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Guidelines on How to Verify Cross Transference Controls

A critical aspect of feed manufacture is to ensure feed is not contaminated with an unintended raw material. The two areas of greatest concern are:

1. Ruminant feeds contaminated with RAM, this is a breach of State regulations and feed suppliers are subject to prosecution. There is a national feed testing program operating, this targets multi species feed mills with State Department inspectors completing site audits and sample collection.
2. Non target feeds are contaminated with medications that are either not compatible with this species or are not registered for use in the species. Incidents of ionophore toxicity in horses have occurred, as have medication residues in non-target species. Ractopamine (Paylean) carryover from pig feeds to cattle or sheep feeds may result in residues that adversely impact trade access or horse feeds where a residue is a breach of rules of professional competition.

These guidelines are written to provide clear direction to feed mills as to what they should be implementing to verify that the control systems in place are adequate.

Under FeedSafe®, the following required ***precautions must be taken to ensure carry-over from previous mixing of feeds does not contaminate subsequent feed mixes.*** **In effect the feed mill MUST have controls in place to prevent cross-over or cross transference.**

In the case of multi-species feed mills, manufacturing ruminant feeds and also using RAM on site, the SFMCA has defined that these controls must be verified at least every 6 months.

In the case of multi-species mills, manufacturing pig feeds containing ractopamine and also manufacturing cattle, sheep or horse feeds, the SFMCA has defined that these controls must be verified through sample testing at least every 6 months.

1. HACCP Plan

The site's HACCP plan must incorporate as a minimum the directions contained within this document.

2. Control Methods

2.1. Sequencing and Flushing

Sequencing needs to provide a minimum number of batches or quantity of feed before "at risk" feeds are manufactured to reduce the potential of cross transference occurring.

Flushing relies upon physical feed transfer through the production line to flush out any "carryover" before the "at risk" feed is manufactured.

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Use of sequencing and flushing are recognised as having limitations in the capacity to provide a guarantee that no carryover residue will occur. Thus testing is required to verify the adequacy of sequencing and flushing for the site.

2.2. Premix and Medication Preparation and Addition

The site HACCP plan must address the hazard of medication carryover occurring due to inadequate controls within the medication and premix preparation area and system for addition to feed. Use of weighing equipment and utensils, holding buckets and bags must be assesses the ensure there is minimal risk of carryover to non-target species feeds.

Medication addition and transfer from hand tipping point into the mixer needs to be included within the HACCP plan as critical control points. Controls need to be in place to ensure medications are not left within tipping stations, conveyors or augers, with this resulting in unintentional carryover to the following batches of feed.

2.3. Equipment Modification

Various parts of the production line are subject to wear and tear and/or poor design with respect to residues of feed left between batches. It must be part of the mills maintenance program to assess equipment and any weakness or decline in performance that results in cross transference.

Equipment repair or replacement needs to be scheduled to ensure cross transference does not occur. For some feed mills this includes the move to split production lines to eliminate known problem areas.

2.4. Raw Material Use

For some manufacturers the use of certain raw materials may not be possible. This includes medications such as ractopamine, as well as RAM where ruminant feeds are manufactured.

If positive feed test results are being found in feeds not intended to contain these materials, then use of contaminating raw material needs to be reassessed and their use discontinued.

Some mills are not capable of manufacturing ruminant feeds and also using RAM in monogastric feeds, similarly some mills are not capable of using medications such as ractopamine.

3. What are adequate controls?

3.1. Ruminant Feeds and RAM

For multi species feed mills using RAM and manufacturing ruminant feeds, they must complete feed tests at least every six months to verify that their control systems are working.

Negative test results are expected. **If a positive result is obtained, the control procedures must be improved to ensure no further positive results are found.** Note that it is in the interest of the feed mill to have an honest approach to completing verification testing. At some point the mill will be subject to State Department sampling and testing and weak control systems are very likely to be found and subject to prosecution.

System verification results must be reported to senior management to ensure any positive results are recognised and actions taken to address.

The test method uses the FeedChek rapid assay test strips, refer to Appendix 1. Mills should always have on hand test strips to conduct testing as well as a more detailed 6 monthly system verification test.

FeedChek rapid assay test kits identify animal protein at levels down to 0.1%. These same test kits are being used by State Departments to identify non-compliance with the ruminant feed ban.

3.2 Medicated Feeds

A verification of controls for medication cross transference can be completed through the testing for medications in non-target feeds. This is however expensive and difficult where many different medications are in use. An alternate lower cost approach is to use micro tracers are a means of assessing the level of carryover from medicated into non medicated feeds. Micro tracers are used by a number of medication suppliers to assist clients in confirming that the medication has been correctly added to feed.

When using micro tracers to assess medication use controls, the expectation is that no tracer will be found in non-target feeds.

3.3 Ractopamine Use in Multi-Species Feed Mills

For mills using ractopamine in pig feeds and also manufacturing cattle, sheep or horse feeds, the 6 monthly verification must be based upon laboratory analysis of feeds. Micro-tracer testing has been found to not be sufficiently sensitive to identify low level ractopamine carryover.

Verification tests need to be completed; this requires feed sample collection and testing for ractopamine presence in feeds manufactured immediately following the defined sequence and flushing controls.

Ractopamine has been found to present residues in cattle livers when feed contains down to 10ppb (10mg/tonne). The verification testing must provide feed results less than 10ppb. Any results found above 10ppb are considered unacceptable and corrective actions are required. **Repeat results above 10ppb identifies the mill as being incapable to using ractopamine and the medication should not be used if also manufacturing cattle, sheep or horse feeds.**

Refer to appendix 3 for information relating to ractopamine analysis laboratories. These laboratories have analytical capability to detect ractopamine down to ppb. The 6 monthly verification testing must be based upon this analysis sensitivity. NOTE that Elanco have available a lower cost rapid assay test kit, these test kits are however only sensitive in detecting ractopamine down to 1ppm and they must not be used for the 6 monthly verification.

3.4 Coccidiostat Use in mills manufacturing broiler feeds and feeds for other species

A number of coccidiostats, although registered for use in broiler feeds are not registered for other applications. Examples of cross transference residues from broiler feed to other feeds and resulting medication residues are nicarbazin in eggs and manduramicin in pig livers. Where products are exported, positive results are a trade issue due to export countries not having an MRL in place.

The feed mill must include this as a risk that is managed through their HACCP program. This must include regular testing to verify that cross contamination is not occurring.

The SFMCA under FeedSafe has adopted the EU requirement for mills to meet the maximum level carry-over of certain coccidiostats as per (EU) No 574/2011. This EU directive specifies the maximum level of carryover that can occur in feed for certain specified medications. **The SFMCA requires all FeedSafe accredited mills to meet these**

maximum carryover level requirements. Appendix 1 provides the list of coccidiostats, the intended feeds and maximum level allowed in feeds.

Through sampling and testing, manufacturers should verify their controls to ensure they do not have carryover that exceeds the levels specified in Appendix 4.

4. Production Risk Areas and Controls

FeedSafe requires controls to be in place for all areas of the feed mill. Where sequencing and flushing is used, this applies from raw material intake through to bulk out-loading or bag feed packing.

If a mill relies on sequencing and flushing, it applies to more than just the batching and mixing stage of manufacture. Sequencing and flushing must also apply to pellet press operations and feed transfer to finished product bins. Feeds are subject to cross transference after the mixing process. Equally important is the collection of dust collector residues and spilt feed reuse. Feed delivery transport vehicles must be sequenced or cleaned out to ensure there is no cross transference occurring in feed delivery.

5. Completing the Control Verification Test

5.1. Multi-species Mill Where Sequencing and Flushing are used as Controls

Verification Sampling
The entire feed production line needs to be considered when undertaking the six monthly verification test:

Raw Material Intake: where a common intake system is used for RAM and other ingredients, samples need to be taken immediately after the flush has been completed.

Batching/Mixing: samples should be taken as feed exits the mixer from the first batch of feed following the final flush.

Pelleting: samples should be taken as feed exits the pellet press, as the first feed following flush is manufactured.

Cooling and crumbling: samples should be taken as feed leaves the crumble rolls in the feed batch immediately following the flush.

Finished feed: samples from both out-loading bins and bagged feed packing lines are to be taken from the batch that followed the last flush of the production line.

For some mills there will be additional production spots that could provide cross contamination, these including holding bins and equipment for fat/oil, enzyme or molasses application.

The verification test needs to be able to confirm that no positive test results are found through the production process. If positive results are obtained, corrective actions need to be implemented to address the problem area.

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5.2. Where Split Production Lines

Where RAM is held on site and production lines are split between ruminant and non-ruminant, the site should still undertake a 6 monthly verification that the system is operating correctly. If there is any common use of equipment such as intake systems, bulk out-loading bins or feed packing, then feed sampling and analysis must be completed.

Similarly if incompatible medications are in use, such as ractopamine, then 6 monthly verification of the control systems are still required.

5.3. Single Species Mills

Assuming there is no RAM used on site, the mill will have a significantly lower risk level of ruminant feed contamination from RAM. The risk is however not eliminated as raw materials may be received that are already contaminated.

These mills need to ensure they have controls in place relating to declarations from ingredient suppliers and transport operators. Rapid assay test strips to routinely check raw materials being received may be used. Focus should be given to carriers that may be transporting bulk RAM products in prior deliveries.

Single species monogastric mills manufacturing pig and poultry feeds are seen to present no RAM cross transference risk. These mills are still required to have controls in place for medication use and controlling cross transference.

6. Flushing Issues

Flush Volume – the SFMCA Guidelines recommend that the minimum flushing volume should be:

- 5% of the mixer volume in a fully self-cleaning systems;
- 25% of the mixer volume in a non-self-cleaning system.

The actual volume used needs to account for potential feed residue within the mixer and feed carryover. Data supplied by Kansas State University identifies the benefit of using the same volume of flush material, but split between either two or three flush sequences. In this manner the residual feed and contaminants are diluted with each passing flush.

Where the existing flushing control procedures are found to be inadequate, larger volumes of flush material and either double or triple flushing should be implemented.

In deciding upon flush volume, smaller volumes of flush may not adequately flush mixers as the volume may not cover the mixer axle and does not sufficiently fill the mixer. The mill needs to take account of this issue and work in verifying the adequacy of flush volume.

Flush material – density of the flush material affects the success of flushing. If lighter density materials such as millrun are in use, there may be lower capacity to flush out heavier ingredients. Some mills are using a combination of limestone and millrun to act as the flush, with the limestone being more effective as a heavier ingredient. Similarly bentonite may be used as part of the flush mix. Where existing flushing controls are inadequate, use of alternate flush materials should be considered.

Flush material disposal - the flushing material used must be segregated and labelled following flushing. This flush material can only be re-used in feeds that present no residue risk.

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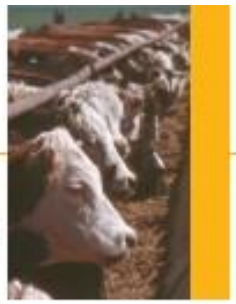
Elevator buckets, augers and conveyors – it is recognised that some equipment will hold feed residues that may result in later batch cross transference. Where positive test results are found, attention needs to be given to these points in the production line. Either physical cleaning prior to at risk feed manufacture or re-engineering may be required to eliminate the production limitation.

Appendix 1

FeedChek™



FeedChek™ is a simple, highly sensitive lateral flow test for the detection of meat and bone meal in feed and feed ingredients.

FeedChek™ Test for Meat and Bone Meal (MBM) is designed to detect the presence of meat and bone meal (MBM) in animal feed. Currently, the use of mammalian-derived MBM in cattle feed is prohibited or highly regulated in most countries due to its potential to spread Bovine Spongiform Encephalopathy (BSE). As a precautionary measure, some regions have restricted the use of MBM from any animal species in ruminant feeds. In order to accommodate user-specific requirements, the FeedChek Test for MBM incorporates 2 tests into one test strip. One test line indicates the presence of any MBM (avian and mammal) in the sample and the second test line indicates the presence of mammalian MBM in the sample. FeedChek has a 15-second extraction process and provides results in ten minutes. No laboratory equipment is needed to perform the test.

How FeedChek works

The feed sample is added to buffer solution in a sample cup. The cup is capped and shaken for 15 seconds to extract the target protein from the sample. The lateral flow strip is then placed into the sample cup and results are read in ten minutes. The FeedChek lateral flow test is an immunoassay, which employs a unique combination of anti-MBM antibodies conjugated to red-colored particles and coated on the surface of a membrane. The lateral flow membrane contains one control line and two test lines. One test line is specific for mammalian MBM, and the other test line is specific for mammalian and avian MBM. The presence of only one line (control line) on the membrane indicates a negative sample. The presence of 2 lines indicates that the sample is positive for MBM. The presence of 3 lines indicates that the sample is positive for mammalian MBM.

Test Sensitivity

The test was validated using a variety of finished feeds (mixed grain, pelletted, or milled) representative of calf, dairy, and beef cattle feeding programs. These feeds varied in crude protein content, crude fiber content, mineral content, and were either medicated or unmedicated depending on their specific application. The test detects 0.1% (w/w) MBM and 1% (w/w) mammalian-MBM in animal feeds.

Applications

FeedChek works with both raw materials and finished feed.

Packaging

Feedchek is available in kits of 20 tests. All materials to perform the assay are included in the kit.

FeedChek™ gives you a simple, affordable test for both raw material and finished feed.

SDI
Strategic Diagnostics Inc.

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Meat & Bone Meal Quick Reference

Read the user's guide instructions completely before performing any test.

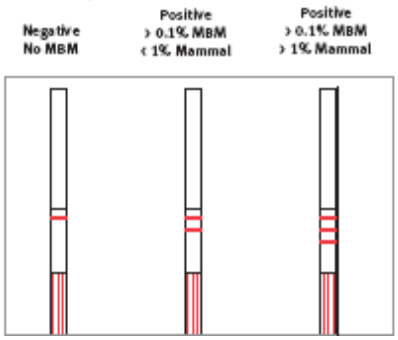
1 Pour extraction buffer into a sample cup to the one-ounce line.

2 Add feed sample. If necessary, use wooden stick to break up feed.

3 Cap sample and shake for 15 seconds.

4 Place one Test Strip into the cup, arrows pointed down.

5 After 10 minutes, read result.



The SDI FeedChek® test kit is available from Foss Pacific telephone 1300 360 848. The test kit contains 20 test strips and should be ordered using the Part Number 7000201.

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Appendix 2

Micro-Tracer Testing

Micro-tracers are coloured uniformly small sized iron particles that are easily identifiable in feed samples. The dye colour provides visual recognition when recovered using a test kit.

For more information on micro-tracers and their use refer to www.microtracers.com

Micro tracers are available from:

Feedworks
Phone: 03 5429 6458
Website: www.feedworks.com.au

Appendix 3

Ractopamine Testing Laboratories

1. Symbio Alliance

Conduct a routine (ppm) and a more sensitive (ppb) ractopamine analysis on feed. The more sensitive analysis must be requested.
Detection limit in feed for the more sensitive assay is claimed to be down to 5ppb.

Laboratory Contact:
Symbio Alliance
PO Box 4312, Eight Mile Plains, Qld 4113
Phone: 07 3340 5702
Email: admin@symbioalliance.com.au

2. National Measurement Institute
Feed analysis detection limit is claimed to be sensitive down to 1ppb.

Laboratory Contact:
NMI
PO Box 264, Lindfield, NSW 2070
Telephone: 02 8467 3600
Email: info@measurement.gov.au

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Appendix 4

COMMISSION REGULATION (EU) No 574/2011

of 16 June 2011

amending Annex I to Directive 2002/32/EC of the European Parliament and of the Council as regards maximum levels for nitrite, melamine, *Ambrosia* spp. and carry-over of certain coccidiostats and histomonostats and consolidating Annexes I and II thereto

SECTION VII: AUTHORISED FEED ADDITIVES IN NON-TARGET FEED FOLLOWING UNAVOIDABLE CARRY-OVER

Coccidiostat	Products intended for animal feed (1)	Maximum content in mg/kg (ppm) relative to a feed with a moisture content of 12 %
1. Decoquinate	Feed materials	0,4
	Compound feed for	
	— laying birds and chickens reared for laying (> 16 weeks),	0,4
	— chickens for fattening for the period before slaughter in which the use of decoquinate is prohibited (withdrawal feed),	0,4

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Coccidiostat	Products intended for animal feed (1)	Maximum content in mg/kg (ppm) relative to a feed with a moisture content of 12 %
	— other animal species.	1,2
	Premixtures for use in feed in which the use of decoquinate is not authorised.	(2)
2. Diclazuril	Feed materials	0,01
	Compound feed for	
	— laying birds, chickens reared for laying (> 16 weeks) and turkeys for fattening (> 12 weeks),	0,01
	— rabbits for fattening and breeding for the period before slaughter in which the use of diclazuril is prohibited (withdrawal feed),	0,01
	— other animal species other than chickens reared for laying (< 16 weeks), chickens for fattening, guinea fowl and turkeys for fattening (< 12 weeks).	0,03
	Premixtures for use in feed in which the use of diclazuril is not authorised.	(2)
3. Halofuginone hydrobromide	Feed materials	0,03
	Compound feed for	
	— laying birds, chickens reared for laying and turkeys (> 12 weeks),	0,03
	— chickens for fattening and turkeys (< 12 weeks) for the period before slaughter in which the use of halofuginone hydrobromide is prohibited (withdrawal feed),	0,03
	— other animal species.	0,09
	Premixtures for use in feed in which the use of halofuginone hydrobromide is not authorised.	(2)
4. Lasalocid sodium	Feed materials	1,25
	Compound feed for	
	— dogs, calves, rabbits, equine species, dairy animals, laying birds, turkeys (> 16 weeks) and chickens reared for laying (> 16 weeks),	1,25
	— chickens for fattening, chickens reared for laying (< 16 weeks) and turkeys (< 16 weeks) for the period before slaughter in which the use of lasalocid sodium is prohibited (withdrawal feed),	1,25
	— other animal species.	3,75
	Premixtures for use in feed in which the use of lasalocid sodium is not authorised	(2)
5. Maduramicin ammonium alpha	Feed materials	0,05

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Coccidiostat	Products intended for animal feed (1)	Maximum content in mg/kg (ppm) relative to a feed with a moisture content of 12 %
	Compound feed for	
	— equine species, rabbits, turkeys (> 16 weeks), laying birds and chickens reared for laying (> 16 weeks),	0,05
	— chickens for fattening and turkeys (< 16 weeks) for the period before slaughter in which the use of maduramicin ammonium alpha is prohibited (withdrawal feed),	0,05
	— other animal species.	0,15
	Premixtures for use in feed in which the use of maduramicin ammonium alpha is not authorised.	(2)
6. Monensin sodium	Feed materials	1,25
	Compound feed for	
	— equine species, dogs, small ruminants (sheep and goat), ducks, bovine, dairy cattle, laying birds, chickens reared for laying (> 16 weeks) and turkeys (> 16 weeks),	1,25
	— chickens for fattening, chickens reared for laying (< 16 weeks) and turkeys (< 16 weeks) for the period before slaughter in which the use of monensin sodium is prohibited (withdrawal feed),	1,25
	— other animal species.	3,75
	Premixtures for use in feed in which the use of monensin sodium is not authorised.	(2)
7. Narasin	Feed materials	0,7
	Compound feed for	
	— turkeys, rabbits, equine species, laying birds and chickens reared for laying (> 16 weeks),	0,7
	— other animal species.	2,1
	Premixtures for use in feed in which the use of narasin is not authorised.	(2)
8. Nicarbazin	Feed materials	1,25
	Compound feed for	
	— equine species, laying birds and chickens reared for laying (> 16 weeks),	1,25
	— other animal species.	3,75

Coccidiostat	Products intended for animal feed (1)	Maximum content in mg/kg (ppm) relative to a feed with a moisture content of 12 %
	Premixtures for use in feed in which the use of nicarbazin (alone or in combination with narasin) is not authorised.	(2)
9. Robenidine hydrochloride	Feed materials	0,7
	Compound feed for	
	— laying birds and chickens reared for laying (> 16 weeks),	0,7
	— chickens for fattening, rabbits for fattening and breeding and turkeys for the period before slaughter in which the use of robenidine hydrochloride is prohibited (withdrawal feed),	0,7
	— other animal species.	2,1
	Premixtures for use in feed in which the use of robenidine hydrochloride is not authorised.	(2)
10. Salinomycin sodium	Feed materials	0,7
	Compound feed for	
	— equine species, turkeys, laying birds and chickens reared for laying (> 12 weeks),	0,7
	— chickens for fattening, chickens reared for laying (< 12 weeks) and rabbits for fattening for the period before slaughter in which the use of salinomycin sodium is prohibited (withdrawal feed),	0,7
	— other animal species.	2,1
	Premixtures for use in feed in which the use of salinomycin sodium is not authorised	(2)
11. Semduramicin sodium	Feed materials	0,25
	Compound feed for	
	— laying birds and chickens reared for laying (> 16 weeks),	0,25
	— chickens for fattening for the period before slaughter in which the use of semduramicin sodium is prohibited (withdrawal feed),	0,25
	— other animal species.	0,75
	Premixtures for use in feed in which the use of semduramicin sodium is not authorised.	(2)