



SCOTTISH
QUALITY CROPS

SQC HACCP Plan

Scottish Quality Crops Limited (SQC)
www.sqcrops.co.uk

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SQC Generic HACCP Plan

A Risk Assessment System for Farm Production of Crops based on a Hazard Analysis and Critical Control Point (HACCP) System under the Scottish Quality Crops Limited (SQC) Scheme Standards.

INTRODUCTION

Background and purpose

This national document has been drawn up at the request of the Board of Scottish Quality Crops Ltd using the expertise of the Scottish Quality Crops (SQC) Hazard Analysis and Critical Control Point (HACCP) Team. (Team members listed at end of document). It carries no legal force.

In recent years, end users and customers have been auditing supplier product safety schemes. The provision of an industry guide to the essential core elements of a HACCP for crop production will underline commitment to food and product safety. It is intended that the pooling of expert knowledge of what can form a potential hazard in crop production and dispatch, and how it can be avoided, or detected, will ensure that an industry standard of good practice will be maintained.

Regulatory Framework

Directive 93/43/EEC of 14 June 1993 stipulates in Article 3 “food business operators shall identify any step in their activities which is critical to ensure food safety and ensure that adequate safety procedures are identified, implemented, maintained and reviewed on the basis of the principles used to develop the system of HACCP”.

This HACCP guide closely adheres to the Codex Alimentarius Food Hygiene requirements as published by the Joint FAO/WHO Food Standards Programme (CAC/RCP 1-1969, Rev 3 (1997), amended 1999).

HACCP and Food safety

SQC growers need to be able to identify and prevent problems that can impact on food safety. The HACCP (Hazard Analysis and Critical Control Point) approach helps to identify hazards and the point where they occur in the crop production process and implements procedures to prevent or minimise them. HACCP involves a systematic assessment of all steps involved in food production and identifies all microbiological, chemical and physical hazards. HACCP identifies critical control points where control must be achieved to maintain the safety and quality of the product.

CONTROL OF OPERATIONS:

Process Steps - overview of the production processes for combinable crops:

Crops are grown on the farms of participating growers. The resultant produce is then marketed or fed to livestock on the farm. The markets for crops include millers, maltsters, distillers, oilseed crushers, animal feed manufacturers, seed trade, bio-energy producers and other farmers.

Growing the crop: SQC growers must plan their cropping following the guidance in the Scheme Standards and verify that the fields selected are suitable. Attention is paid to previous cropping, fertiliser previously applied, proximity of fields to public access (risk of contamination from rubbish), soil analysis, possible soil contamination with heavy metals. Fields are cultivated appropriately and a variety suitable for the end use is selected. Regard is paid to its agronomic features. Avoid where possible growing cereal crops after maize. This will reduce the risk of Fusarium mycotoxins. If crops do follow maize, ground should be ploughed and debris buried. For wheat, choose a Fusarium tolerant variety. Seed of an acceptable quality in terms of purity, germination, freedom from seed borne diseases and weed seeds is dressed with a suitable seed treatment if necessary, and sown at an appropriate seed rate. Appropriate fertiliser may be broadcast or combined drilled. Where biosolids are used the relevant codes of practice must be adhered to. The fertiliser application equipment must be regularly maintained and calibrated to check that it is operating efficiently.

Crop protection products must be selected according to the needs of the crop from the Chemicals Regulation Directorate (CRD), formerly Pesticide Safety Directorate (PSD) list of UK approved products. They must be applied by a competent operator who holds a NPTC certificate of competence. The operator must also either be in the Continual Professional Development (CPD) Scheme run by SQC or a member of NRoSO. The crop protection product must be applied according to its label recommendations through a sprayer that has been independently tested through the National Sprayer Testing Scheme (NSTS). The sprayer must also be regularly calibrated. Records must be kept of all inspections and maintenance carried out, including calibrations.

Combines used to harvest crops must be thoroughly cleaned internally before harvest and the settings checked to make sure the grain/oilseed/pulses are not damaged when being harvested. Transport from the combine must be in trailers that have been cleaned and are fit for purpose. Equipment that is not dedicated to hauling and loading crops must be power washed and treated with a food grade disinfectant where organic material has been carried.

If conditioning of the produce is carried out at the primary place of production, then any handling equipment must be clean and well maintained and documented. Driers must be correctly set and monitored so the moisture of the produce is reduced to the desired level without any damage or taint. Moistures must be checked with a regularly calibrated moisture meter. This must be documented for each separate meter. Any pre-cleaners / dressers used must be clean and well maintained to prevent any contamination or damage to the crop.

Premises and Construction Materials

All construction materials used in buildings on the farm, and in contact with the crop product, must be fit for purpose.

Cleaning

A fully documented system of process plant/equipment cleaning must be in place. Cleaning and disinfection materials selected must be stored and used appropriately. Records must be kept of their use.

Air

Intakes for air used in processing should be sited so as to avoid sources of pollution such as drier or vehicle exhausts.

Storage

Both temporary and long term stores must be thoroughly cleaned out before harvest and subsequently tested using bait bags / pitfall traps for insect pests. If intake/temporary storage has been previously used for livestock the floors and walls must be cleaned, washed with a pressure hose and disinfected with a food grade disinfectant. Any use of an insecticide spray to the grain store must be applied by an appropriately qualified operator. Vermin must be controlled. Birds and domestic animals must be kept out of permanent stores. All stores must be water-tight and any glass windows or lighting must be protected. Grain in long term storage must be monitored regularly during the storage period and temperatures measured and recorded. If an insecticide is applied to the grain, it must be applied through calibrated application machinery.

Transport off farm

Loaders must be cleaned and inspected before grain is loaded. Any vehicles used to transport bulk grain must comply with the Agricultural Industries Confederation (AIC) Code of Practice for Road Haulage. This specifies the need to clean trailers out thoroughly between loads, and details products that cannot be transported in vehicles that haul grain for food use. The bulk trailer to which the produce is being transferred must be clean and records of the last 3 loads carried must be available. SQC Passports duly completed must accompany every load that leaves the primary producer.

Glass

Where possible, glass must not be used in the process or storage areas. Where this is unavoidable, protection must be in place in case of breakage. The risk of contamination must be reduced by the use of safety bulbs or tight covers wherever possible. All light fittings and glass, including light covers, vehicle glass and mirrors must be checked regularly. In the

event of broken glass or other contaminants being found, this must be swept and segregated, from the rest of the bulk.

Pest Control on Farm

Rodents

A pest control programme must be in place. A suitably trained person should be used to control rodents in all critical process and storage areas. The following must be addressed: materials used, infestation due to intake of materials, ingress of rodents, waste accumulation and disposal, frequency of treatment, inspection and evaluation of rodent control performance. Records must be kept of all treatments, inspections and bait point locations. Doors and hatches must be kept closed when not in use. Waste materials that might encourage pests must be regularly cleared away and disposed of.

Birds

All storage and process areas must be protected against bird ingress. Doors and hatches must be kept closed when not in use.

Insects

All personnel involved in applying insecticides must be qualified. Insecticides or fumigants applied to crops, to stores or to equipment must be approved by CRD. Some customers may have particular restrictions on some crop protection products. Records must be retained for a minimum of 3 years. Records must include: the chemical used, the dose, date of application and the operator's name. Application equipment must be regularly maintained and calibrated. Records for maintenance and calibration of application equipment must be kept.

Complaints

A register must be kept to record any complaints that may arise from the purchase of crops. The register must cover any complaint that has an effect on food safety. Actions taken to prevent re-occurrence must be recorded.

Traceability / Recall

Adequate records must be kept to enable the identification of crops at risk should a problem arise.

Corrective Action

This HACCP Plan gives an indication of corrective action to be taken in the event of critical limits on a Critical Control Point being exceeded.

SYSTEM TO ASSESS RISK

The SQC HACCP Team has produced a flow chart for all the process stages in crop production. 12 stages have been identified:

1. Planning
2. Cultivation
3. Sowing
4. Fertilising
5. Crop protection
6. Harvesting
7. Haulage from field to farm
8. Intake/Temporary storage
9. Screening/Drying
10. Cooling
11. Long term storage
12. Out loading and haulage from farm if using farm transport

A classification of potential crop hazards has been defined.

Risk Assessment

A Risk Assessment Form has been completed for each process step which defines hazards and categorises their probability and severity using the following ratings:

Ratings for probability of occurrence:

- Unlikely = 1
- Possible = 2
- Probable = 3

Ratings for severity of consequence:

- Negligible = 1
- Moderate = 2
- Severe = 3

The risk from each hazard is arrived at by multiplying the probability by the severity. A score of 6 or over triggers a Critical Control Point (CCP). This is arrived at by the following combinations:

Probability	Severity
Possible (2)	Severe (3)
Probable (3)	Moderate (2)
Probable (3)	Severe (3)

For each CCP, monitoring and corrective action is detailed:

- Control measures are set
- Critical limits are defined
- Procedures are listed
- Monitoring frequency stated
- Corrective action suggested
- Action responsibility allocated - Appropriate action must be taken by a responsible person to ensure critical limits are met.

SQC HACCP Review

The SQC HACCP Plan will be reviewed annually by the appointed SQC HACCP Team (see below). The review and any changes made will be ratified by the SQC TAC.

Compliance to the SQC HACCP Standard

This is checked at the SQC grower's annual audit. Records of each SQC grower audit are kept on file at the Acoura Offices.

SQC HACCP Team:

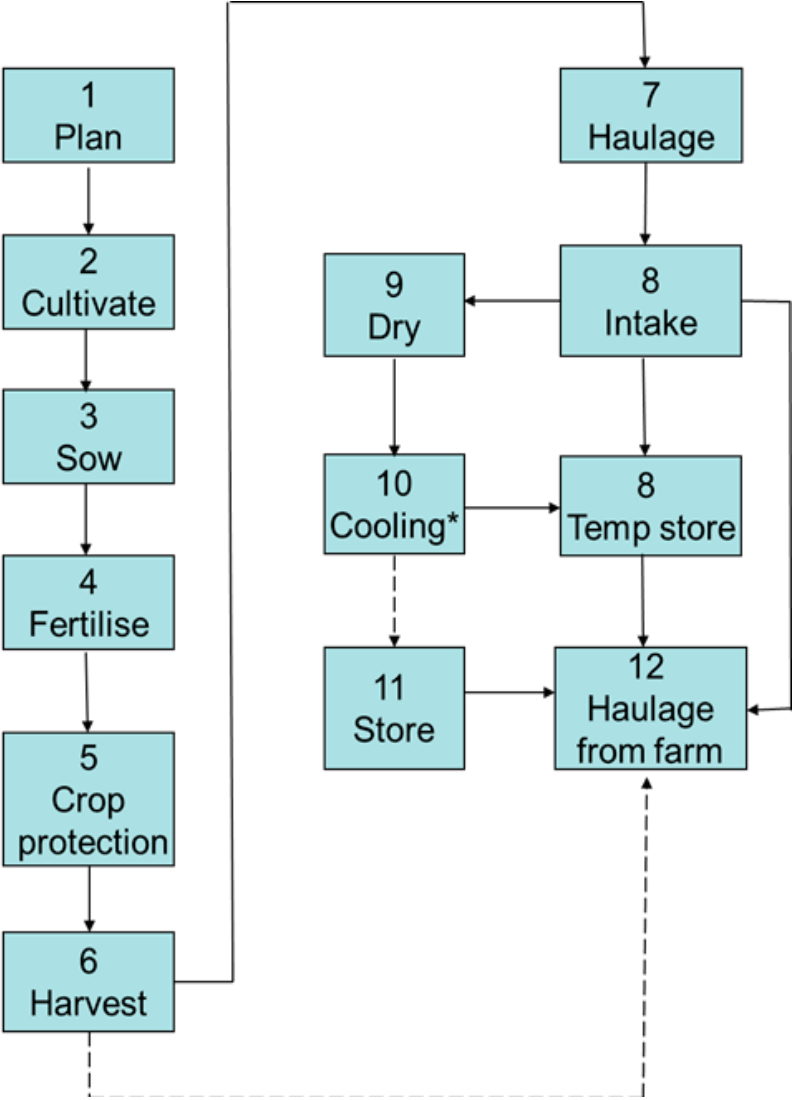
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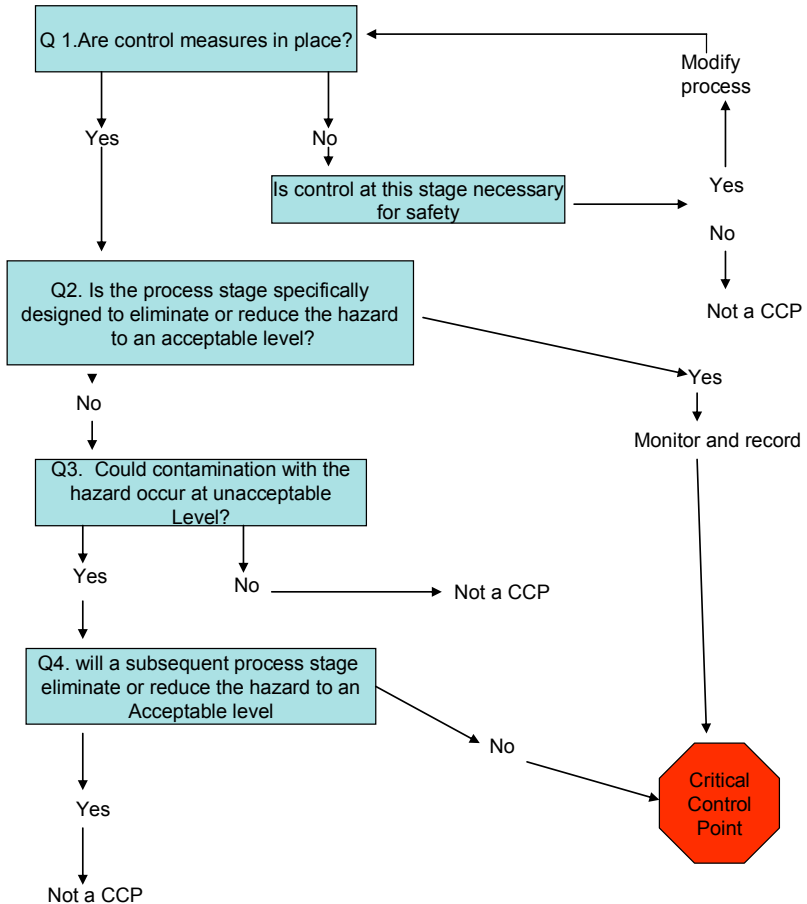
SQC would like to thank the following organisations with the assistance they have given in preparing this HACCP Plan:

- Scottish Agronomy
- Acoura

SQC HACCP Flow Chart – Process stages



Decision Tree for CCP's



SQC Classification of potential crop hazards

Hazard Type	HAZARD
BIOLOGICAL	Microbiological: Bacterial pathogens (e.g. coliform, salmonella)
	Microbiological: Fungi, and mould (e.g. Ergot, bunt etc.)
	Insect, bird, rodent contamination

Hazard Type	HAZARD
CHEMICAL	Mycotoxins (e.g. DON, ZON, Ochratoxin A)
	Pest Control residues (e.g. insecticides used in store, rodenticides)
	Crop protection residues (e.g. herbicides, fungicides, insecticides, growth regulators)
	Heavy metals, PCBs*, PAH's**
	Hydraulic oil, lubricants and fuel oil
	Cleaning Chemicals
	Taint or odours from other than those listed above

Hazard Type	HAZARD
PHYSICAL	Contamination by non-metal objects: e.g. glass

*PCBs – polychlorinated biphenyls

**PAHs – polycyclic aromatic hydrocarbons

PCB's and PAH's are caused by poorly maintained / calibrated oil fired burners used in the drying process. Fuel in oil fired driers must meet commercial ISDN/ISO fuel standards. It is a legal requirement that all refined oils have a Benzo alpha Pyrene (BaP) level of less than 2ppb. BaP is a measure for PAHs.

SQC Risk Assessment Forms

The following 12 process steps are the SQC Risk Assessment Forms for the defined processes:

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
1	Planning crops	Chemical – Fusarium mycotoxins Deoxynivalenol (DON), Zearalenone (ZON) wheat	CCP1	2	3	6	Toxic to end user.	Adoption of good agricultural practice. Identify fields at risk. Plough to bury debris and avoid wheat after maize. Choose tolerant variety. Plan to apply an effective T3 fungicide.	AHDB Cereals and Oilseeds Information Sheet 40.
		Chemical – Fusarium mycotoxins – other cereals		1	3	3	Toxic to end user.	Adoption of good agricultural practice. Avoid growing after maize.	AHDB Cereals and Oilseeds Guidelines to minimise risk of fusarium mycotoxins in cereals (Updated Summer 2016 G69)
		Chemical – storage mycotoxins – All cereals, ochratoxin A (OA)		1	3	3	Toxic to end user.	Review capacity for crop handling, drying and grain movement.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd Edition 2011.
		Microbiological – ergot – All cereals	CCP2	2	3	6	Toxic to end user.	Check which fields were contaminated last year and modify cropping. Carry out independent seed analysis.	AHDB Cereals and Oilseeds Information Sheet 33, AHDB Cereals and Oilseeds Wheat disease management guide (Updated February 2016 G63), AHDB Barley Disease Management guide February 2016 G64

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
2	Cultivate	No hazards	CCP	0	0	0	No perceived risk.		

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
3	Sowing	No hazards	CCP	0	0	0	No perceived risk.		

No 4	Process Step Fertilising	Hazard Description Chemical - Heavy metals in biosolids Chemical - Heavy metals in composts/digestates Chemical – Other products	CCP	Prob 1	Sev 3	Risk 3	Consequence of the Risk Toxic to end user.	Type of Measures Obtain analysis for soil & fertiliser. Use approved supplier holding a permit from SEPA/EA. Obtain analysis for soil & fertiliser. Use PAS certified product. Use approved supplier holding a permit from SEPA/EA.	Reference Regulated by SEPA/EA. The Safe Sludge Matrix. Regulated by WRAP. Regulated by SEPA/EA
No 5	Process Step Crop protection	Hazard Description Chemical - crop protection products applied to growing crop	CCP	Prob 2	Sev 2	Risk 4	Consequence of the Risk May be toxic to end user if overdosed or applied at the wrong stage or applied in unsuitable conditions.	Type of Measures Apply product according to label recommendations through well maintained calibrated equipment using a qualified operator. Use agronomist on BASIS Professional Register and check product registration with CRD.	Reference CRD website. SQC Self assessment record for sprayers and current NSTS MOT. NPTC Certificate. SQC Sprayer Operators Course. Or valid NRoSO.
No 6	Process Step Harvesting	Hazard Description Microbiological – ergot	CCP CCP2	Prob 2	Sev 3	Risk 6	Consequence of the Risk Toxic to end user.	Type of Measures Check crop prior to harvest. Segregate or quarantine produce from infected areas or where contaminated, follow thresholds for disposal and options for separating out.	Reference AHDB Cereals and Oilseeds Information Sheet 33, AHDB Cereals and Oilseeds Wheat disease management guide (Updated February 2016 G63), AHDB Barley Disease Management guide February 2016 G64

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
7	Haulage from field to farm	Physical – contaminant		2	1	2	May be a risk to end user.	Visual inspection, of trailer before loading, and prior to tipping, if risk or concern.	
		Microbiological- coliform bacteria		1	3	3	Risk to end user.	Trailer cleaning & disinfection.	Analysis shows extremely low incidence of Salmonella.
		Chemical – fuel/hydraulic oil contamination		1	2	2	May be a risk to end user.	Visual and sensory check.	

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
8	Intake/Temporary storage	Physical – glass		1	3	3	Injurious to end user.	Glass protection measures adopted and monitored.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011.
		- Other contaminants e.g. plastic		2	1	2	May be injurious to end user.	Continual monitoring for contaminants.	
		Microbiological from moulds - e.g. fungi		2	2	4	May be toxic to end user.	Dry, aerate, cool grain.	AHDB Cereals and Oilseeds Grain Storage Guide, 3rd edition (2011)
		Biological - Mites		2	1	2	May impart taint to product.	Pre-harvest hygiene. Visually inspect and segregate.	AHDB Cereals and Oilseeds Grain Storage Guide, 3rd edition (2011) AHDB Insects and mites in stored grain and grain stores (2016)
		Biological – Rodents	CCP3	2	3	6	Risk of Weils disease and coliform bacteria.	Pest control carried out and monitored. Clear up spilt grain.	CRRU UK Code of Best Practice AHDB Rodent Control on farms G70.
		Biological - Bird faeces		1	2	2	May introduce salmonella.	Reduce bird ingress.	Test results - minimal incidence.

							Complete AHDB Cereals and Oilseeds risk assessment – test grain if requested.	AHDB Cereals and Oilseeds Guidelines to minimise risk of fusarium mycotoxins in cereals (Updated Summer 2016 G69)	
						3	1	If following maize, consider testing if other risk factors (high rainfall at flowering/harvest) are high.	AHDB Cereals and Oilseeds Guidelines to minimise risk of fusarium mycotoxins in cereals (Updated Summer 2016 G69)
						3	1	Check moisture content. For grain > 18%, give priority to drying or harvest movement. If not practical, introduce ventilation.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011; AHDB Cereals and Oilseeds Safe Storage Time Calculator for Cereals.
						4	2	Apply by a qualified operator using a CRD approved product with well maintained calibrated applicator.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
9	Screening/Drying	Chemical – taint from exhaust gases, dioxins, PAHs*	CCP	2	2	4	May be toxic to end user.	Regular maintenance & calibration of nozzles. Use fuel that meets ISDN/ISO standards. Recalibrate if fuel type is changed. OSR must not be stored on tarmac floors or in contact with bitumen paint/fillers.	Refer to driver instructions. AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011.

*PAHs = polycyclic aromatic hydrocarbons

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
10	Cooling	Chemical – taint - introduction of drier and vehicle exhaust gases nitrosamines, PCB's*, PAH's*, dioxins	2	2	4	May be toxic to end user.	Ensure vehicles are switched off where possible and drier exhaust fumes are ducted away from air intake.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011	

*PCBs = polychlorinated biphenyls

*PAHs = polycyclic aromatic hydrocarbon

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
11	Long term storage	Physical – glass - Other contaminants e.g. plastic Microbiological/chemical – fungal growth Chemical, - storage mycotoxins (OA)	1	3	3	Injurious to end user.	Continuous monitoring of all glass in store.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011.	
			2	1	2	May be injurious to end user.	Continual monitoring for contaminants.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011.	
			1	2	2	May be toxic to operator and end user.	Pre harvest hygiene. Adopt good storage practice	Current SQC Standards AHDB Cereals and Oilseeds Grain Storage Guide 3 rd edition 2011.	
			1	3	3	Toxic to operator and end user.	Assess if storage mycotoxins may have already developed by reviewing action taken for grain >18% moisture. Consider options for reducing subsequent risk. Adopt good storage practice.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011.	
		Biological - Bird faeces	2	1	2	Could introduce Salmonella to food chain.	Keep store secure from bird ingress.	CRRU UK Code of Best Practice. AHDB Rodent Control on farms G70.	
		Biological - Rodent	CCP3	2	3	Risk of Weils disease and coliform bacteria.	Pest control carried out and monitored. Clear up spilt grain.	AHDB Cereals and Oilseeds Grain Storage Guide 3 rd edition 2011.	
		Biological - Insects, mites	1	2	2	May be toxic to end user.	Pest checks & control; Monitor temperatures.	AHDB Insects and mites in stored grain and grain stores (2016)	

		Biological – Domestic animals	1	3	3	Toxic to end user.	Keep doors closed.	
		Chemical – PAH's*	1	3	3	Toxic to end user.	OSR must not be stored on tarmac floors or in contact with bitumen paint/fillers.	
		Chemical - Mineral lubricants	1	2	2	May be toxic to end user.	Visual and sensory check. Use food grade lubricants.	
		Chemical - Insecticide used on stored produce	2	2	4	May be toxic to end user if overdosed.	Apply by qualified operator using a CRD approved product with well maintained calibrated applicator.	CRD website.

*PAH's = polycyclic aromatic hydrocarbons

No	Process Step	Hazard Description	CCP	Prob	Sev	Risk	Consequence of the Risk	Type of Measures	Reference
12	Out loading and haulage from farm if using farm transport	Physical – glass		1	3	3	Injurious to end user.	Continual monitoring of contaminants.	AHDB Cereals and Oilseeds Grain Storage Guide, 3 rd edition 2011. TASC/GTAS Standard.
		- Other contaminants		2	1	2	May be risk to end user.	Continual monitoring of contaminants.	TASC/GTAS Standard.
		Biological – animal faeces		1	3	3	Injurious to end user due to introduction of coliform bacteria into food chain.	Loading equipment must be clean before use.	TASC/GTAS Standard.
		Chemical – lubricants, Fuel		1	2	2	May be toxic to end user.	Visual and sensory check on loading equipment.	

SOC – Monitoring and Corrective Action at Each CCP

CCP No.	Process Step	Hazard	Control Measure	Critical Limit	Procedure	Monitoring Frequency	Corrective Action	Responsibility / Action Responsibility Allocated
1	Planning - wheat Intake/ Temporary Storage - wheat	Chemical – Fusarium mycotoxins Chemical – Fusarium mycotoxins, ZON and DON	Avoid cereals after maize, mould board plough to bury debris. Choose tolerant variety. Refer to AHDB Cereals and Oilseeds Risk Assessment. If risk assessment is > 1.5, or standing crop has high incidence of fusarium, test grain.	Low rating for AHDB Cereals and Oilseeds Risk assessment for Fusarium mycotoxins. Wheat - low to medium rating on AHDB Cereals and Oilseeds Risk Assessment.	Carry out pre-flowering part of AHDB Cereals and Oilseeds Risk Assessment. Complete AHDB Cereals and Oilseeds Risk Assessment.	Monitor for rainfall at flowering and harvest. Enter risk score on SOC passports accompanying every load.	Plan to apply effective T3 fungicide. If test result above EU threshold, consult with customer.	Operator/grower Operator/grower
2	Planning Harvesting	Microbiological: ergot Microbiological: ergot	Mould board plough if growing cereals Check crops prior to harvest. Check field margins and harvest separately.	Zero Zero tolerance in representative sample as per AHDB Cereals and Oilseeds, GSAP* Project.	Check last years records. Visual check prior to harvest.	Check during planning phase. Daily until harvest completed.	Mould board plough or grow non-grass crop. Grower - segregate / quarantine infected produce, quantify and take appropriate action.	Operator/grower Operator/grower
3	Storage	Biological - Contamination by rodents	A suitably trained person should be used to control rodents	No visible signs.	Bait point map and use approved boxes appropriately sited with appropriate bait.	Grower / operator monitors weekly.	Increase bait points and call in external qualified contractor.	Operator/grower

*GSAP – Grain sampling and analysis project for ergot (refer to AHDB Cereals and Oilseeds website and enter “sampling” into search box).

