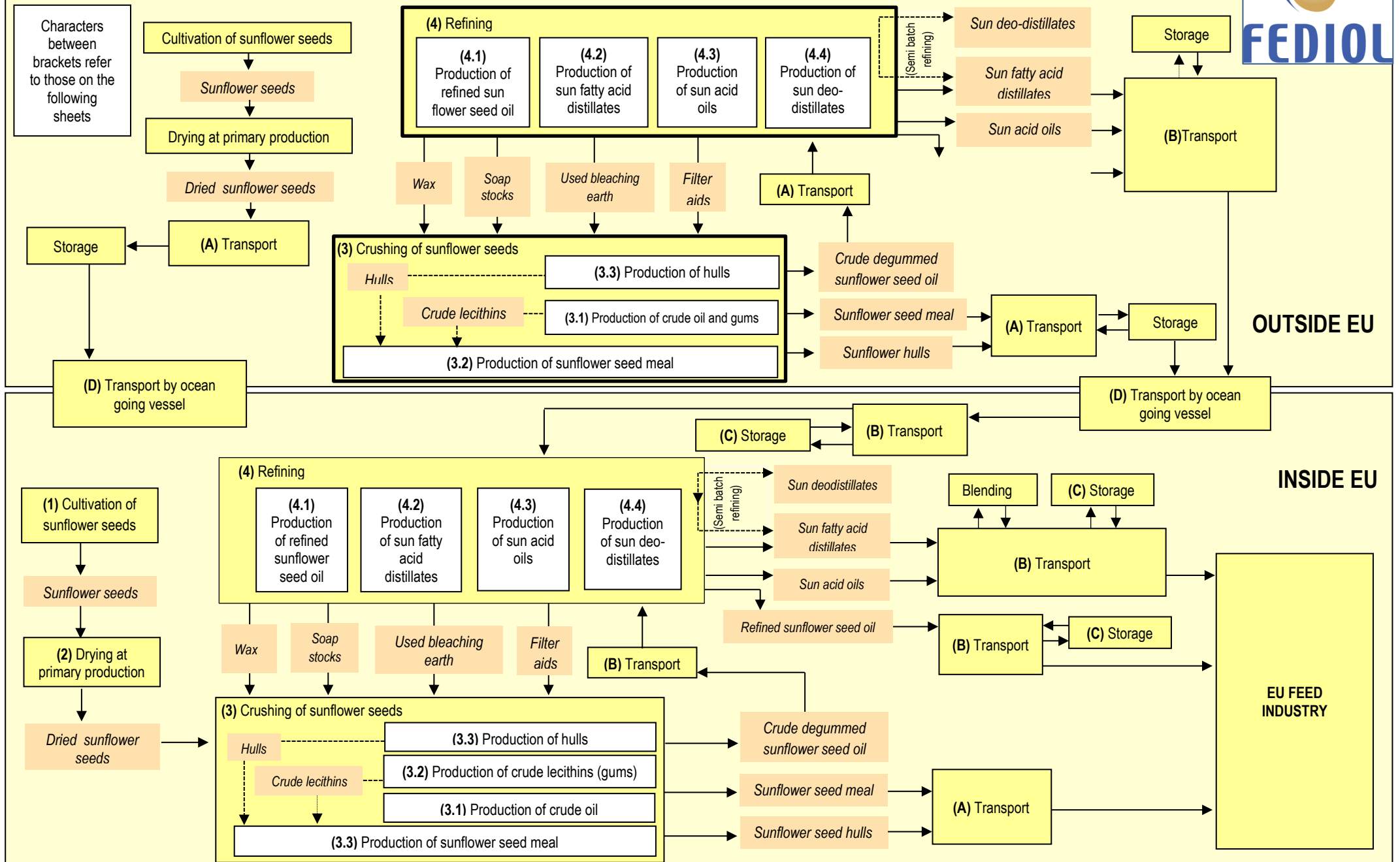


Flow chart of the production chain of sunflower seed oil products for feed application in the EU



Feed

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

1. Risk assessment of the chain of sunflower seed meal and oil products

			1. Cultivation of sunflower seeds*					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU 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 178/2006 establishes Annex I that lists the food and feed products for which pesticide residue limits apply. Regulation 149/2008 establishes Annexes II, III and IV that sets the MRLs for the products listed in Annex I. FEDIOL specifications for purchasing sun seeds from non-EU origin contain MRLs for certain pesticide residues (11SPEC097).		Regulation (EC) 882/2004 allows for the processing of non-compliant agricultural commodities into compliant food or feed products under the control of the authorities.
Phytotoxins	C				Sunflower seeds may contain the weed seed Datura Stramonium. This is particularly the case for France.			Visual inspection of sunflower seeds is recommended as a control measure.

* Assessment of risks outside the EU is out of the scope of this document. For more information, see section d) Methodology of the FEDIOL food and feed chain risk assessments of the Sector reference document on the manufacturing of safe feed materials from oilseed crushing and vegetable oil refining

Feed

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

			2. Drying of sunflower seeds at primary production*					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	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).		<p>Good Manufacturing Practices recommend using fuels which are not generating dioxins and dioxin-like compounds and other harmful contaminants.</p> <p>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.</p> <p>Feed materials derived from sunflower seeds have to comply with the limits for dioxin and dioxin-like PCBs of the Directive 2002/32/EC.</p>

* Assessment of risks outside the EU is out of the scope of this document. See also the footnote on the previous page.

Feed

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

			Utilities: sunflower seeds crushing, oil refining and processing					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Hydraulic oils or lubricants from equipment	C	Low	High	3	Hydraulic oils and lubricants may contain toxic compounds.	FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (14COD341) .	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 hydraulic oils and lubricants that are suitable for incidental contact with food is minimised. The prerequisite programme could involve recording of the quantities used. Equipment in requires proper lubrication to operate at optimum performance and reliability. In specific cases where no H1 lubricant could meet the particular lubrication requirements of the equipment, a specific assessment of the lubricant to be used should be performed, including consideration as regards the absence of mineral oil hydrocarbons (MOAH).	
Contaminants in water such as PFOS and PFOA	C	Low	Medium	2	Water is used in the crushing and refining process.	Regulation 183/2005/EC is addressing water use.		
Cleaning agents and boiler chemicals	C	Medium	Medium	3	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	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.	

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

			3. Crushing of sunflower seeds					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Toxins from pest control materials	C	Low	High	3	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 such as benzene	C	Low	High	3	Industrial hexane may contain toxic compounds.	Directive 2009/32/EC and its amendments sets purity criteria for the use of hexane during the crush of oilseeds.	Food grade hexane must be used. An extraction solvent is considered as being used in compliance with good manufacturing practice if its use results only in the presence of residues or derivatives in technically unavoidable quantities presenting no danger to human health.	
Foreign material like glass, wood, metals, etc.	P	Medium	Medium	3	Foreign material may be present		A system should be in place that removes foreign material.	
Contaminants from viable seeds and weeds	B	medium	low	2	Viable seeds from weeds growing in the operator premises or coming from spillage of containers/bags could end up in the food/feed chain			No control needed for food safety reasons, but control needed for environmental reasons. The prerequisite programme should assure that the contamination of product with viable seeds (during the receipt, storage, production, delivery and transport activity) is avoided and the risk of contamination is minimized. The prerequisite programme should include weed seed control. Would any volume of seeds

Feed

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

									be lost and/or spilled on the premises of the crushing plant (unlikely), this volume should be collected and stored in closed containers/bags. Abnormal effects during weed eradication should be reported to FEDIOL.
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Feed

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

			3.1 Production of crude oil					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contaminants from filter aids	C	Low	High	3	The crude oil can potentially wash contaminants out of the filter aid.	FEDIOL Code of Practice and quality assurance agreement on the purchase and use conditions of fresh bleaching earth and filter aids for vegetable oils and fats refineries and integrated plants (Ref. 16COD137).	Use of filter aids that are suitable for the food industry. Monitoring, establishment of quality and safety criteria for the purchase of filter aids	
Mineral oils from a failing recovery system	C	Medium	Medium	3	Low-medium viscosity mineral oils are used for hexane recovery It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well and thus to avoid that a possible contamination of the mineral oil is washed out and carried to the vegetable oil by hexane.	FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (14COD341).	Mineral oil of the recovery system must be suitable for incidental contact with food and must be free from mineral oil aromatic hydrocarbons (MOAH).. 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 such oils is minimised. The prerequisite programme could involve recording of the quantities used.	The GMP+ International standard limits the content of MOSH C(10-40) in sunflower seed oils and by-products of refining to 1000 mg/kg.
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	Low	Medium	2	Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. 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 processing/concentration factor for pesticides into processed products, provided food safety is assured.		Regulation (EC) 882/2004 allows for the processing of non-compliant agricultural commodities into compliant food or feed products under the control of the authorities.

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

						The FEDIOL position (11SAF181) concludes that based on the average oil content in sunflower seeds, ranging from 40%-45%, a processing factor of 2.5 should be used to establish the MRL of fat soluble pesticide residues in sunflower seed oil.		
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	After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil.	Feed Marketing Regulation 767/2009 stipulates that feed materials shall be free from chemical impurities resulting from the manufacturing process and from processing aids, unless a maximum content is fixed in the Catalogue. The Catalogue of Feed Materials, Regulation 68/2013 introduces a threshold for the setting of max contents for these chemical impurities of 0.1% (1000 ppm).		Toxicological assessments show that crude oil with hexane levels of up to 1000 ppm is safe. FOSFA has a flash point limit at 121° C which is related to transport and storage safety.

Feed

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

			3.2 Production of crude lecithins					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Mineral oils from a failing recovery system	C	Medium	High	3	Low-medium viscosity mineral oils are used for hexane recovery. It is in the interest of the crusher to recover as much hexane as possible, and to thus maintain the recovery system well.	FEDIOL code of practice for the management of mineral oil hydrocarbons presence in vegetable oils and fats intended for food uses (14COD341).	Mineral oil of the recovery system must be suitable for incidental contact with food. 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 MOSH C(10-40) in sunflower seed oils and by-products of refining to 1000 mg/kg.
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	Low	Medium	2	Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. 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 processing/concentration factor for pesticides into processed products, providing food safety is assured. FEDIOL contract for purchasing sun seeds from the Black Sea area (contains a clause on compliance with EU MRL legislation).		Regulation (EC) 882/2004 allows for the processing of non-compliant agricultural commodities into compliant food or feed products under the control of the authorities. Footnote 1 of Annex I of Regulation EC No 396/2005 says that MRLs do not apply to products used exclusively as ingredients for animal feed, until separate MRLs will be applicable.
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	Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff.		

Feed

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

					sunflower seed oil, however, is very low.			
Hexane that resides in the crude oil after recovery	C	High	Little	3	After hexane extraction of the oil and subsequent hexane recovery from the oil, traces of hexane will reside in the crude oil.	Feed Marketing Regulation 767/2009 stipulates that feed materials shall be free from chemical impurities resulting from the manufacturing process and from processing aids, unless a maximum content is fixed in the Catalogue. The Catalogue of Feed Materials, Regulation 68/2013 introduces a threshold for the setting of max contents for these chemical impurities of 0.1% (1000 ppm).		Toxicological assessments show that feed materials with hexane levels of up to 1000 ppm are safe. FOSFA has a flash point limit at 12° C, which is related to transport and storage safety.
Pathogens	B	Low	Medium	2	Microbiological growth as a result of condensation of water evaporated from the crude lecithins.			

Feed

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

			3.3 Production of sunflower seed expeller and meal					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Dioxin from anti-caking agent	C	Low	High	3	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	High	High	4	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. FEDIOL together with three other associations representing the suppliers and consumers of feed, ie FEFAC, COCERAL and COPA-COGECA have accepted responsibility for issuing guidance for industry to help it control Salmonella and have published the "Common principles for the management of the Salmonella risk in the feed chain" in June 2011. The European Guide to good practice for the industrial manufacture of safe feed materials has been amended so as to comply with these principles.	FEDIOL, FEFAC, COCERAL, COPA-COGECA Common principles for the management of the Salmonella risk in the feed chain. FEDIOL Recommendation on moisture content for rape/colza seed meal and sunflower seed meal.	The operator's PRP programme is to cover the following measures: a) Preserving feed materials from contamination during processing and storage eg by closed systems, hygiene practices, or by separating the premises into hygienic zones as appropriate. b) Applying time and temperature control on the Desolventiser Toaster (DT). c) Apply moisture control of the meals/expellers. FEDIOL is recommending a moisture content of sunflower seed meal of max 12.5%. If the monitoring system indicates that Salmonella is found in the finished feed	The operator shall introduce line monitoring with samples to be taken from the whole line, from where the product leaves the DT, from when it enters the storage silo up to and including the load out area. The operator is to set realistic targets for reduction of the incidence of Salmonella contamination of his meals/expellers basis historic data.

Feed

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

							<p>material, the following actions shall be considered:</p> <ul style="list-style-type: none"> ○ Carry out serotyping and traceability to identify the source of contamination; ○ Review processing conditions and relevant pre-requisite programs ○ Additional cleaning of storage and vehicles (where appropriate); ○ Additional cleaning of plant and equipment; ○ Review previous monitoring results ○ Consider additional training or changes in process or procedures <p>Applying chemical treatment with the aim to reduce Salmonella to acceptable levels.</p>	
Dioxin from used bleaching earth	C	Low	High	3	<p>Bleaching clay is of mineral origin and may contain dioxin by nature. Dioxin is toxic to humans and animals.</p>	<p>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).</p> <p>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-</p>	<p>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 (16COD137).</p>	<p>The risk only applies to integrated crushing and refining plants.</p>

Feed

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

						PCDD/F-PCB-TEQ) as upperbound value.		
Mycotoxins	C	Low	High	3	Result of insufficient drying of sunflower seeds		Control the mycotoxin level of the sunflower seed meal.	
Cadmium	C	Medium*	High	4	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. Fertiliser on the basis of low quality phosphorus can contain high cadmium levels.	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 chance is applying to certain geographical origins.
Hexane residue	C	High	little	3	Hexane residue is present in oilseed meals.	Feed Marketing Regulation 767/2009 stipulates that feed materials shall be free from chemical impurities resulting from the manufacturing process and from processing aids, unless a maximum content is fixed in the Catalogue. The Catalogue of Feed Materials, Regulation 68/2013 introduces a threshold for the setting of max contents for these chemical impurities of 0.1% (1000 ppm).		Toxicological assessments show that oilseed meals with hexane levels of up to 1000 ppm are feed safe. OVID in Germany has a safety data sheet referring to a max 300 ppm hexane in sunflower seed meal for explosion prevention during barge transport.
Arsenic	C	Low	Medium	2	Arsenic contamination of sunflower seeds has been observed in Spain.			
Datura Stramonium	B	Low*	Medium	2		Directive 2002/32/EC limits the maximum content of		*Certain origins of sunflower seeds can have a medium

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Feed

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

						Datura Stramonium in feed materials to 1000 ppm.		chance of exceeding the max limit for Datura Stramonium in sunflower seed meal.
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	Low	Medium	2	Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits. MRL policy in third countries differs from EU MRL policy.	EC Regulation No. 396/2005 sets limits for residues of pesticides. FEDIOL contract for purchasing sun seeds from the Black Sea area (contains a clause on compliance with EU MRL legislation).		Regulation (EC) 882/2004 allows for the processing of non-compliant agricultural commodities such as sunflower seeds into compliant food or feed products under the control of the authorities. Footnote 1 of Annex I of Regulation EC No 396/2005 says that MRLs do not apply to products used exclusively as ingredients for animal feed, until separate MRLs will be applicable.

Feed

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

			3.4 Separation of sunflower seed hulls					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Salmonella	B	High	High	4	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. FEDIOL together with three other associations representing the suppliers and consumers of feed, ie FEFAC, COCERAL and COPA-COGECA have taken their responsibility and have published the "Common principles for the management of the Salmonella risk in the feed chain" in June 2011. The European Guide to good practice for the industrial manufacture of safe feed materials has been amended so as to comply with these principles	FEDIOL, FEFAC, COCERAL, COPA-COGECA Common principles for the management of the Salmonella risk in the feed chain.	<p>The operator's PRP programme is to cover the following measures:</p> <p>a) Preserving feed materials from contamination during processing and storage eg by closed systems, hygiene practices, or by separating the premises into hygienic zones as appropriate.</p> <p>b) Apply moisture control</p> <p>If the monitoring system indicates that Salmonella is found in the finished feed material, the following actions shall be considered:</p> <ul style="list-style-type: none"> o Carry out serotyping and traceability to identify the source of contamination; o Review processing conditions and relevant pre-requisite programs o Additional cleaning of storage and vehicles (where appropriate); o Additional cleaning of plant and equipment; o Review previous monitoring results 	

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

							<ul style="list-style-type: none"> ○ Consider additional training or changes in process or procedures Applying chemical treatment with the aim to reduce Salmonella to acceptable levels. 	
<p>Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.</p>	C	Low	Medium	2	<p>Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within legal limits.</p> <p>MRL policy in third countries differs from EU MRL policy.</p>	EC Regulation No. 396/2005 sets limits for residues of pesticides.		<p>Footnote 1 of Annex I of Regulation EC No 396/2005 says that MRLs do not apply to products used exclusively as ingredients for animal feed, until separate MRLs will be applicable.</p>

Feed

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

			4. Refining					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contaminants in processing aids (alkali solution, acids) such as mercury in caustic soda.	C	Low	High	3	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.	

Feed

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

			4.1 Production of refined sunflower seed oil					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Dioxin and dioxin-like PCBs	C	Low	High	3	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%. Dioxin partly evaporates during distillation.	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). FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining (16COD137) , 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 EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	Low	Medium	2	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 processing/concentration factor for pesticides into processed products, providing feed safety is assured.		Regulation (EC) 882/2004 allows for the processing of non-compliant agricultural commodities into compliant food or feed products under the control of the authorities.
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	Directive 2002/32/EC sets limits for a number of pesticides residues in feeding stuff.		

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

					sunflower seed oil, however, is very low.			
Microbiological contamination	B	Low	Medium	2	Moisture content (i.e. water activity) in refined oils is too low for bacteria to grow.			
Foreign materials like glass, wood, metals, etc.	P	Medium	Medium	3	Foreign materials may be present.		Apply hygienic practices (eg closed systems). Filter before loading.	

Feed

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

			4.2 Physical refining: production of sun fatty acid distillates					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Dioxin	C	Low	High	3	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%.	<p>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).</p> <p>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).</p> <p>According to Regulation 2015/2019 amending the Feed Hygiene Regulation 183/2005 100% of the batches of fatty acid distillates for feed shall be tested on the sum of dioxins and dioxin-like PCBs.</p> <p>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining (16COD137), which includes a maximum limit for dioxin and dioxin-like PCBs of 1,5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value.</p>	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 EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides	C	Low	Medium	2	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	Regulation 396/2005 sets limits for residues of pesticides. This regulation allows to use a processing/		Footnote 1 of Annex I of Regulation EC No 396/2005 says that MRLs do not apply to products used

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

above the EU MRL.					can result in sunflower seeds and by-products of refining not respecting MRLs.	concentration factor for pesticides into processed products, providing feed safety is assured.		exclusively as ingredients for animal feed, until separate MRLs will be applicable.
Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff	C	Low	High	3	Some banned pesticides may be present in the environment. The chance of finding them in crude sunflower seed oil, however, is very low; 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 feed.	

Feed

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

			4.3 Chemical refining: production of sun soap stocks and sun acid oils					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	Low	Medium	2	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 processing/concentration factor for pesticides into processed products, providing feed safety is assured.		. Footnote 1 of Annex I of Regulation 396/2005 EC No says that MRLs do not apply to products used exclusively as ingredients for animal feed, until separate MRLs will be applicable.
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.		
Dioxin	C	Very low	High	2	The level of oil soluble contaminants in soap stocks mirrors that of crude oils.	FEDIOL factsheet on feed grade soap stocks from integrated crushing and refining (16SAF214). FEDIOL factsheet on acid oils from chemical refining for feed (16SAF215).		In integrated crushing and refining plants, soap stocks can be safely put back on the meal.

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

		4.4 Chemical refining: production of sun deodistillates						
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Dioxin	C	Medium	High	4	A potential source of dioxin contamination during refining of the oil is bleaching earth. During chemical refining, dioxins concentrate into the deodistillates.	<p>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).</p> <p>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).</p> <p>According to Regulation 2015/1905 amending the Feed Hygiene Regulation 183/2005 100% of the batches of deodistillates for feed shall be tested on the sum of dioxins and dioxin-like PCBs.</p> <p>FEDIOL has developed a Code of Practice on the purchase conditions of fresh bleaching earth for oil refining (16COD137), which includes a maximum limit for dioxin and dioxin-like PCBs of 1.5 ng/kg (WHO-PCDD/F-PCB-TEQ) as upperbound value.</p>	<p>Deodistillates from chemical refining are forbidden for use in feed unless they have been treated so as to ensure that dioxin levels are matching limits of the Undesirable Substances Directive 2002/32 (see also the FEDIOL factsheet on safe feed application of deodistillates Ref. 16SAF216)..</p> <p>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.</p> <p>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.</p>	
Pesticide residues above the EU MRL, i.e. residues of herbicides, insecticides,	C	Low	Medium	2	Regular monitoring of pesticide residues on sunflower seeds shows that residue levels remain within	Regulation 396/2005 sets limits for residues of pesticides. This regulation allows using a transfer factor for		Footnote 1 of Annex I of Regulation EC No 396/2005 says that MRLs

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fungicides or rodenticides above the EU MRL.					legal limits. However, during chemical refining, dioxins concentrate into the distillates.	authorised pesticides into processed products, providing feed safety is assured.		do not apply to products used exclusively as ingredients for animal feed, until separate MRLs will be applicable.
Pesticides residues as listed in EU Directive 2002/32 for undesirable substances in feeding stuff	C	Medium	High	4	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.	Deodistillates from chemical refining are forbidden for use in feed unless they have been treated so as to ensure that pesticide residue levels are matching limits of the Undesirable Substances Directive 2002/32 ((see also the FEDIOL factsheet on safe feed application of deodistillates Ref. 16SAF216).	

5. Hydrogenation of sunflower seed oil								
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Nickel	C	Low	High	3	Nickel is used as a catalyst with hydrogenation (hardening) of oil.		Processing aids that directly come into contact with the oil must be for food use or of food grade quality. Filter the hardened oil.	The nickel content of hardened oils from FEDIOL members is well below 20 ppm.

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			A. Storage and transport of sunflower seeds and sunflower seed meal					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Toxins from pest control materials	C	Low	High	3	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 EU MRL, i.e. residues of herbicides, insecticides, fungicides or rodenticides above the EU MRL.	C	Medium	Medium	3	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. Pesticide used on previous loads during storage and transport can contaminate rape seeds.		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.	Footnote 1 of Annex I of Regulation EC No 396/2005 says that MRLs do not apply to products used exclusively as ingredients for animal feed, until separate MRLs will be applicable.
Contamination by the previous cargo during the transport by farm cart, truck or barge or ocean going vessel	C	Low	High	3	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	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	G	Low	Medium	2	Analytically, melamine mimics proteins	Regulation 2002/32 sets a limit of 2.5 mg/kg for melamine in feed-materials.		

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			B. Transport of sunflower seed oil and derived products for feed application by tank car, rail tank, barge or coaster (excluding ocean going vessel).					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	JUSTIFICATION	LEGISLATION, INDUSTRY STANDARDS AND/OR CONTRACT TERMS	CONTROL MEASURE	REMARKS
Contamination by previous cargo								
- Tank cars, rail tanks and barges	C	Medium	High	4	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 to the transport of foodstuff or feeding stuff should have undergone a validated cleaning procedure.	
- Tank cars, tank containers, rail tanks and barges following EU standards for the transport of food stuffs	C	Low	High	3	Transport of most of the vegetable oils is by means of transport that is dedicated to food stuffs.	The Food Hygiene Regulation No. EC/852/2004 requires the transport of liquid food stuffs by tank cars, rail tanks and barges to be dedicated to that of food stuffs. FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter A).	Make sure a means of transport is marked "for foodstuffs only".	
- Tank coasters following EU standards for the transport of food stuffs	C	Low	High	3	Tank coasters carrying oils and fats during short sea voyages in the EU must have as an absolute minimum as the immediate previous cargo a product that is either a foodstuff or a product appearing on the EU list of accepted	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter B) (including FOSFA operational	Check previous cargoes via FEDIOL practical guide to previous cargo(es) for means of transport and tank lining (Ref 14COD153). FOSFA certificate of compliance,	

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

					immediate cargoes of Regulation EU no 579/2014.	procedures).	cleanliness and suitability of Ship's tanks issued by a FOSFA Member Superintendent. FOSFA combined Masters certificate signed by the Captain/First Officer or an equivalent statement signed by the ship's owner or authorised agent, applicable before any loading or cargo transfer.	
Contamination by cleaning agents								
- Tank cars, rail tanks and barges	C	Medium	Medium	3	Increased risk at cleaning stations that clean both feed and chemical tanks on one site.	FEDIOL code of working practice for bulk road and tank container transport of fats and oils for direct food use (Ref 07COD138 chapter A).	Apply good practices for cleaning of tanks.	
- Tank coasters	C	Medium	Medium	3	Increased risk in case coaster is not dedicated to feed- or foodstuff.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter B) (including FOSFA operational procedures).	FOSFA certificate of compliance, cleanliness and suitability of Ship's tanks issued by a FOSFA Member Superintendent. FOSFA combined Masters certificate signed by the Captain/First Officer or an equivalent statement signed by the ship's owner or authorised agent, applicable before any loading or cargo transfer.	
Heating or cooling fluids from equipment								

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- Tank cars	C	Low	High	3	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 (14COD152 chapter A).	Use of thermal heating fluids in direct heating systems is forbidden.	
- Rail tanks, tank barges	C	Low	High	3	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.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (14COD152 chapter A).	Heating coils of rail tanks must be of stainless steel . 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.
- Tank coasters	C	Low	High	3	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.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (14COD152 chapter B) (including FOSFA operational procedures).	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.	

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Foreign bodies	P	Medium	Medium	3			A quality plan should require the loading of tank cars with refined oils under a roof.	
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Risk assessment of the chain of sunflower seed meal and oil products

			C. Storage of crude and refined sunflower seed oil					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	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	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 Regulation EU No 579/2104 as amended by Commission Regulation 2016/238.	
Contamination by cleaning agents	C	Low	High	3	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	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, or do not sell the fatty acid distillate as feed.	
Thermal heating fluids from failing equipment	C	Low	High	3	Toxic thermal heating fluids may still be used. However, due to the relatively low heating temperatures		If thermal heating fluids have been used, the storage company must provide for	The use of water and steam heating is recommended.

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					applied during storage, the chance of leakage of thermal heating fluids into the product is low.		documentation on net losses and analyse accordingly, if necessary.	
Misuse of additives	C	Low	Medium	2	Additives allowed for food oil applied to oil going to feed –or vice versa- for which use they may not have been approved.			

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			D. Transport of sunflower seed oil by ocean going vessel					
HAZARD	CAT.	CHANCE	SERIOUSNESS	RISK CLASS.	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	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.	<p>Regulation EU No 579/2014 as amended by Commission Regulation 2016/238 (Derogation to EC Regulation No. 852/2004) requires that previous loads have to be checked.</p> <p>FOSFA contracts oblige the seller to inform the buyer what the three preceding cargoes have been during the sea transport of oils and fats.</p> <p>FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref 14COD152 chapter B) (including FOSFA operational procedures).</p> <p>The EU has not regulated the sea transport of oils and fats for feed application.</p>	<p>FOSFA certificate of compliance, cleanliness and suitability of Ship's tanks issued by a FOSFA Member Superintendent. FOSFA combined Masters certificate signed by the Captain/First Officer or an equivalent statement signed by the ship's owner or authorised agent, applicable before any loading or cargo transfer.</p> <p>The use of dedicated pipe lines at loading and unloading.</p>	
- Contamination by cleaning agents	C	Low	Little	1	Usually maritime business sticks to good practice and cleans with sea water.			
Solvent from coating	C	Low	High	3	Solvents from virgin coatings migrating to the oil, which may end up in the fatty acid distillates during refining		Do proper analyses on maiden voyages oil before accepting and monitor refining, or do not feed the fatty acid distillate.	

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Thermal heating fluids (THF) from equipment	C	Low	High	3	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.	FEDIOL Code of Practice for the transport in bulk of oils and fats into or within the European Union (Ref. 14COD152 chapter B) (including FOSFA operational procedures).	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	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.