going vessel** | C | low | high | 3 | PRP | Transport of oilseeds and oilseed meals usually does not take place in means of transport that are dedicated to the transport of food or feed. | | Transport companies must clean farm carts, trucks, barges and ocean-going-vessels before loading. Inspection on cleanliness before loading. | |
| **Contamination by the previous cargo during storage** | C | low | high | 3 | PRP | Oilseeds and oilseed meals may be contaminated with mycotoxin containing previous loads. | | Storage companies must clean sites before use and must inspect them on cleanliness before use. | |
| **Anti dusting agent on soya (beans)** | C | medium | little | 2 | | For dust prevention, the USA allows the spraying of white oils (paraffins) on soya (beans) at levels of up to 200 ppm. Paraffin is a relatively expensive agent for dust prevention. In South America soya (bean) oil is used. | | | |
| **Adulteration with melamine** | C | Low | High | 3 | PRP | Analytically, melamine mimics proteins | | Make sure melamine is controlled when buying meal from areas with a known history for adulteration with melamine. | |

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | high | 3 | PRP | Transport of oils is dedicated. | EC Regulation No. 852/2004 implies the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated.<br><br>FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| - Tank coasters | C | low | high | 3 | PRP | Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| **Contamination by cleaning agents** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | medium | 2 | | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Include safeguards to preclude contamination of the food or feed grade cargo tanks and equipment by steam, water and cleaning agents used in the cleaning of non-food grade cargo tanks. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| - Tank coasters | C | low | medium | 2 | | Increased risk in case coaster is not dedicated to feed- or foodstuff. | | Selected cleaning stations must have an implemented HACCP-system. Demand a signed cleaning certificate before loading. | |

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards (continued)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Heating or cooling fluids from equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils). | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | | |
| - Rail tanks, tank barges and coasters | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | Heating coils of rail tanks must be of stainless steel (FEDIOL).<br>If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | |
| **Foreign bodies** | P | low | high | 3 | PRP | | | A quality plan should require the loading of tank cars with refined oils under a roof. | |
| **Adulteration** | C/P/B | low | high | 3 | PRP | Adulteration can cause harm. | | Application of minimum mandatory requirements in FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use. | |

## C. Transport of tropical and seed oils and derived products and by-products for feed application according not in compliance with EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | C | low | high | 3 | PRP | Tank cars and barges may have been used for non food or non feed compatible products such as petrochemicals. | | Tank cars and barges that are not dedicated tot the transport of foodstuff or feeding stuff should have undergone a validated cleaning procedure. | |
| **Contamination by cleaning agents** | C | medium | medium | 3 | PRP | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | | Feed- or food-grade cleaning agents must have been used. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| **Heating or cooling fluids from failing equipment** | | | | | | | | | |
| - Tank cars | C | low | High | 3 | PRP | Tank cars that use coils for heat transfer are banned.<br>The tanks are heated with cooling water from the motor through a system of double walls. | | | |
| - Barges | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | The use of hot water or steam heating is recommended. |
| **Foreign bodies** | P | low | medium | 2 | | | | | |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil for feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Adulteration with mineral oil** | C | low | high | 3 | PRP | Adulteration with mineral oils is still a problem with the transport of oils in the countries of origin. Since October 1999 control has been intensified and the chance of adulteration taking place has decreased. | | Prevent adulteration. | |

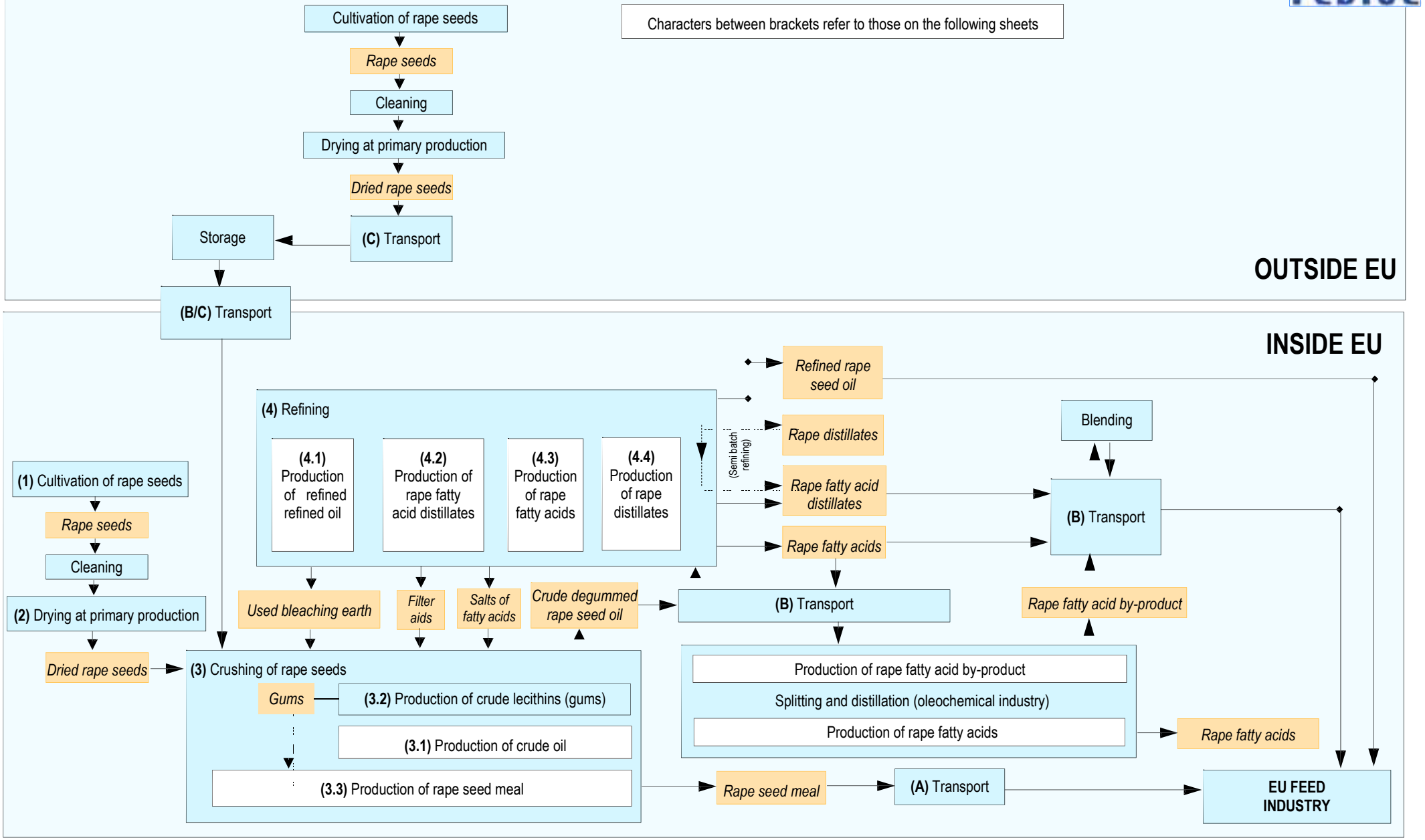
## D. Storage

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination due to lack of segregation** (contamination from previous cargoes, use of incorrect joining, shared equipment) | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs. | Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EC Regulation No. 852/2004) | Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Directive 96/3/EC. | |
| **Contamination by cleaning agents** | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low. | | Cleaning agents must be suitable for use in the food industry. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids from failing equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the storage company must provide for documentation on net losses and analyse accordingly, if necessary. | The use of water and steam heating is recommended. |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil for feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | |

## E. Transport by ocean going vessel

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Transport contamination** | | | | | | | | | |
| - Contamination by previous cargoes present in tanks or pipes | C | medium | medium | 3 | PRP | Ocean going vessels carrying oils and fats for edible use into the EU must have as an absolute minimum that the immediate previous cargoes is a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | Directive 96/3/EC (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked.<br><br>FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats.<br><br>FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union.<br><br>The EU has not regulated the sea transport of oils and fats for feed application. | Before loading, FOSFA recognised superintendents need to check whether tanks are sufficiently cleaned. Before unloading, FOSFA recognised superintendents need to check the ship's logbook on compliance with previous cargo lists.<br><br>The use of dedicated pipe lines at loading and unloading. | |
| - Contamination by cleaning agents | C | low | high | 3 | PRP | Usually maritime business sticks to good practice. | | Check ship log-book. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | **Solvent from coating** |
| **Thermal heating fluids (THF) from equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | The use of water and steam heating is recommended. |
| **Hydraulic oils from portable pumps** | C | low | high | 3 | PRP | Hydraulic oils from portable pumps may be toxic. | | The use of portable pumps with clear separation of hydraulic motor from pump. If not, hydraulic oils of food grade quality must be used. | Hydraulic motors that are directly linked to the pump allow for unwanted leakages of hydraulic oil into the vegetable oil in case of seal failure. |

# Flow chart of the production chain of rape seed oil products for feed application in the EU



## Risk assessment of the chain of rape seed meal and oil products

| 1. Cultivation of rape seeds* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | Third countries of export of rape seeds work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation.<br><br>In rape seeds originating from wet areas the level of fungicides may be high. | EC Regulation No. 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products. | | |
| **Phytotoxins** | C | | | | | Rape seeds may contain weeds. | Directive 2002/32/EC limits the maximum content of toxic weed seeds. | | Visual inspection of rape seeds. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## Risk assessment of the chain of rape seed meal and oil products

| 2. Drying of rape seeds at primary production* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
| **Contaminants caused by drying**<br>- dioxin | C | | | | | Burning of waste may result in dioxin formation. Up to now the crushers have found dioxin levels in crude rape seed oil to be lower than detection limit. | Code of Practice for the prevention and reduction of dioxin and dioxin-like PCB contamination in foods and feeds (Codex CAC/RCP 62-2006). | | Good Manufacturing Practices recommend using fuels which are not generating dioxins and dioxin-like compounds and other harmful contaminants.<br>In case of direct heating, proper burners should be used. Monitoring is regarded necessary to ensure that drying or heating processes do not result in elevated levels of dioxins and dioxin-like PCBs. No use of waste products as a fuel for direct drying.<br>Feed materials derived from rape seeds have to comply with the limits for dioxin and dioxin-like PCBs of the Directive 2002/32/EC. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## Risk assessment of the chain of rape seed meal and oil products

| Utilities: rape seeds crushing, oil refining and processing. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Hydraulic oils or lubricants from equipment** | C | low | high | 3 | PRP | Hydraulic oils and lubricants may contain toxic compounds. | | The prerequisite programme should assure that the contamination of product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used. | |
| **Quality of water** | C | low | high | 3 | PRP | Water is used in the crushing and refining process. | For manufacture of feed, according to Regulation 183/2005/EC water used during shall be of suitable quality. | Apply water of suitable quality. | |
| **Cleaning agents and boiler chemicals** | C | medium | medium | 3 | PRP | Cleaning agents and steam (using boiler chemicals) come into contact with the product. | | Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry. | |
| **Thermal heating fluids (THF) from equipment** | C | medium | high | 4 | CCP | THF may still be used by non-FEDIOL members. | According to the FEDIOL Code of Practice on the Heating of Edible Oils during Processing, the use of THF is not allowed. | Use hot water or steam heating. Otherwise, a control measure should assure that the contamination of product with thermal heating fluids is avoided. | |

## Risk assessment of the chain of rape seed meal and oil products

### 3. Crushing of rape seeds

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxins from pest control materials** | C | low | high | 3 | PRP | Poisoned grain from open boxes could end up in the food chain. | | A pest control programme must be applied that is suitable for use in the food chain. | |
| **Toxic compounds from hexane** | C | low | high | 3 | PRP | Industrial hexane may contain toxic compounds. | Directive 2009/32/EC sets purity criteria for the use of hexane during the crush of oilseeds. | Food grade hexane must be used. | |
| **Foreign material like glass, wood, metals, etc.** | P | medium | medium | 3 | PRP | Foreign material may be present | | A system should be in place that removes foreign material. | |

## 3.1 Production of crude oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contaminants from filter aids** | C | low | high | 3 | PRP | The crude oil can potentially wash contaminants out of the filter aid. | | Use of filter aids that are suitable for the food industry. | |
| **Mineral oils from a failing recovery system** | C | low | high | 3 | PRP | Mineral oils may contain toxic compounds. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well. | | Mineral oil of the recovery system must be of food grade quality. The prerequisite programme should assure that the contamination of product with non-food grade oils is avoided and that the risk of contamination of the product with food grade oils is minimised. The prerequisite programme could involve recording of the quantities used. | The Dutch GMP-limit for C (10-40) in oils is 400 mg/kg. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on rape seeds shows that residue levels remain within legal limits. | EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rape seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Hexane that resides in the crude oil after recovery** | C | high | little | 3 | PRP | After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil. | FOSFA flash point limit at 121°C. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |

## 3.2 Production of crude lecithins (wet gums)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Mineral oils from a failing recovery system** | C | low | high | 3 | PRP | Mineral oils may contain toxic compounds. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well. | | Mineral oil of the recovery system must be of food grade quality. The prerequisite programme should assure that the contamination of product with non-food grade oils is avoided and that the risk of contamination of the product with food grade oils is minimised. The prerequisite programme could involve recording of the quantities used. | The Dutch GMP-limit for C (10-40) in oils is 400 mg/kg. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on rape seeds shows that residue levels remain within legal limits. | EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rape seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Hexane that resides in the crude oil after recovery** | C | high | little | 3 | PRP | After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil. | FOSFA flash point limit at 121°C. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |
| **Microbiological deterioration** | B | | | | | Wet gums that are dried insufficiently may deteriorate. | | | |

## 3.3 Production of rape seed expeller and meal

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin from anti-caking agent** | C | low | high | 3 | PRP | Anti-caking agent is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals. | Regulation 2439/1999/EC sets quality criteria for anti-caking agents. | Purchase anti-caking agent of feed grade quality. | |
| **Salmonella** | B | medium | medium | 3 | PRP | Salmonella is the major hazard for microbiological contamination of feed. Salmonella are widespread in the environment and each link in the chain, from the producers up to and including the consumers has a role to play in reducing the risk of Salmonella harming animals or humans. Animal feed is known to be one possible route by which Salmonella can enter the food chain. | FEDIOL Code of Practice for the Control of Salmonellae in Oilseed Crushing Plants. | Apply the PRPs of the FEDIOL Salmonella Code such as cleaning of dust collectors and coolers, condensation prevention in process lines and silos, training of personnel. | All links of the feed chain have to reduce to a minimum the occurrence of Salmonella in their products. The EU oilseed crushing industry has already made strenuous efforts, through voluntary measures, to reduce the contamination rates of their feed materials. Substantial progress has been made since the introduction of the FEDIOL GMP code for the seed crushing industry in 1993 (replaced by this Guide). |
| **Dioxin from used bleaching earth** | C | low | high | 3 | PRP | Bleaching clay is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | The risk only applies to integrated crushing/refining plants. |
| **Hexane residue** | C | high | little | 3 | PRP | Hexane residue is present in oilseed meals. | ADR 400 ppm. | Follow transport regulation, which provides for stricter | |

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|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | hexane residue limits than needed in relation to feed safety. | |

## Risk assessment of the chain of rape seed meal and oil products

### 4. Refining

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Processing aids (alkali solution, acids)** | C | medium | medium | 3 | PRP | Processing aids come into contact with the product. | | Processing aids that directly come into contact with the oil must be for food use or of food grade quality. | |
| **Foreign materials like glass, wood, metals, etc.** | P | medium | medium | 3 | PRP | Foreign materials may be present. | | Filter before loading. | |

## 4.1 Production of refined rape seed oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin and dioxin-like PCBs** | C | low | high | 3 | PRP | A potential source of dioxin contamination for the oil is drying of rape seeds and bleaching earth. Nevertheless, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Source fresh bleaching earth from suppliers that fulfil the FEDIOL specifications on fresh bleaching earth. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on rape seeds shows that residue levels remain within legal limits. | EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rape seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Microbiological contamination** | B | low | medium | 2 | | Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow. | | | |

## 4.2 Physical refining: production of rape fatty acid distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | low | high | 3 | PRP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | No deliberate admixture of other distillates. | |
| **Dioxin from bleaching earth** | C | low | high | 3 | PRP | A potential source of dioxin contamination during refining of the oil is bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on rape seeds shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | low | high | 3 | PRP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rape seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | Non-complying product should not be applied to feeding stuff. | |

## Risk assessment of the chain of rape seed meal and oil products

### 4.3 Chemical refining: production of (salts of) rape fatty acid free from distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Regular monitoring of pesticide residues on rape seeds shows that residue levels remain within legal limits. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rape seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |

### 4.4 Chemical refining: production of rape distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | medium | high | 4 | CCP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | According to FEDIOL, distillates from chemical refining may not be used for feed purposes. Fatty products obtained from batch refining processes combining physical and chemical refining steps in one and the same equipment may be used for feed purposes, provided that there is analytical proof showing that limits for dioxin and pesticide residues are respected. | |
| **Dioxin from bleaching earth** | C | medium | high | 4 | CCP | A potential source of dioxin contamination during refining of the oil is bleaching earth. During chemical refining, dioxins concentrate into the distillates. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ). | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |

## Risk assessment of the chain of rape seed meal and oil products

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| | | | | | | | FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | According to FEDIOL, distillates from chemical refining may not be used for feed purposes | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on rape seeds shows that residue levels remain within legal limits. However, during chemical refining, dioxins concentrate into the distillates. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | See above under "general". | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | medium | high | 4 | CCP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rape seed oil, however, is very low, but they will concentrate into the distillates during refining. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | See above under "general".<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes | |

## A. Storage and transport of oilseeds and oilseeds meal

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxins from pest control materials** | C | low | high | 3 | PRP | Poisoned grain from open boxes could end up in the food chain. | | A pest control programme must be applied that is suitable for use in the food chain. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Post-harvest use of pesticides on oilseeds is critical due to the limited time that is available for the pesticides to break down. The countries of export of oilseeds work with positive lists for the use of pesticides which, for some substances, may conflict with European legislation, particularly in the case of soft seeds such as those of sunflowers. | Regulation 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annex of this regulation. | Transport and storage companies must use pesticides correctly and document this. Otherwise they must verify that the levels of the residues of the pesticides used during transport and storage comply with EU legislation. | |
| **Contamination by the previous cargo during the transport by farm cart, truck or barge or ocean going vessel** | C | low | high | 3 | PRP | Transport of oilseeds and oilseed meals usually does not take place in means of transport that are dedicated to the transport of food or feed. | | Transport companies must clean farm carts, trucks, barges and ocean-going-vessels before loading. Inspection on cleanliness before loading. | |
| **Contamination by the previous cargo during storage** | C | low | high | 3 | PRP | Oilseeds and oilseed meals may be contaminated with mycotoxin containing previous loads. | | Storage companies must clean sites before use and must inspect them on cleanliness before use. | |
| **Adulteration with melamine** | C | Low | High | 3 | PRP | Analytically, melamine mimics proteins | | Make sure melamine is controlled when buying meal from areas with a known history for adulteration with melamine. | |

## Risk assessment of the chain of rape seed meal and oil products

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | high | 3 | PRP | Transport of oils is dedicated. | EC Regulation No. 852/2004 implies the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated.<br><br>FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| - Tank coasters | C | low | high | 3 | PRP | Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| **Contamination by cleaning agents** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | medium | 2 | | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Include safeguards to preclude contamination of the food or feed grade cargo tanks and equipment by steam, water and cleaning agents used in the cleaning of non-food grade cargo tanks. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| - Tank coasters | C | low | medium | 2 | | Increased risk in case coaster is not dedicated to feed- or foodstuff. | | Selected cleaning stations must have an implemented HACCP-system. Demand a signed cleaning certificate before loading. | |

## Risk assessment of the chain of rape seed meal and oil products

### B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards (continued)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Heating or cooling fluids from equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils). | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | | |
| - Rail tanks, tank barges and coasters | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | Heating coils of rail tanks must be of stainless steel (FEDIOL).<br>If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | |
| **Foreign bodies** | P | low | high | 3 | PRP | | | A quality plan should require the loading of tank cars with refined oils under a roof. | |
| **Adulteration** | C/P/B | low | high | 3 | PRP | Adulteration can cause harm. | | Application of minimum mandatory requirements in FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use. | |

## Risk assessment of the chain of rape seed meal and oil products

### C. Transport of tropical and seed oils and derived products and by-products for feed application according not in compliance with EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | C | low | high | 3 | PRP | Tank cars and barges may have been used for non food or non feed compatible products such as petrochemicals. | | Tank cars and barges that are not dedicated tot the transport of foodstuff or feeding stuff should have undergone a validated cleaning procedure. | |
| **Contamination by cleaning agents** | C | medium | medium | 3 | PRP | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | | Feed- or food-grade cleaning agents must have been used. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| **Heating or cooling fluids from failing equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Tank cars that use coils for heat transfer are banned.<br>The tanks are heated with cooling water from the motor through a system of double walls. | | | |
| - Barges | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | The use of hot water or steam heating is recommended. |
| **Foreign bodies** | P | low | medium | 2 | | | | | |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | |
| **Adulteration with mineral oil** | | low | high | 3 | PRP | Adulteration with mineral oils is still a problem with the transport of oils in the countries of origin. Since October 1999 control has been | | Prevent adulteration. | |

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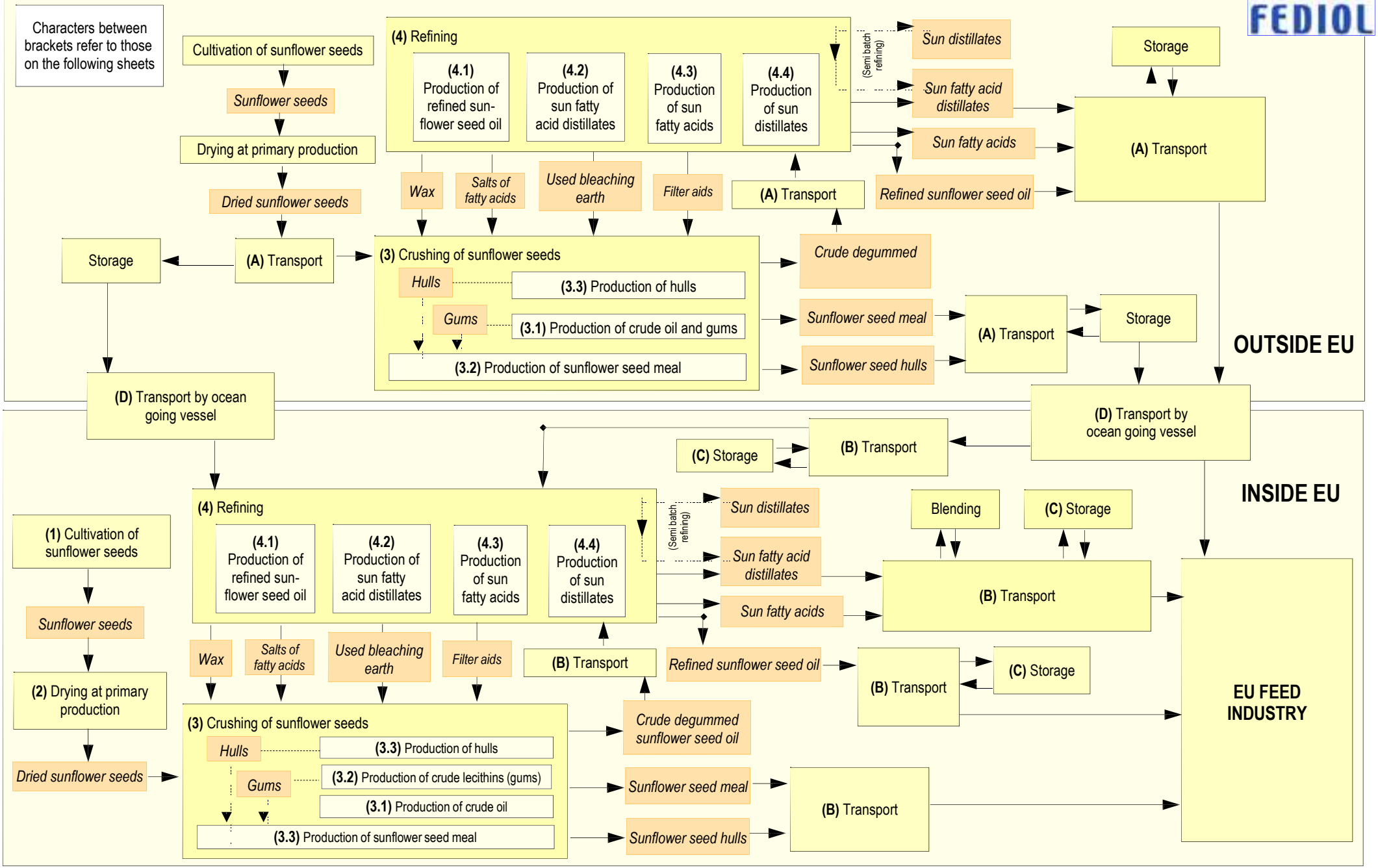
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | intensified and the chance of adulteration taking place has decreased. | | | |

## Risk assessment of the chain of rape seed meal and oil products

### D. Storage

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination due to lack of segregation** (contamination from previous cargoes, use of incorrect joinings, shared equipment) | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs. | Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EC Regulation No. 852/2004) | Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Directive 96/3/EC. | |
| **Contamination by cleaning agents** | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low. | | Cleaning agents must be suitable for use in the food industry. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids from failing equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the storage company must provide for documentation on net losses and analyse accordingly, if necessary. | The use of water and steam heating is recommended. |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | |

# Flow chart of the production chain of sunflower seed oil products for feed application in the EU



## Risk assessment of the chain of sunflower seed meal and oil products

| 1. Cultivation of sunflower seeds* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | Third countries of export of sunflower seeds (Argentina, Hungary, etc) work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation. With sunflower seeds, post-harvest use of pesticides appears to be more critical than pre-harvest use of pesticides. | EC Regulation No. 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products. | | |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## 2. Drying of sunflower seeds at primary production*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contaminants caused by drying** | | | | | | | | | |
| - dioxin | C | | | | | Burning of waste may result in dioxin formation. Up to now the crushers have found dioxin levels in crude sunflower seed oil to be lower than detection limit. | Code of Practice for the prevention and reduction of dioxin and dioxin-like PCB contamination in foods and feeds (Codex CAC/RCP 62-2006). | | Good Manufacturing Practices recommend using fuels which are not generating dioxins and dioxin-like compounds and other harmful contaminants.<br>In case of direct heating, proper burners should be used. Monitoring is regarded necessary to ensure that drying or heating processes do not result in elevated levels of dioxins and dioxin-like PCBs. No use of waste products as a fuel for direct drying.<br>Feed materials derived from sunflower seeds have to comply with the limits for dioxin and dioxin-like PCBs of the Directive 2002/32/EC. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Utilities: sunflower seeds crushing, oil refining and processing. | | | | | | |
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Hydraulic oils or lubricants from equipment** | C | low | high | 3 | PRP | Hydraulic oils and lubricants may contain toxic compounds. | | The prerequisite programme should assure that the contamination of product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used. | |
| **Quality of water** | C | low | high | 3 | PRP | Water is used in the crushing and refining process. | For manufacture of feed, according to Regulation 183/2005/EC water used during shall be of suitable quality. | Apply water of suitable quality. | |
| **Cleaning agents and boiler chemicals** | C | medium | medium | 3 | PRP | Cleaning agents and steam (using boiler chemicals) come into contact with the product. | | Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry. | |
| **Thermal heating fluids (THF) from equipment** | C | medium | high | 4 | CCP | THF may still be used by non-FEDIOL members. | According to the FEDIOL Code of Practice on the Heating of Edible Oils during Processing, the use of THF is not allowed. | Use hot water or steam heating. Otherwise, a control measure should assure that the contamination of product with thermal heating fluids is avoided. | |

## 3. Crushing of sunflower seeds

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxins from pest control materials** | C | low | high | 3 | PRP | Poisoned grain from open boxes could end up in the food chain. | | A pest control programme must be applied that is suitable for use in the food chain. | |
| **Toxic compounds from hexane** | C | low | high | 3 | PRP | Industrial hexane may contain toxic compounds. | Directive 2009/32/EC sets purity criteria for the use of hexane during the crush of oilseeds. | Food grade hexane must be used. | |
| **Foreign material like glass, wood, metals, etc.** | P | medium | medium | 3 | PRP | Foreign material may be present | | A system should be in place that removes foreign material. | |

## 3.1 Production of crude oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contaminants from filter aids** | C | low | high | 3 | PRP | The crude oil can potentially wash contaminants out of the filter aid. | | Use of filter aids that are suitable for the food industry. | |
| **Mineral oils from a failing recovery system** | C | low | high | 3 | PRP | Mineral oils may contain toxic compounds. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well. | | Mineral oil of the recovery system must be of food grade quality. The prerequisite programme should assure that the contamination of product with non-food grade oils is avoided and that the risk of contamination of the product with food grade oils is minimised. The prerequisite programme could involve recording of the quantities used. | The Dutch GMP standard limits the content of C(10-40) in sunflower seed oils and byproducts of refining to 1000 mg/kg. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits.<br>MRL policy in third countries differs from EU MRL policy. | EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured.<br>FEDIOL contract for purchasing sun seeds form the Black Sea area (contains a clause on compliance with EU MRL legislation). | Check incoming material (depending on the origin). | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Hexane that resides in the crude oil after recovery** | C | high | little | 3 | PRP | After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil. | FOSFA flash point limit at 121°C. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |

## 3.2 Production of crude lecithins (wet gums)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Mineral oils from a failing recovery system** | C | low | high | 3 | PRP | Mineral oils may contain toxic compounds. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well. | | Mineral oil of the recovery system must be of food grade quality. The prerequisite programme should assure that the contamination of product with non-food grade oils is avoided and that the risk of contamination of the product with food grade oils is minimised. The prerequisite programme could involve recording of the quantities used. | The Dutch GMP standard limits the content of C(10-40) in sunflower seed oils and byproducts of refining to 1000 mg/kg. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits.<br>MRL policy in third countries differs from EU MRL policy. | EC Regulation No. 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured.<br>FEDIOL contract for purchasing sun seeds form the Black Sea area (contains a clause on compliance with EU MRL legislation). | Check incoming material (depending on the origin). | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Hexane that resides in the crude oil after recovery** | C | high | little | 3 | PRP | After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil. | FOSFA flash point limit at 121°C. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Microbiological deterioration** | B | | | | | Wet gums that are dried insufficiently may deteriorate. | | | |

## 3.3 Production of sunflower seed meal

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin from anti-caking agent** | C | low | high | 3 | PRP | Anti-caking agent is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals. | Regulation 2439/1999/EC sets quality criteria for anti-caking agents. | Purchase anti-caking agent of feed grade quality. | |
| **Salmonella** | B | medium | medium | 3 | PRP | Salmonella is the major hazard for microbiological contamination of feed. Salmonella are widespread in the environment and each link in the food chain, from the producers up to and including the consumers has a role to play in reducing the risk of Salmonella harming animals or humans. Animal feed is acknowledged to be one possible route by which Salmonella can enter the food chain. | FEDIOL Code of Practice for the Control of Salmonellae in Oilseed Crushing Plants. | Apply the PRPs of the FEDIOL Salmonella Code such as cleaning of dust collectors and coolers, condensation prevention in process lines and silos, training of personnel. | All links of the feed chain have to reduce to a minimum the occurrence of Salmonella in their products. The EU oilseed crushing industry has already made strenuous efforts, through voluntary measures, to reduce the contamination rates of their feed materials. Substantial progress has been made since the introduction of the FEDIOL GMP code for the seed crushing industry in 1993 (replaced by this Guide). |
| **Dioxin from used bleaching earth** | C | low | high | 3 | PRP | Bleaching clay is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | The risk only applies to integrated crushing/refining plants. |
| **Mycotoxins** | C | low | high | 3 | PRP | Result of insufficient drying of | | Control the mycotoxin level of | |

## Risk assessment of the chain of sunflower seed meal and oil products

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | sunflower seeds | | the sunflower seed meal. | |
| **Cadmium** | C | medium | high | 4 | CCP | Cadmium concentrates into the meal during crushing. Depending on the geographical origin sunflower seeds run the risk of having cadmium levels leading to levels exceeding the limit in the meal. | Directive 2002/32/EC limits the presence of cadmium in feed materials of vegetable origin to 1 ppm. | Depending on the origin of the seeds, batch-wise control on incoming sunflower. | This risk is applying to certain geographical origins. |
| **Hexane residue** | C | high | little | 3 | PRP | Hexane residue is present in oilseed meals. | ADR 400 ppm. | Follow transport regulation, which provides for stricter hexane residue limits than needed in relation to feed safety. | |

## 3.4 Separation of sunflower seed hulls

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Salmonella** | B | low | high | 3 | PRP | Salmonella is the major hazard for microbiological contamination of feed. Salmonella are widespread in the environment and each link in the food chain, from the producers up to and including the consumers has a role to play in reducing the risk of Salmonella harming animals or humans. Animal feed is acknowledged to be one possible route by which Salmonella can enter the food chain. | FEDIOL Code of Practice for the Control of Salmonellae in Oilseed Crushing Plants. | Apply the preventive measures as listed in the FEDIOL Code of Practice for the Control of Salmonellae in Oilseed Crushing Plants. | |

## 4. Refining

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Processing aids (alkali solution, acids)** | C | medium | medium | 3 | PRP | Processing aids come into contact with the product. | | Processing aids that directly come into contact with the oil must be for food use or of food grade quality. | |
| **Foreign materials like glass, wood, metals, etc.** | P | medium | medium | 3 | PRP | Foreign materials may be present. | | Filter before loading | |

## 4.1 Production of refined sunflower seed oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin and dioxin-like PCBs** | C | low | high | 3 | PRP | A potential source of dioxin contamination during for the oil is drying of sunflower seeds and bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. However, post-harvest use of pesticides is critical, which can result in sunflower seeds and by-products of refining not respecting MRLs, unless residues are fully removed during refining of the crude oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | In case of a pesticide residue level exceeding the limit, a feed safety assessment should be carried out. | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Microbiological contamination** | B | low | medium | 2 | | Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow. | | | |

## 4.2 Physical refining: production of sun fatty acid distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | low | high | 3 | PRP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | No deliberate admixture of soybean distillates. | |
| **Dioxin from bleaching earth** | C | low | high | 3 | PRP | A potential source of dioxin contamination during refining of the oil is bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. However, post-harvest use of pesticides is critical, which can result in sunflower seeds and by-products of refining not respecting MRLs. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | In case of a pesticide residue level exceeding the limit, a feed safety assessment should be carried out. | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | low | high | 3 | PRP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low, but they will concentrate into the fatty acid distillates during refining. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | Non-complying product should not be applied to feeding stuff. | |

## 4.3 Chemical refining: production of (salts of) sun fatty acids free from distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. However, post-harvest use of pesticides is critical, which can result in sunflower seeds and by-pproducts of refining not respecting MRLs. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | In case of a pesticide residue level exceeding the limit, a feed safety assessment should be carried out. | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | . | |

## 4.4 Chemical refining: production of sun distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | medium | high | 4 | CCP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | According to FEDIOL, distillates from chemical refining may not be used for feed purposes. Fatty products obtained from batch refining processes combining physical and chemical refining steps in one and the same equipment may be used for feed purposes, provided that there is analytical proof showing that limits for dioxin and pesticide residues are respected. | |
| **Dioxin from bleaching earth** | C | medium | high | 4 | CCP | A potential source of dioxin contamination during refining of the oil is bleaching earth. During chemical refining, dioxins concentrate into the distillates. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. However, during chemical refining, dioxins concentrate into the distillates. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | See above under “general”. | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | medium | high | 4 | CCP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low, but they will concentrate into the fatty acid distillates during refining.. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | See above under “general”.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes. | |

## A. Storage and transport of oilseeds and oilseeds meal

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxins from pest control materials** | C | low | high | 3 | PRP | Poisoned grain from open boxes could end up in the food chain. | | A pest control programme must be applied that is suitable for use in the food chain. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | medium | medium | 3 | PRP | Post-harvest use of pesticides on oilseeds is critical due to the limited time that is available for the pesticides to break down. The countries of export of oilseeds work with positive lists for the use of pesticides which, for some substances, may conflict with European legislation, particularly in the case of soft seeds such as those of sunflowers. | Regulation 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annex of this regulation. | Transport and storage companies must use pesticides correctly and document this. Otherwise they must verify that the levels of the residues of the pesticides used during transport and storage comply with EU legislation. | |
| **Contamination by the previous cargo during the transport by farm cart, truck or barge or ocean going vessel** | C | low | high | 3 | PRP | Transport of oilseeds and oilseed meals usually does not take place in means of transport that are dedicated to the transport of food or feed. | | Transport companies must clean farm carts, trucks, barges and ocean-going-vessels before loading. Inspection on cleanliness before loading. | |
| **Contamination by the previous cargo during storage** | C | low | high | 3 | PRP | Oilseeds and oilseed meals may be contaminated with mycotoxin containing previous loads. | | Storage companies must clean sites before use and must inspect them on cleanliness before use. | |
| **Adulteration with melamine** | C | Low | High | 3 | PRP | Analytically, melamine mimics proteins | | Make sure melamine is controlled when buying meal from areas with a known history for adulteration with melamine. | |

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | high | 3 | PRP | Transport of oils is dedicated. | EC Regulation No. 852/2004 implies the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated.<br><br>FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| - Tank coasters | C | low | high | 3 | PRP | Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| **Contamination by cleaning agents** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | medium | 2 | | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Include safeguards to preclude contamination of the food or feed grade cargo tanks and equipment by steam, water and cleaning agents used in the cleaning of non-food grade cargo tanks. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| - Tank coasters | C | low | medium | 2 | Increased risk in case coaster is not dedicated to feed- or foodstuff. | | |

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards (continued)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Heating or cooling fluids from equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils). | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | | |
| - Rail tanks, tank barges and coasters | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | Heating coils of rail tanks must be of stainless steel (FEDIOL).<br>If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | |
| **Foreign bodies** | P | low | high | 3 | PRP | | | A quality plan should require the loading of tank cars with refined oils under a roof. | |
| **Adulteration** | C/P/B | low | high | 3 | PRP | Adulteration can cause harm. | | Application of minimum mandatory requirements in FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use. | |

## C. Transport of tropical and seed oils and derived products and by-products for feed application according not in compliance with EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | C | low | high | 3 | PRP | Tank cars and barges may have been used for non food or non feed compatible products such as petrochemicals. | | Tank cars and barges that are not dedicated tot the transport of foodstuff or feeding stuff should have undergone a validated cleaning procedure. | |
| **Contamination by cleaning agents** | C | medium | medium | 3 | PRP | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | | Feed- or food-grade cleaning agents must have been used. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| **Heating or cooling fluids from failing equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Tank cars that use coils for heat transfer are banned.<br>The tanks are heated with cooling water from the motor through a system of double walls. | | | |
| - Barges | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | The use of hot water or steam heating is recommended. |
| **Foreign bodies** | P | low | medium | 2 | | | | | |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | **Abuse of additives** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Adulteration with mineral oil** | | I | high | 3 | PRP | Adulteration with mineral oils is still a problem with the transport of oils in the countries of origin. Since October 1999 control has been intensified and the chance of adulteration taking place has decreased. | | |

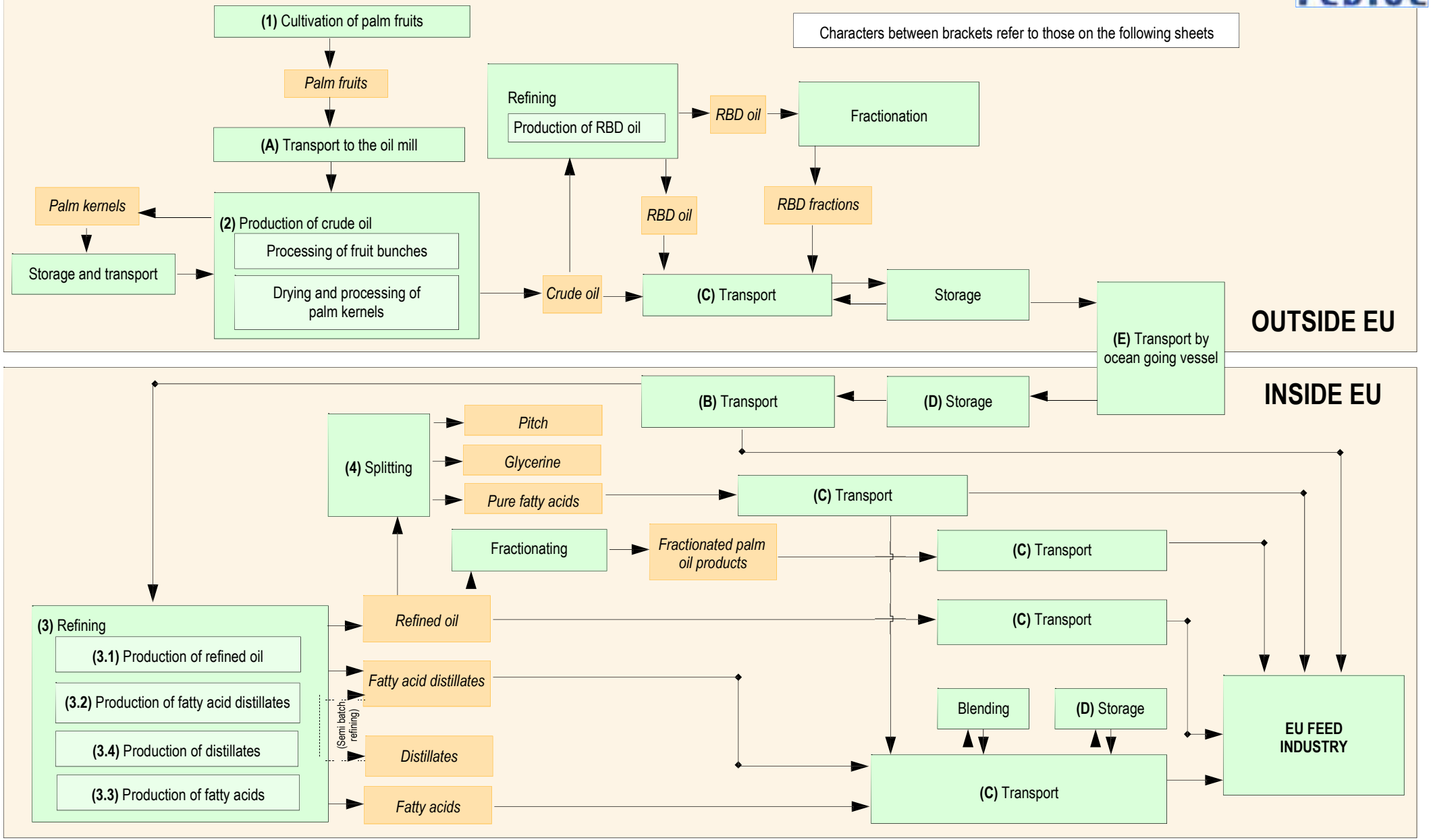
## D. Storage

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination due to lack of segregation** (contamination from previous cargoes, use of incorrect joining, shared equipment) | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs. | Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EC Regulation No. 852/2004) | Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Directive 96/3/EC. | |
| **Contamination by cleaning agents** | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low. | | Cleaning agents must be suitable for use in the food industry. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids from failing equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the storage company must provide for documentation on net losses and analyse accordingly, if necessary. | The use of water and steam heating is recommended. |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | **Abuse of additives** |

## E. Transport by ocean going vessel

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Transport contamination** | | | | | | | | | |
| - Contamination by previous cargoes present in tanks or pipes | C | medium | medium | 3 | PRP | Ocean going vessels carrying oils and fats for edible use into the EU must have as an absolute minimum that the immediate previous cargoes is a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | Directive 96/3/EC (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked.<br><br>FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats.<br><br>FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union.<br><br>The EU has not regulated the sea transport of oils and fats for feed application. | Before loading, FOSFA recognised superintendents need to check whether tanks are sufficiently cleaned. Before unloading, FOSFA recognised superintendents need to check the ship's logbook on compliance with previous cargo lists.<br><br>The use of dedicated pipe lines at loading and unloading. | |
| - Contamination by cleaning agents | C | low | high | 3 | PRP | Usually maritime business sticks to good practice. | | Check ship log-book. | |
| **Thermal heating fluids (THF) from equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | The use of water and steam heating is recommended. |
| **Hydraulic oils from portable pumps** | C | low | high | 3 | PRP | Hydraulic oils from portable pumps may be toxic. | | The use of portable pumps with clear separation of hydraulic motor from pump. If not, hydraulic oils of food grade quality must be used. | Hydraulic motors that are directly linked to the pump allow for unwanted leakages of hydraulic oil into the vegetable oil in case of seal failure. |

# Flow chart of the production chain of palm oil and palm kernel oil products for feed application in the EU



## Risk assessment of the chain of palm and palm kernel oil products

### 1. Cultivation of palm fruits*

| HAZARD | CAT. | CHANCE | SERIOUSNESS* | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | The countries of export of palm oil (Indonesia, Malaysia and others) work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation. Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | EC Regulation 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products. | | |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## Risk assessment of the chain of palm and palm kernel oil products

# 2. Production of crude oil*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Boiler chemicals** | C | | | | | Increased risk at plants without good manufacturing practices. | | | Steam (using boiler chemicals) that directly comes into contact with the product must be suitable for use in the food industry. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing food safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | | | | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude palm or palm kernel oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Recycling of contaminated fat from fat traps in effluent water.** | C | | | | | Effluent water may be chemically contaminated. | | | Fat from fat traps in effluent water must not be recycled for food application. |
| **Hydraulic oil or lubricants from equipment** | C | | | | | Hydraulic oils and lubricants may contain toxic compounds. | | | The prerequisite programme should assure that the contamination of the product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used.<br>The Dutch GMP-limit for C (10-40) in oils is 400 mg/kg. |
| **Foreign bodies** | P | | | | | Foreign bodies may be present. | | | A system should be in place that removes any foreign material. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## Risk assessment of the chain of palm and palm kernel oil products

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Utilities: palm and palm kernel oil refining and processing. | | | | | |
| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
| **Hydraulic oils or lubricants from equipment** | C | low | high | 3 | PRP | Hydraulic oils and lubricants may contain toxic compounds. | | The prerequisite programme should assure that the contamination of product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used. | |
| **Quality of water** | C | low | high | 3 | PRP | Water is used in the crushing and refining process. | For manufacture of feed, according to Regulation 183/2005/EC water used during shall be of suitable quality. | Apply water of suitable quality. | |
| **Cleaning agents and boiler chemicals** | C | medium | medium | 3 | PRP | Cleaning agents and steam (using boiler chemicals) come into contact with the product. | | Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry. | |
| **Thermal heating fluids (THF) from equipment** | C | medium | high | 4 | CCP | THF may still be used by non-FEDIOL members. | According to the FEDIOL Code of Practice on the Heating of Edible Oils during Processing, the use of THF is not allowed. | Use hot water or steam heating. Otherwise, a control measure should assure that the contamination of product with thermal heating fluids is avoided. | |

## 3. Refining

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Processing aids (alkali solution, acids)** | C | medium | medium | 3 | PRP | Processing aids come into contact with the product. | | Processing aids that directly come into contact with the oil must be of food grade quality or for food use. | |
| **Foreign materials** | P | medium | medium | 3 | PRP | Foreign materials may be present. | | Filter before loading. | |

## 3.1 Production of refined palm and palm kernel oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin from bleaching earth** | C | low | high | 3 | PRP | A potential source of dioxin contamination during refining of the oil is bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude palm or palm kernel oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Microbiological contamination** | B | low | medium | 2 | | Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow. | | | |

## 3.2 Physical refining: production of palm and palm kernel fatty acid distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | low | high | 3 | PRP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | No deliberate admixture of soybean distillates. | |
| **Dioxin from bleaching earth** | C | medium | high | 4 | CCP | A potential source of dioxin contamination is environmental deposition and bleaching earth. This dioxin may move to the fatty acid distillates during physical refining. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | This risk may be managed by:<br>- positive release of a batch or<br>- active coal treatment to filter dioxin.<br><br>Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | low | high | 3 | PRP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude rapeseed oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | Non-complying product should not be applied to feeding stuff. | |

## 3.3 Chemical refining: Production of palm or (salts of) palm kernel fatty acids (free from distillate)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude palm or palm kernel oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |

## 3.4 Chemical refining: production of palm and palm kernel distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | medium | high | 4 | CCP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | According to FEDIOL, distillates from chemical refining may not be used for feed purposes. Fatty products obtained from batch refining processes combining physical and chemical refining steps in one and the same equipment may be used for feed purposes, provided that there is analytical proof showing that limits for dioxin and pesticide residues are respected. | |
| **Dioxin from bleaching earth** | C | medium | high | 4 | CCP | A potential source of dioxin contamination during refining of the oil is bleaching earth. During chemical refining, dioxins concentrate into the distillates. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 3 | | Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | See above under “general”. | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | medium | high | 4 | CCP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude palm or palm kernel oil, however, is very low, but they will concentrate into the distillates during refining. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | See above under “general”.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes | |

## Risk assessment of the chain of palm and palm kernel oil products

## 4. Splitting of crude and refined oil with water, heat and pressure and subsequent fractional distillation to produce pure fatty acids and glycerine*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Dioxin from bleaching earth** | C | | | | | A potential source of dioxin contamination during refining of the oil is bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | | Non-complying product should not be applied to feeding stuff. |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | Hitherto no residues of pesticides have been detected in palm and palm kernel oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | | | | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude palm or palm kernel oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## Risk assessment of the chain of palm and palm kernel oil products

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | **A. Transport of fruit bunches and palm kernels to the oil mill and storage of palm kernels*** | | | | | | |
| **HAZARD** | **CAT.** | **CHANCE** | **SERIOUSNESS** | **RISK CLASS.** | **PRP or CCP** | **JUSTIFICATION** | **LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS** | **CONTROL MEASURE** | **REMARKS** |
| **Foreign bodies** | P | | | | | Foreign bodies such as stones from dirty trucks and glass particles, dead rodents and tree leaves can be present. | | | Load compartments of means of transport must be free from previous load residues before loading fruit bunches. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | high | 3 | PRP | Transport of oils is dedicated. | EC Regulation No. 852/2004 implies the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated.<br><br>FEDIOL Code of working practice for bulk road and tank container transport of fats and oils for direct food use. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| - Tank coasters | C | low | high | 3 | PRP | Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| **Contamination by cleaning agents** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | medium | 2 | | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Include safeguards to preclude contamination of the food or feed grade cargo tanks and equipment by steam, water and cleaning agents used in the cleaning of non-food grade cargo tanks. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| - Tank coasters | C | low | medium | 2 | | Increased risk in case coaster is not dedicated to feed- or foodstuff. | | Selected cleaning stations must have an implemented HACCP-system. Demand a signed cleaning certificate before loading. | |

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards (continued)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Heating or cooling fluids from equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils). | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | | |
| - Rail tanks, tank barges and coasters | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | Heating coils of rail tanks must be of stainless steel (FEDIOL).<br>If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | |
| **Foreign bodies** | P | low | high | 3 | PRP | | | A quality plan should require the loading of tank cars with refined oils under a roof. | |
| **Adulteration** | C/P/B | low | high | 3 | PRP | Adulteration can cause harm. | | Application of minimum mandatory requirements in FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use. | |

## C. Transport of tropical and seed oils and derived products and by-products for feed application according not in compliance with EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | C | low | high | 3 | PRP | Tank cars and barges may have been used for non food or non feed compatible products such as petrochemicals. | | Tank cars and barges that are not dedicated tot the transport of foodstuff or feeding stuff should have undergone a validated cleaning procedure. | |
| **Contamination by cleaning agents** | C | medium | medium | 3 | PRP | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | | Feed- or food-grade cleaning agents must have been used. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| **Heating or cooling fluids from failing equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Tank cars that use coils for heat transfer are banned.<br>The tanks are heated with cooling water from the motor through a system of double walls. | | | |
| - Barges | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | The use of hot water or steam heating is recommended. |
| **Foreign bodies** | P | low | medium | 2 | | | | | |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | |
| **Adulteration with mineral oil** | | low | high | 3 | PRP | Adulteration with mineral oils is still a problem with the transport of oils in the countries of origin. Since October 1999 control has been intensified and the chance of adulteration taking place has decreased. | | Prevent adulteration. | |

## D. Storage

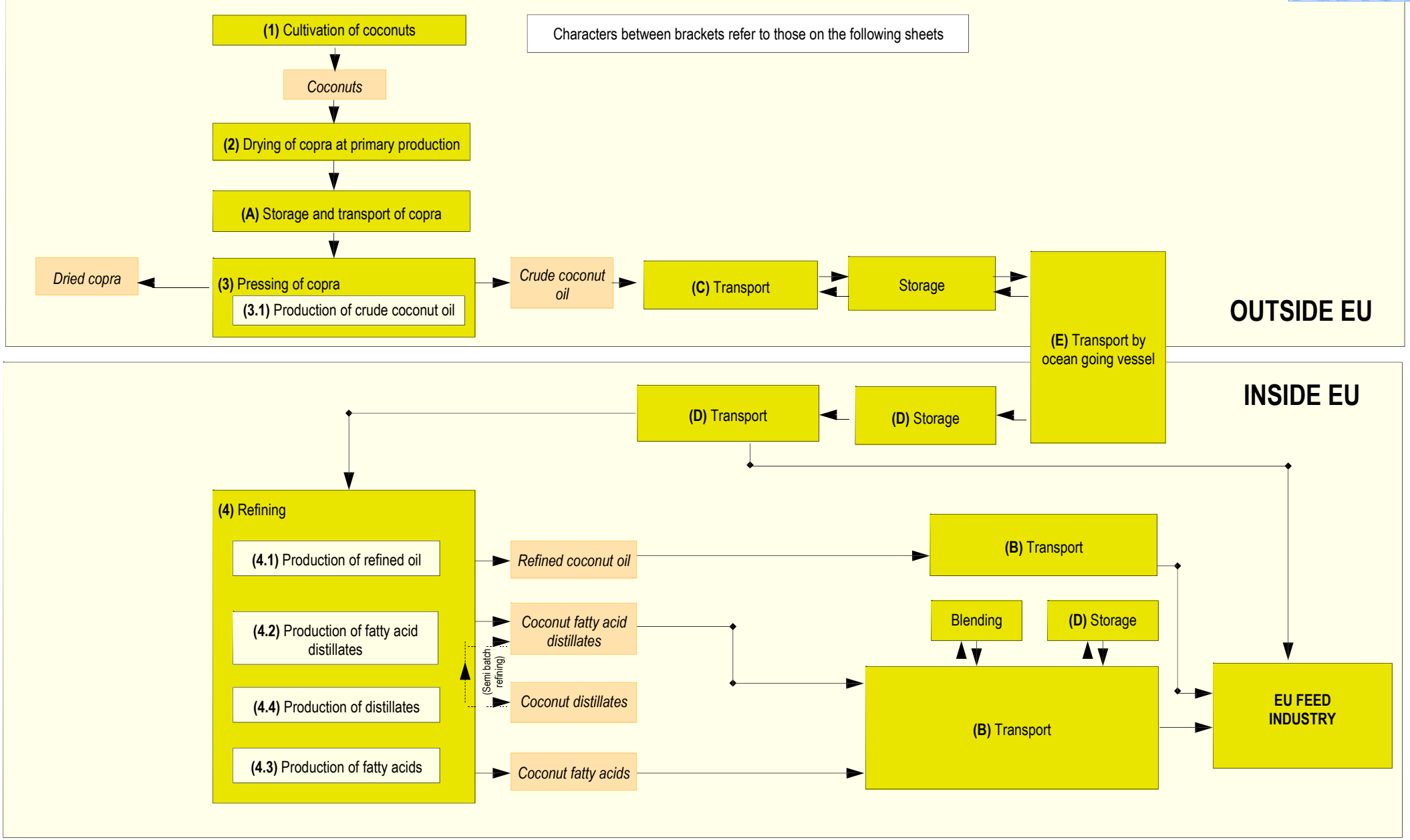
| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination due to lack of segregation** (contamination from previous cargoes, use of incorrect joinings, shared equipment) | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs. | Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EC Regulation No. 852/2004) | Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Directive 96/3/EC. | |
| **Contamination by cleaning agents** | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low. | | Cleaning agents must be suitable for use in the food industry. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids from failing equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the storage company must provide for documentation on net losses and analyse accordingly, if necessary. | The use of water and steam heating is recommended. |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they | | Agree on clear specifications as regards use of additives | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | may not have been approved. | | | |

## E. Transport by ocean going vessel

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Transport contamination** | | | | | | | | | |
| - Contamination by previous cargoes present in tanks or pipes | C | medium | medium | 3 | PRP | Ocean going vessels carrying oils and fats for edible use into the EU must have as an absolute minimum that the immediate previous cargoes is a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | Directive 96/3/EC (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked.<br><br>FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats.<br><br>FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union.<br><br>The EU has not regulated the sea transport of oils and fats for feed application. | Before loading, FOSFA recognised superintendents need to check whether tanks are sufficiently cleaned. Before unloading, FOSFA recognised superintendents need to check the ship's logbook on compliance with previous cargo lists.<br><br>The use of dedicated pipe lines at loading and unloading. | |
| - Contamination by cleaning agents | C | low | high | 3 | PRP | Usually maritime business sticks to good practice. | | Check ship log-book. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids (THF) from equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | The use of water and steam heating is recommended. |
| **Hydraulic oils from portable pumps** | C | low | high | 3 | PRP | Hydraulic oils from portable pumps may be toxic. | | The use of portable pumps with clear separation of hydraulic motor from pump. If not, hydraulic oils of food grade quality must be used. | Hydraulic motors that are directly linked to the pump allow for unwanted leakages of hydraulic oil into the vegetable oil in case of seal failure. |

# Flow chart of the production chain of coconut oil products for feed application in the EU



# Risk assessment of the chain of coconut oil products

## 1. Cultivation of coconuts*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | | | | | The countries of export of coconut oil (Philippines, Indonesia and others) work with positive lists for the use of pesticides during cultivation which, for some substances, may conflict with European pesticide residue legislation. Hitherto no residues of pesticides have been detected in coconut oil. | EC Regulation No. 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. EC Regulation No. 459/2010 amends the annexes II, III and IV listing all pesticide MRLs by products. | | |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

# Risk assessment of the chain of coconut oil products

## 2. Drying of copra at primary production*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contaminants caused by drying** | | | | | | | | | |
| - PAHs | C | | | | | Plantations dry copra on open fires, a source of PAH contamination for the copra. | | | Sun drying or indirect drying with heat exchangers (avoiding contamination of the copra with off-gases) prevents PAH contamination.<br>JECFA (Joint FAO/WHO Expert Committee on Food Additives) recommends replacing direct drying by indirect drying. In case of direct heating, Good Manufacturing Practices recommend not to use waste products as a fuel for direct drying. Temperature and time should be controlled to avoid PAH formation. The equipment has to be kept clean and well maintained. |
| - dioxin | C | | | | | Plantations dry copra on open fires, a source of dioxin contamination for the copra. | Code of Practice for the prevention and reduction of dioxin and dioxin-like PCB contamination in foods and feeds (Codex CAC/RCP 62-2006). | | Waste products must not be used as a fuel for direct drying. |
| - mineral oil | C | | | | | Copra being dried across roads may pick up spilled mineral oil. | | | |
| **Aflatoxins** | C | | | | | Aflatoxins may be formed when copra is not sufficiently dried. | Directive 2002/32/EC limits aflatoxin B1 in copra and products derived to 0.02 mg/kg (based on a product with a moisture content of 12%). | | FEDIOL advocates sun drying or (preferably) indirect drying of copra till a moisture content of max 6%. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

# Risk assessment of the chain of coconut oil products

## 3. Pressing orextraction of copra*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Toxic compounds from hexane** | C | | | | | Some coconut oil mills use hexane as an extraction solvent for crude oil. Industrial hexane may contain toxic compounds. | Directive 88/344/EEC sets purity criteria for the use of hexane in the production of foodstuffs. | | Hexane for oil extraction must be of food grade quality. |
| **Hydraulic oils or lubricants from failing equipment** | C | | | | | Hydraulic oils and lubricants may contain toxic compounds. | | | Contamination of the product with non-food grade hydraulic oils or lubricants have to be strictly avoided, for example by recording of the quantities used.<br>The risk of contamination of the product with food grade hydraulic oils and lubricants should be minimised. |
| **Foreign bodies** | P | | | | | Foreign bodies may be present. | | | A system should be in place that removes any foreign material. |
| **Recycling of contaminated fat from fat traps in effluent water** | C | | | | | Effluent water may be chemically contaminated. | | | Fat from fat traps in effluent water must have a non-food, non-feed destination except in case of dedicated process water fat taps. |

* Assessment of risks outside the EU is out of the scope of this document. See section d) Risk analysis, paragraph 2.3 for more information.

## 3.1. Production of crude coconut oil*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **PAHs** | C | | | | | Concentration of PAHs in crude coconut oil during pressing of the copra. | FOSFA has an optional allowance scheme for crude coconut oil for BaP levels exceeding 50 µg/kg. | | |
| **Dioxin** | C | | | | | A potential source of dioxin contamination is direct drying of the copra. | | | Monitoring data show that depending on origin crude coconut oil runs the risk of having dioxin levels exceeding the legal limits for this contaminant in feed materials. |
| **Mineral oils** | C | | | | | Copra being dried across roads may pick up spilled diesel, which will concentrate in the crude oil during the pressing of the oil. | | | The Dutch GMP standard limits the content of C(10-40) in oils and fats to 400 mg/kg. |
| **Aflatoxins** | C | | | | | When improperly dried copra is stored for several days aflatoxin may be formed. Rainfall during storage and transport will accelerate the formation of aflatoxins. Some pick up by crude coconut oil during pressing of the copra. | | | |
| **Residues of herbicides, insecticides, fungicides or rodenticides above the MRL** | C | | | | | Hitherto no residues of pesticides have been detected in crude coconut oil. | EC Regulation No. 396/2005 prohibits putting into circulation commodities that do not comply with the MRLs set in the annexes. | | |

* Assessment of risks outside the EU is out of the scope of this document. See section d) Risk analysis, paragraph 2.3 for more information.

# Risk assessment of the chain of coconut oil products

## Utilities: coconut oil refining and processing

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Hydraulic oils or lubricants from equipment** | C | low | high | 3 | PRP | Hydraulic oils and lubricants may contain toxic compounds. | | The prerequisite programme should assure that the contamination of product with non-food grade hydraulic oils or lubricants is avoided and that the risk of contamination of the product with food grade hydraulic oils and lubricants is minimised. The prerequisite programme could involve recording of the quantities used. | |
| **Quality of water** | C | low | high | 3 | PRP | Water is used in the crushing and refining process. | For manufacture of feed, according to Regulation 183/2005/EC water used during shall be of suitable quality. | Apply water of suitable quality. | |
| **Cleaning agents and boiler chemicals** | C | medium | medium | 3 | PRP | Cleaning agents and steam (using boiler chemicals) come into contact with the product. | | Cleaning agents used in the production system should be flushed. Cleaning agents and boiler chemicals must be suitable for use in the food industry. | |
| **Thermal heating fluids (THF) from equipment** | C | medium | high | 4 | CCP | THF may still be used by non-FEDIOL members. | According to the FEDIOL Code of Practice on the Heating of Edible Oils during Processing, the use of THF is not allowed. | Use hot water or steam heating. Otherwise, a control measure should assure that the contamination of product with thermal heating fluids is avoided. | |

# Risk assessment of the chain of coconut oil products

## 4. Refining

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Processing aids (alkali solution, acids)** | C | medium | medium | 3 | PRP | Processing aids come into contact with the product. | | Processing aids that directly come into contact with the oil must be of food grade quality or for food use. | |
| **Foreign materials** | P | medium | medium | 3 | PRP | Foreign materials may be present. | | Filter before loading. | |

## 4.1 Production of refined coconut oil

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **PAHs** | C | high | medium | 4 | CCP | Crude coconut oil may be heavily contaminated with PAHs due to bad drying practices. | EC Regulation No. 1881/2006 sets a 2.0 µg/kg limit for BaP in oils and fats intended for direct human consumption or use as an ingredient in foods. | The amount of active coal added and the intensity of the deodorisation process must be sufficient to remove both heavy and light PAHs. | |
| **Dioxin and dioxin-like PCBs** | C | low | high | 3 | PRP | A potential source of dioxin contamination for the oil is drying of copra and bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Hitherto no residues of pesticides have been detected in coconut oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude coconut oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Aflatoxins** | C | very low | high | 2 | | Crude coconut oil may be contaminated with traces of aflatoxin. | Directive 2002/32/EC limits aflatoxin B1 in copra and products derived to 0.02 mg/kg (based on a product with a moisture content of 12%). | Validate refining process for aflatoxin removal. | Alatoxins will disappear under normal refining conditions. |

## 4.2 Physical refining: production of coconut fatty acid distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | low | high | 3 | PRP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | No deliberate admixture of coconut distillates. | |
| **PAH** | C | high | medium | 4 | CCP | Light PAHs will concentrate into the fatty acid distillate during deodorisation. In case active coal have been added, heavy PAHs are removed. | | Non-complying product should not be applied to feeding stuff. | |
| **Dioxin from bleaching earth** | C | low | high | 3 | PRP | A potential source of dioxin contamination during refining of the oil is bleaching earth. However, the dosage level of bleaching earth during refining is only 1-3%. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Hitherto no residues of pesticides have been detected in crude coconut oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | low | high | 3 | PRP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude coconut oil, however, is very low, but they will concentrate into the fatty acid distillates during physical refining. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | Non-complying product should not be applied to feeding stuff. | |
| **Alatoxins** | C | medium | high | 3 | CCP | Alatoxin will concentrate during deodorisation. | Directive 2002/32/EC limits aflatoxin B1 in copra and products derived to 0.02 mg/kg (based on a product with a moisture content of 12%). | Non-complying product should not be applied to feeding stuff. | Alatoxins are water soluble. During physical refining they may be separated with the condense water. |

## Risk assessment of the chain of coconut oil products

### 4.3. Chemical refining: production of (salts of) coconut fatty acids free from distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **PAHs** | C | high | medium | 4 | CCP | During chemical refining, the PAH content of the fatty acids is expected to be similar to that of the crude coconut oil. | | Non-complying product should not be applied to feeding stuff. | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 2 | | Hitherto no residues of pesticides have been detected in crude coconut oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | very low | high | 2 | | Some of the banned pesticides may be present in the environment. The chance of finding them in crude coconut oil, however, is very low. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | | |
| **Aflatoxins** | C | medium | high | 4 | CCP | Aflatoxins are water soluble. During chemical refining they are expected to transfer to the soap stock and they may stay with the fatty acids. | Directive 2002/32/EC limits aflatoxin B1 in copra and products derived to 0.02 mg/kg (based on a product with a moisture content of 12%). | Non-complying product should not be applied to feeding stuff. | It is not clear whether aflatoxins will stay with the fatty acids or will disappear with the effluent. |

## 4.4 Chemical refining: production of coconut distillates

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **General** | C | medium | high | 4 | CCP | | Products intended for animal feed containing a level of undesirable substance that exceeds the legal limit may not be mixed for dilution purposes with the same, or other, products intended for animal feed (Directive 2002/32/EC). | According to FEDIOL, distillates from chemical refining may not be used for feed purposes. Fatty products obtained from batch refining processes combining physical and chemical refining steps in one and the same equipment may be used for feed purposes, provided that there is analytical proof showing that limits for dioxin and pesticide residues are respected. | |
| **PAH** | C | high | medium | 4 | CCP | Light PAHs will concentrate into the fatty acid distillate during deodorisation. In case active coal have been added, heavy PAHs are removed. | | Non-complying product should not be applied to feeding stuff. | |
| **Dioxin from bleaching earth** | C | medium | high | 4 | CCP | A potential source of dioxin contamination during refining of the oil is bleaching earth. During chemical refining, dioxins concentrate into the distillates. | Directive 2002/32/EC limits the dioxin content in feed material of vegetable origin to 0.75 ng/kg (WHO-PCDD/F-TEQ) and limits the sum of dioxin and dioxin-like PCBs to 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ).<br><br>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining, which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value. | Purchase fresh bleaching earth from suppliers that fulfil the FEDIOL specifications as listed in the FEDIOL Code of Practice on the purchase conditions of fresh bleaching earth for oil refining.<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes | |
| **Pesticide residues above the MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the MRL.** | C | low | medium | 3 | | Hitherto no residues of pesticides have been detected in crude coconut oil. | Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for authorised pesticides into processed products, providing feed safety is assured. | See above under "general". | |
| **Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff** | C | medium | high | 4 | CCP | Some of the banned pesticides may be present in the environment. The chance of finding them in crude coconut oil, however, is very low, but they will concentrate into the distillates during refining. | Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff. | See above under "general".<br><br>According to FEDIOL, distillates from chemical refining may not be used for feed purposes | |
| **Alatoxins** | C | very low | high | 2 | | Alatoxins are water soluble. During chemical refining aflatoxins will disappear with the soap stock. | Directive 2002/32/EC limits aflatoxin B1 in copra and products derived to 0.02 mg/kg (based on a product with a moisture content of 12%). | | |

## A. Storage of copra and transport of copra to the oil mill*

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Aflatoxins** | C | | | | | When improperly dried copra is stored for several days, aflatoxin may be formed. Rainfall during storage and transport will accelerate the formation of aflatoxins. | | | Storage and transport companies must protect copra against rainfall and sea water. Aeration during storage.<br><br>If copra is processed directly after harvesting, the risk at aflatoxin formation is low. |
| **Foreign bodies** | P | | | | | Foreign bodies such asstones from dirty trucks and glass particles, dead rodents and tree leaves can be present. | | | Oil mills must inspect incoming copra and must remove foreign bodies. |

* Assessment of risks outside the EU is out of the scope of this document. See Methodology document, paragraph 2.3 for more information.

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | high | 3 | PRP | Transport of oils is dedicated. | EC Regulation No. 852/2004 implies the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated.<br><br>FEDIOLCcode of working practice for bulk road and tank container transport of fats and oils for direct food use. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| - Tank coasters | C | low | high | 3 | PRP | Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining. | |
| **Contamination by cleaning agents** | | | | | | | | | |
| - Tank cars, rail tanks and barges | C | low | medium | 2 | | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Include safeguards to preclude contamination of the food or feed grade cargo tanks and equipment by steam, water and cleaning agents used in the cleaning of non-food grade cargo tanks. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| - Tank coasters | C | low | medium | 2 | | Increased risk in case coaster is not dedicated to feed- or foodstuff. | | Selected cleaning stations must have an implemented HACCP-system. Demand a signed cleaning certificate before loading. | |

## B. Transport of tropical and seed oils and derived products for feed application according to EU food transport standards (continued)

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Heating or cooling fluids from equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Stainless steel tanks are used which are heated with cooling water from the motor through a system of double walls (and not coils). | FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | | |
| - Rail tanks, tank barges and coasters | C | low | High | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | Heating coils of rail tanks must be of stainless steel (FEDIOL).<br>If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible nett losses and analyse accordingly if necessary. | |
| **Foreign bodies** | P | low | high | 3 | PRP | | | A quality plan should require the loading of tank cars with refined oils under a roof. | |
| **Adulteration** | C/P/ B | low | high | 3 | PRP | Adulteration can cause harm. | | Application of minimum mandatory requirements in FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use. | |

## C. Transport of tropical and seed oils and derived products and by-products for feed application according not in compliance with EU food transport standards

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination by previous cargo** | C | low | high | 3 | PRP | Tank cars and barges may have been used for non food or non feed compatible products such as petrochemicals. | | Tank cars and barges that are not dedicated tot the transport of foodstuff or feeding stuff should have undergone a validated cleaning procedure. | |
| **Contamination by cleaning agents** | C | medium | medium | 3 | PRP | Increased risk at cleaning stations that clean both feed and chemical tanks on one site. | | Feed- or food-grade cleaning agents must have been used. | FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use includes good practices for cleaning of tanks. |
| **Heating or cooling fluids from failing equipment** | | | | | | | | | |
| - Tank cars | C | low | high | 3 | PRP | Tank cars that use coils for heat transfer are banned.<br>The tanks are heated with cooling water from the motor through a system of double walls. | | | |
| - Barges | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | The use of hot water or steam heating is recommended. |
| **Foreign bodies** | P | low | medium | 2 | | | | | |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved. | | Agree on clear specifications as regards use of additives | |
| **Adulteration with mineral oil** | | low | high | 3 | PRP | Adulteration with mineral oils is still a problem with the transport of oils in the countries of origin. Since October 1999 control has been intensified and the chance of adulteration taking place has decreased. | | Prevent adulteration. | |

# Risk assessment of the chain of coconut oil products

## D. Storage

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Contamination due to lack of segregation** (contamination from previous cargoes, use of incorrect joinings, shared equipment) | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. Less risk is involved when the tank terminal applies the EU list of acceptable previous cargoes during sea transport to the storage of vegetable oils. Least risk is involved when the vegetable oils are stored in tanks that are dedicated to the storage of foodstuffs. | Terminals in the EU that store oils and fats for food application are obliged to apply HACCP (EC Regulation No. 852/2004) | Food or feed dedication of storage tanks. Otherwise, storage tanks must at least adhere to the EU rules on previous cargoes that have been set up for sea transport in Directive 96/3/EC. | |
| **Contamination by cleaning agents** | C | low | high | 3 | PRP | This risk classification applies to terminals that store both chemicals and vegetable oils. They may abstain from using cleaning agents that are suitable for use in the food industry. For tank terminals in the EU that apply HACCP and that keep the storage of vegetable oils and chemicals separated, the chance of using the wrong cleaning agents is very low. | | Cleaning agents must be suitable for use in the food industry. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids from failing equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during storage, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the storage company must provide for documentation on net losses and analyse accordingly, if necessary. | The use of water and steam heating is recommended. |
| **Misuse of additives** | C | low | high | 3 | PRP | Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they | | Agree on clear specifications as regards use of additives | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | may not have been approved. | | | |

## E. Transport by ocean going vessel

| HAZARD | CAT. | CHANCE | SERIOUSNESS | RISK CLASS. | PRP or CCP | JUSTIFICATION | LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS | CONTROL MEASURE | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| **Transport contamination**<br><br>- Contamination by previous cargoes that is present in tanks or pipes | C | medium | medium | 3 | PRP | Ocean going vessels carrying oils and fats for edible use into the EU must have as an absolute minimum as the immediate previous cargoes a product that is either a foodstuff or a product appearing on the EU list of accepted immediate cargoes of Directive 96/3/EC. | Directive 96/3/EC (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked.<br><br>FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats.<br><br>FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union. | Before loading, FOSFA recognised superintendents need to check whether tanks are sufficiently cleaned. Before unloading, FOSFA recognised superintendents need to check the ship's logbook on compliance with previous cargo lists.<br><br>The use of dedicated pipe lines at loading and unloading. | |
| - Contamination by cleaning agents | C | low | high | 3 | PRP | Usually maritime business sticks to good practice. | | Check ship log-book. | |
| **Solvent from coating** | C | low | high | 3 | PRP | Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining | | Use stainless steel tanks or in case of use of tanks with virgin coating, do not feed the FAD | |
| **Thermal heating fluids (THF) from failing equipment** | C | low | high | 3 | PRP | Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures applied during transport, the chance of leakage of thermal heating fluids into the product is low. | | If thermal heating fluids have been used, the transporter of the oil must provide for documentation on possible net losses and analyse accordingly if necessary. | The use of water and steam heating is recommended. |
| **Hydraulic oils from failing portable pumps** | C | low | high | 3 | PRP | Hydraulic oils from portable pumps may be toxic. | | The use of portable pumps with clear separation of hydraulic motor from pump. If not, hydraulic oils of food grade quality must be used. | Hydraulic motors that are directly linked to the pump allow for unwanted leakages of hydraulic oil into the vegetable oil in case of seal failure. |