



Australian Government
Australian Quarantine and Inspection Service

Standard
for Minimising the Risk of
Corynetoxin Contamination of
Hay and Straw for Export



Australian Government
Department of Agriculture Fisheries and Forestry
Australian Quarantine and Inspection Service

Contents

1.	Introduction.....	3
2.	Background	3
3.	What is a standard?	3
4.	Objective of this Standard	4
5.	Definitions.....	4
6.	Sampling methods.....	5
7.	Sampling Bales in Paddocks.....	6
8.	Post-Baling Sampling Away from a Paddock (in a storage area).....	7
9.	Sampling from the Processing Line.....	7
10.	Processed Bale Sampling	8
11.	100% Sampling of Bales	8
12.	Preparation for Sampling.....	9
13.	Sampling Collection Procedure	9
14.	Liquid sampling	10
15.	Testing Methods.....	10
16.	Identity Preservation.....	10
17.	Record Keeping.....	10

1 . I n t r o d u c t i o n

- 1.1 This document, the *Standard for Minimising the Risk of Corynetoxin Contamination of Hay and Straw for Export*, outlines the methods to sample and test for the presence of *Corynetoxin* (“CT”) 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.

2 . B a c k g r o u n d

- 2.1 The contamination of hay and straw by 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, *Rathyibacter toxicus* (“*R. 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.
- 2.2 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.
- 2.3 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 corynetoxin 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.
- 2.4 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 9, 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 9, tested for *R. toxicus* and found to be negative.
 - (e) If, following (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 paragraphs (a) and (b) above.

3 . W h a t i s a s t a n d a r d ?

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

3.2 This Standard was developed taking into account:

- The unique character of the Australian hay and straw export industry;
- Australia's international agreements and commitments, and national and State 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; and
- The expectations of the Australian hay and straw export industry with respect to the production and export of Australian hay and straw.

4 . Objective of this Standard

4.1 The objective of this Standard is to ensure that hay and straw exports are free from Corynetoxin. To this end, the Standard outlines:

- Methods for sampling hay and straw (sections 6-13);
- Methods for testing of hay and straw samples for *R. toxicus* or Corynetoxin (section 14);
- Identity preservation procedures for hay and straw exports (section 15); and
- Record keeping procedures (section 16).

5 . Definitions

Annual Ryegrass Toxicity (ARGT) means the disease in livestock caused by consuming grasses and ryegrasses containing Corynetoxins produced by *R. toxicus*.

Bacterial gall means a nematode gall that is colonized by *R. toxicus* and identified by a positive ELISA for *R. toxicus*.

Bacterium means the bacterium *Rathayibacter toxicus* detected in accordance with the sampling and testing procedures detailed in this Standard.

Composite sample means a collection of individual samples that have been combined to form one sample.

Contaminated means containing Corynetoxin, bacterial galls or *R. toxicus*.

Corynetoxins (CT) means the toxins produced by *R. toxicus*.

CT positive galls means galls which test positive for Corynetoxins by the ELISA for Corynetoxins.

Department means the Australian Government Department of Agriculture, Fisheries and Forestry.

ELISA means enzyme linked immuno sorbent assay for testing corynetoxin or *R. toxicus*. These tests have been developed by Western Australia Department of Agriculture and the CSIRO, and are set out in section 15.

Fines means the particles of hay or straw that fall to the ground during processing.

Gall means the infected, distorted ryegrass or grass ovary resulting from its colonisation by the nematode or, nematode and bacterium.

Hay means hay from any pasture plant, wheat, oat, barley, rye, or triticale.

Lot means a group of bales that are represented by a sample.

Nematode means an organism of the *Anguina spp.*

Nematode gall means the gall induced in ryegrass or grass by the nematode.

Paddock means the area of a crop.

Processed bale means bales of hay or straw ready for export (i.e. pressed ready for loading into containers for export).

Registered establishment means an establishment that is registered in accordance with the requirements of the Export Control (Hay and Straw) Orders 2004.

Ryegrass means the grass of the *Lolium spp.*

Sample means fines, core, grab or liquid samples taken from hay or straw.

Standard means the 'Standard for Minimising the Risk of Corynetoxin Contamination of Hay and Straw for Export'.

Storage area means the area where bales are stacked or stored either in a building or in a paddock.

Straw means straw from a cereal plant including wheat, oat, barley, rye and triticale but not including straw from rice.

Test, of hay or straw, means a test for *R. toxicus* or Corynetoxin using a method prescribed in section 14.

6 . S a m p l i n g m e t h o d s

6.1 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);
- 100% sampling of bales (section 11);
- Another stage that is approved by AQIS.

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

7 . S a m p l i n g B a l e s i n P a d d o c k s

7.1 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.

- (a) 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
- (b) Samples should be taken from each bale that is produced by every 7th lap of the baler and bales from the perimeter lap; or
- (c) 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
- (d) Any similar systematic plan used for the selection of bales to be sampled.

7.2 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.

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

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

7.5 If the test is negative, all bales meet the Standard without further testing.

7.6 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.

8 . P o s t - B a l i n g S a m p l i n g A w a y f r o m a P a d d o c k (i n a s t o r a g e a r e a)

- 8.1 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:
- (a) 1 to 5 bales: at least one sample is drawn from each bale;
 - (b) 6 to 30 bales: at least one sample is drawn from every 3rd bale with not less than 5 bales being sampled;
 - (c) 31 or more bales: at least one sample is drawn from every 5th bale with no less than 10 bales being sampled.
- 8.2 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.
- 8.3 Persons responsible for sampling should group bales into lots and ensure that each lot is clearly identified.
- 8.4 Persons responsible for sampling should also label composite samples clearly so that they can be readily traced back to their original lot.
- 8.5 If the test is negative, all bales represented by the composite sample meet the Standard without further testing.
- 8.6 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.
- ## **9 . S a m p l i n g f r o m t h e P r o c e s s i n g L i n e**
- 9.1 The following procedure should be used for sampling from the processing line (ie. in-line sampling).
- 9.2 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.
- 9.3 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.
- 9.4 Persons responsible for sampling should label composite samples clearly so that they can be readily traced back to their original lot.
- 9.5 If the test is negative, all bales represented by the sample meet the Standard.

9.6 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 for Processed Bale Sampling in section 10, tested and found to be negative.

10 . P r o c e s s e d B a l e S a m p l i n g

10.1 Persons responsible for sampling should sample processed bales if *R. toxicus*, Corynetoxin 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.

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

10.3 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.

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

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

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

10.7 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.

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

11 . 1 0 0 % S a m p l i n g o f B a l e s

11.1 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.

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

11.3 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.

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

11.5 If the test is negative, all bales represented by the composite sample meet the Standard.

11.6 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.

1 2 . P r e p a r a t i o n f o r S a m p l i n g

12.1 Persons responsible for sampling should ensure that:

- (a) Sampling equipment is available and fit for use.
- (b) Adequate sampling facilities are available and fit for use.
- (c) 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.

12.2 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.

12.3 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.

1 3 . S a m p l i n g C o l l e c t i o n P r o c e d u r e

13.1 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.

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

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

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

1 4 . L i q u i d s a m p l i n g

- 14.1 If AQIS 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 and those samples will constitute hay or straw samples for the purpose of this standard.

1 5 . T e s t i n g M e t h o d s

- 15.1 Persons responsible for sampling should submit all samples to an approved laboratory for testing using one of the following methods:
- (a) The Western Australian Department of Agriculture ELISA for the bacterium *Rathayibacter toxicus*; or
 - (b) The CSIRO developed ELISA for Corynetoxin.

1 6 . I d e n t i t y P r e s e r v a t i o n

- 16.1 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.
- 16.2 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 the following identity preservation procedures:
- (a) 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;
 - (b) Owners or occupiers of registered establishments should use storage plans to record the movement of tested hay and straw in storage sheds or processing lines;
 - (c) Owners or occupiers of registered establishments should maintain production plans and records to identify hay or straw that has been processed and consolidated for export; and
 - (d) Owners or occupiers of registered establishments should maintain container loading details to identify hay and straw that has been loaded into containers for export.

1 7 . R e c o r d K e e p i n g

17.1 Records should be retained for at least two years.

17.2 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:

- (a) The date that the sample was drawn for testing and the lot from which it was drawn;
- (b) The number of bales represented by the sample;
- (c) The date on which the product was processed and loaded for export; and
- (d) Whether the samples are negative or positive to CT or *R. toxicus*.

17.3 The records should include:

- (a) The load out report for each container identifying the hay or straw bales and samples to the ARGV test results;
- (b) The sampling plan; and
- (c) Any other document that may assist in traceability.