



# REFERENCE

## Standard for minimising the risk of Corynetoxin contamination of hay and straw for export

### In this document

This document contains the following topics:

Section 1: Purpose of this document.....	2
Section 2: Definitions .....	2
Section 3: Background .....	3
Section 4: What is a standard? .....	4
Section 5: Objective of this standard .....	4
Section 6: Sampling methods.....	4
Section 7: Sampling bales in paddocks .....	4
Section 8: Post-baling sampling away from a paddock (in a storage area) .....	5
Section 9: Sampling from the processing line.....	6
Section 10: Processed bale sampling .....	6
Section 11: Sampling of 100% of bales .....	6
Section 12: Preparation for sampling .....	7
Section 13: Sampling collection procedure .....	7
Section 14: Liquid sampling .....	7
Section 15: Testing methods.....	7
Section 16: Identity preservation.....	8
Section 17: Record keeping.....	8
Document information .....	9
Version history .....	9

## Section 1: Purpose of this document

This document outlines the methods to sample and test for the presence of corynetoxin in hay and straw exports. The standard should be used by all Australian hay and straw producers and exporters who prepare hay or straw for overseas' markets.

## Section 2: Definitions

Term	Definition
Annual Ryegrass Toxicity (ARGT)	A disease in livestock caused by consuming grasses and ryegrasses containing corynetoxins produced by <i>Rathayibacter toxicus</i> .
Bacterial gall	A nematode gall that is colonised by <i>R. toxicus</i> and identified by a positive ELISA for <i>R. toxicus</i> .
Bacterium	The bacterium <i>R. toxicus</i> detected in accordance with the sampling and testing procedures detailed in this standard.
Composite sample	A collection of individual samples that have been combined to form one sample.
Contaminated	Products containing corynetoxin, bacterial galls or <i>R. toxicus</i> .
Corynetoxins (CT)	The toxins produced by <i>R. toxicus</i> .
CT positive galls	Galls which test positive for corynetoxins by the ELISA for corynetoxins.
Department	The Department of Agriculture, Water and the Environment.
ELISA	Enzyme-Linked Immuno-Sorbent Assay for testing corynetoxin or <i>R. toxicus</i> . These tests have been developed by Western Australia Department of Agriculture and the CSIRO and are set out in <a href="#">Section 15</a> .
Fines	The particles of hay or straw that fall to the ground during processing.
Gall	The infected, distorted ryegrass or grass ovary resulting from its colonisation by the nematode or the nematode in combination with the bacterium.
Hay	A pasture or cereal plant (whether whole or after harvesting seed) that is cut and dried.
Lot	A group of bales that are represented by a sample.
Nematode	An organism of the <i>Anguina</i> genus.
Nematode gall	The gall induced in ryegrass or grass by the nematode.
Paddock	The area of a crop.
Processed bale	Bales of hay or straw ready for export (that is, pressed ready for loading into containers for export).
Registered establishment	An establishment that is registered in accordance with the requirements of the Export Control (Plants and Plant Products) Rules 2021.
Ryegrass	The grass of the <i>Lolium</i> genus.

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Term	Definition
Sample	Fines, core, grab or liquid samples taken from hay or straw.
Standard	The 'Reference: Standard for minimising the risk of corynetoxin contamination of hay and straw for export'.
Storage area	The area where bales are stacked or stored either in a building or in a paddock.
Straw	Straw from a cereal plant including wheat, oat, barley, rye and triticale but not including straw from rice.
Test	A test for <i>R. toxicus</i> or corynetoxin using a method prescribed in <a href="#">Section 15</a> , when referring to a test of hay or straw.

### Section 3: Background

The contamination of hay and straw by corynetoxin (CT) is a major concern for Australian hay and straw exports. CT is a powerful tunicamycin-like poison that infects some annual grasses. CT is produced when the nematode, *Anguina* spp., carries the bacterial organism, *Rathayibacter toxicus*, into developing seed heads of some pastoral and cereal plants. The hay and straw produced from CT contaminated plants can cause annual ryegrass toxicity (ARGT) in livestock. The symptoms of ARGT in livestock closely resemble those of Bovine Spongiform Encephalitis (also known as mad-cow disease) and often result in the death of the infected livestock.

Large areas of Western Australia and South Australia and, to an unknown extent, areas of Victoria, New South Wales and Queensland, are infected with *R. toxicus* or *Anguina* spp. or both. This means that Australian hay or straw exports may be contaminated with CT. Livestock deaths caused by ARGT poisoning from Australian hay or straw exports in an importing country could devastate the Australian hay and straw export industry.

The purpose of this standard is to prevent ARGT poisoning of livestock from Australian hay or straw exports by prescribing the way in which hay and straw intended for export should be sampled and tested for the presence of CT. The standard allows producers or exporters of hay or straw to test for CT directly using a test for CT or indirectly using the test for *R. toxicus*. The test for *R. toxicus* is useful because samples of hay and straw tested for *R. toxicus* and found to be negative cannot contain CT.

A summary of testing outcomes for CT and *R. toxicus* are outlined below:

- a) If samples of hay or straw are tested for CT and found to be negative, the hay or straw represented by the sample can be exported.
- b) If samples of hay or straw are tested for CT and found to be positive, the hay or straw represented by the sample can only be exported if the hay or straw is re-sampled in accordance with the 100% sampling procedure set out in Section 11, tested for CT and found to be negative.
- c) If samples of hay or straw are tested for *R. toxicus* and found to be negative, the hay or straw represented by the sample can be exported.
- d) If samples of hay or straw are tested for *R. toxicus* and found to be positive, the hay or straw represented by the sample can only be exported if the hay or straw is re-sampled in accordance with the 100% sampling procedure set out in [Section 11](#), tested for *R. toxicus* and found to be negative.
- e) If, following option 'd', the sample is found to be positive, the hay or straw represented by the sample can only be exported if the hay or straw is tested for CT in accordance with statements 'a' and 'b' above.

## Section 4: What is a standard?

A standard specifies materials, methods, processes and practices to ensure that consistent and acceptable levels of quality, performance, safety and reliability are achieved.

This standard was developed with consideration of:

- the unique character of the Australian hay and straw export industry
- Australia's international agreements and commitments, national and state and territory legislation
- the department's responsibilities and its obligations to the Australian hay and straw export industry
- the expectations of the Australian community with respect to the production and export of Australian hay and straw
- the expectations of the Australian hay and straw export industry with respect to the production and export of Australian hay and straw.

## Section 5: Objective of this standard

The objective of this standard is to ensure that hay and straw exports are free from CT. The standard outlines:

- methods for sampling hay and straw ([Sections 6-14](#))
- methods for testing of hay and straw samples for *R. toxicus* or CT ([Section 15](#))
- identity preservation procedures for hay and straw exports ([Section 16](#))
- record keeping procedures ([Section 17](#)).

## Section 6: Sampling methods

Persons responsible for sampling should sample hay or straw at one of the following production stages:

- bales in the paddock ([Section 7](#))
- bales in storage ([Section 8](#))
- hay or straw on the processing line ([Section 9](#))
- processed bales prepared for export ([Section 10](#))
- sampling of 100% of bales ([Section 11](#))
- another stage that is approved by the department.

If composite samples are divided into sub-samples prior to testing, persons responsible for sampling should ensure that the composite samples are mixed thoroughly.

## Section 7: Sampling bales in paddocks

Persons responsible for sampling should sample bales in a paddock in accordance with one of the following procedures. In each procedure, the greater of 12 bales or 15% of all bales in the paddock should be sampled.

- Samples should be taken from all bales on the perimeter of the paddock, then taken from bales that fall within the lines of a 'W' or 'M' pattern across the rest of the paddock

or

- Samples should be taken from each bale that is produced by every 7th lap of the baler and bales from the perimeter lap  
or
- Starting from the first bale produced in the paddock, every 'x' bale should be sampled, following the path of the baler to ensure that the greater of 12 bales or at least 15% of all bales are sampled  
or
- Any similar systematic plan used for the selection of bales to be sampled, approved by the department.

When more than 12 bales in a paddock are sampled, up to 40 individual samples may be combined to form a single composite sample for testing. However, it is advisable that samples from perimeter and non-perimeter bales are tested separately.

Persons responsible for sampling should group bales into lots and ensure that each lot is clearly identified.

Persons responsible for sampling should also label composite samples clearly so that they can be readily traced back to their original lot.

If the test is **negative**, all bales meet the standard without further testing.

If the test is **positive**, no bale represented by the sample meets the standard unless it is re-sampled in accordance with the 100% sampling procedure in [Section 11](#), tested and found to be negative.

## Section 8: Post-baling sampling away from a paddock (in a storage area)

Bales that have been placed into storage should be sampled in accordance with one of the following procedures. In each procedure, samples should be taken from a minimum of 20% of the total number of bales for testing:

- 1 to 5 bales – at least one sample is drawn from each bale.
- 6 to 30 bales – at least one sample is drawn from every 3rd bale with no less than 5 bales being sampled.
- 31 or more bales – at least one sample is drawn from every 5th bale with no less than 10 bales being sampled.

If more than 31 bales are present in a lot, the person responsible for sampling can combine samples from up to 40 individual bales to make a single composite sample for testing.

Persons responsible for sampling should group bales into lots and ensure that each lot is clearly identified.

Persons responsible for sampling should also label composite samples clearly so that they can be readily traced back to their original lot.

If the test is **negative**, all bales represented by the composite sample meet the standard without further testing.

If the test is **positive**, no bale represented by the sample meets the standard unless it is re-sampled in accordance with the 100% sampling procedure in [Section 11](#), tested and found to be negative.

## Section 9: Sampling from the processing line

The following procedure should be used for sampling from the processing line (that is, in-line sampling).

Persons responsible for sampling should collect a representative sample of 450 grams (+/- 20 grams) of fines per container of hay and or straw from a location along the processing line where there is a concentration of fines discharged.

A maximum of ten samples may be combined to form a composite sample. The composite samples should be thoroughly mixed before being sent for testing.

Persons responsible for sampling should label composite samples clearly so that they can be readily traced back to their original lot.

If the test is **negative**, all bales represented by the sample meet the standard.

If the test is **positive**, all bales represented by the sample do not meet the standard unless they are re-sampled in accordance with the methods in [Section 10](#), tested and found to be negative.

## Section 10: Processed bale sampling

Persons responsible for sampling should sample processed bales if *R. toxicus*, CT or both are detected in a sample collected from the processing line. All bales from the lot (product represented by the combined in-line sample) should be sampled.

Bales may be grouped into lots of up to 40 bales and each lot should be clearly identified.

Persons responsible for sampling should remove one sample (greater than 10 grams) from one end of each individual bale. Up to 40 samples may be combined to form a composite sample.

Single or composite samples or both should be submitted for testing.

Persons responsible for sampling should label composite samples clearly so that they can be readily traced back to their original lot.

If the test is **negative**, all bales represented by the sample meet the standard without further testing.

If the test is **positive** in a composite sample, all processed bales represented by the sample do not meet the standard unless they are sorted into individual bales, re-sampled from both ends and the two samples combined to form a composite sample for a single bale. This bale does not meet the standard unless the sample is tested and found to be negative.

If the test is **positive** in an individual sample, the processed bale represented by the sample does not meet the standard.

## Section 11: Sampling of 100% of bales

The following procedure should be used to sample hay or straw if the person responsible for sampling chooses or is required to sample 100% of all bales.

Persons responsible for sampling should group bales into lots of up to 40 and ensure that each lot is clearly identified.

One core sample should be removed from one end of each individual bale. Up to 40 core samples may be combined to form a composite sample for testing.

Persons responsible for sampling should label composite samples clearly so that they can be readily traced back to their original lot.

If the test is **negative**, all bales represented by the composite sample meet the standard.

If the test is **positive**, no bale represented by the composite sample meets the standard unless it is re-sampled, tested and found to be negative.

## Section 12: Preparation for sampling

Persons responsible for sampling should ensure that:

- sampling equipment is available and fit for use
- adequate sampling facilities are available and fit for use
- identity preservation procedures are in place for hay and straw bales and their corresponding samples, and that all necessary materials are available including markers, labels, and record sheets.

Persons responsible for sampling should also ensure that samples can be taken from bales in the paddock, bales in storage, or hay and straw in the processing line. With respect to bales in the paddock or bales in storage, persons responsible for sampling should ensure that there is sufficient space (a minimum of 1 metre) around stacks or bales of hay or straw to enable sufficient access to all bales.

Persons responsible for sampling should thoroughly inspect sampling equipment for cleanliness and hygiene after each sample lot to prevent cross contamination from previous samples or residues. Persons responsible for sampling should record the results of these inspections on a Hygiene Inspection and Cleaning Record.

## Section 13: Sampling collection procedure

Persons responsible for sampling should take a core sample from each bale to be sampled. The core sample should be taken at right angles to the direction that the stems lie in the bale and taken from one or both ends of the bale.

The bale corer should be inserted to its full length to obtain a full cross-section.

Fines should be collected in a receptacle on the processing line, and receptacles should be completely emptied between samples.

The core or fines samples of hay or straw should be placed in a clean plastic bag and labelled accordingly.

## Section 14: Liquid sampling

If the department receives a notice from an approved laboratory stating that a person is competent to collect liquid supernatant samples from wetted hay or straw, that person may collect samples in that manner for testing. Those samples will constitute hay or straw samples for the purpose of this standard.

## Section 15: Testing methods

Persons responsible for sampling should submit all samples to an approved laboratory for testing using one of the following methods:

- the Western Australian Department of Agriculture ELISA for the bacterium *R. toxicus*  
or
- the CSIRO developed ELISA for CT.

## Section 16: Identity preservation

Owners or occupiers of registered establishments should preserve the identity of hay and straw bales and samples from sampling through to packing into containers for export.

Owners or occupiers of registered establishments (and all other persons involved in the sampling, testing or movement of bales or samples before export) will meet the identity preservation requirements of this standard by complying with the following identity preservation procedures.

Owners or occupiers of registered establishments should:

- label hay and straw bales and samples sufficiently to ensure that bales can be identified in relation to corresponding samples
- use storage plans to record the movement of tested hay and straw in storage sheds or processing lines
- maintain production plans and records to identify hay or straw that has been processed and consolidated for export
- maintain container loading details to identify hay and straw that has been loaded into containers for export.

## Section 17: Record keeping

Records should be retained for at least 2 years.

Records are needed to trace hay and straw samples from the point of sampling (paddock or shed) to the point of loading for export. The records should show:

- the date that the sample was drawn for testing and the lot from which it was drawn
- the number of bales represented by the sample
- the date on which the product was processed and loaded for export
- whether the samples are negative or positive to CT or *R. toxicus*.

The records should include:

- the load out report for each container identifying the hay or straw bales and samples to the ARG T test results
- the sampling plan
- any other documentation that may assist in traceability.

The owner or occupier of a registered establishment must retain records showing, in relation to each consignment of hay or straw that the establishment prepares for export:

- the details of the person who supplied the hay or straw
- the date on which the hay or straw was prepared for export
- the date on which the sample of hay or straw was drawn for testing
- the means of identifying the group of bales from which the sample was drawn
- the sampling method used (of those methods listed under 'sampling methods' in this standard)
- the details of the laboratory that tested the hay or straw
- the test method used (of those methods listed under [Section 15: Testing methods](#))
- the test results (whether the samples are negative or positive to CT or *R. toxicus*)
- the details of the person who took delivery of the hay or straw after it had been prepared for export, if it was not the person who supplied it or the exporter



- the details of the exporter, if known.

A laboratory undertaking testing of hay or straw for export must retain records, for each sample as follows:

- a unique identifier
- the details of the person who submitted the sample to be tested
- the date testing was done
- the method of testing
- the test results (whether the samples are negative or positive to CT or *R. toxicus*)
- a statement that testing was conducted in accordance with the hay and straw export standard
- a statement that the person who submitted the sample to be tested was given written notice of the test results
- a copy of the written notice.

An exporter of hay or straw must retain records showing, in relation to each export of hay or straw that the exporter conducts:

- the date of export
- the destination of the export
- the full contents of each shipping container of hay or straw exported
- the test results relevant to each consignment of hay or straw that is in the shipping container
- the details of the immediately preceding source of the hay or straw (that is, details of the registered establishment, agent or other person who provided the hay or straw to the exporter).

## Document information

The following table contains administrative metadata.

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## Version history

The following table details the published date and amendment details for this document.

Version	Date	Amendment details
1	31/05/2022	Amended Reference into approved template.