

# VFAD Feed Analysis Summary for 2013 to 2015

Feed analysis is important in assuring the safety and quality of feed, as well as enhancing productivity and ensuring animal welfare. Feed safety quality assurance programmes are required by feed manufacturers and livestock producers to ensure that the raw materials fed to livestock meet nutritional requirements, and that feed ingredients shall not contain residues or contaminants that can accumulate or be found in the finished product that can be detrimental to human health. Therefore, feed analysis laboratories are essential for providing accurate results on feed composition and determining the level of desirable and undesirable substances, to ensure a safe and balanced diet for livestock.

In 2009, the Malaysian Government enacted the Feed Act 2009. The authority in charge of the Feed Board requires all feed manufacturers, importers or exporters to comply with documentation requirements which include health certificate, Halal certification, certificate of origin, export permit, etc.

VFAD provides quality diagnostic testing required for raw materials, feed ingredients and finished feed products. We are a SAMM accredited laboratory with proven capability and competence in the field of diagnostic testing. Tests are conducted by competent personnel under stringent QA/QC conditions.

## **Guidelines:**

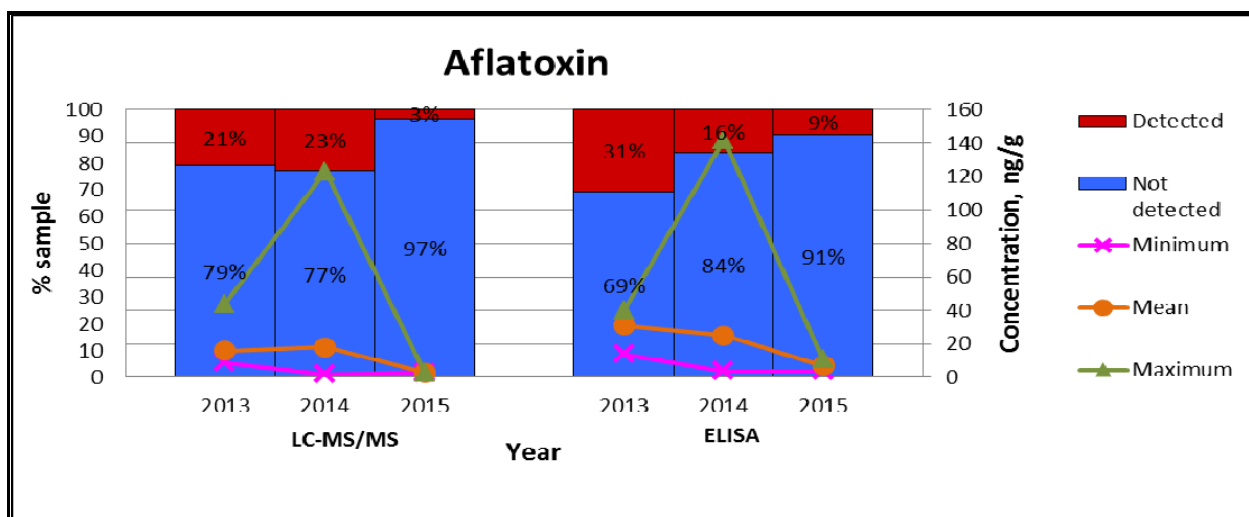
- Send 100-500 g of solid specimen in clean and dry plastic bags/containers.
- Label clearly with specimen identification and any other relevant details.
- Fill up and send specimen submission form together with specimens.
- Maximum turnaround time is 7 working days.
- Test results may be accessed online through VRS Online.

## **Tests offered for feed/feed ingredients:**

- Identification and quantification of chemical/drug residues
- Proximate analysis
- Screening and confirmation of mycotoxins
- Detection and enumeration of targeted pathogenic bacteria
- Identification of bacteria, yeast and mould
- Detection of porcine derivatives
- Detection of Genetically Modified Roundup soy

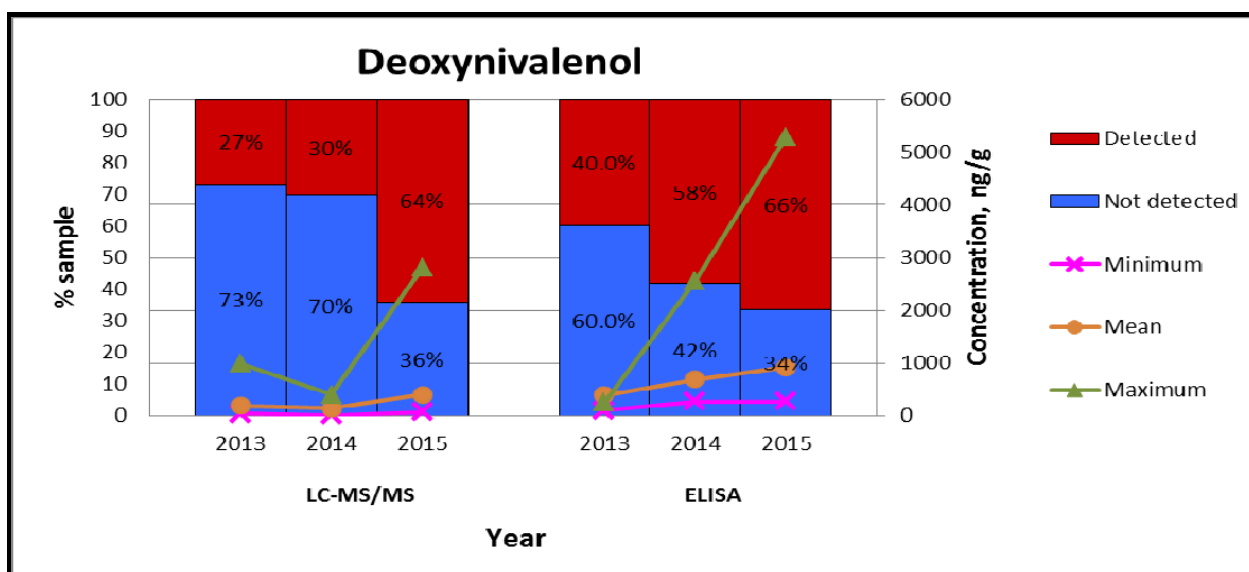
## **Note:**

All findings in this summary are derived from specimens received from customers and analyzed as requested from January 2013 to July 2015.



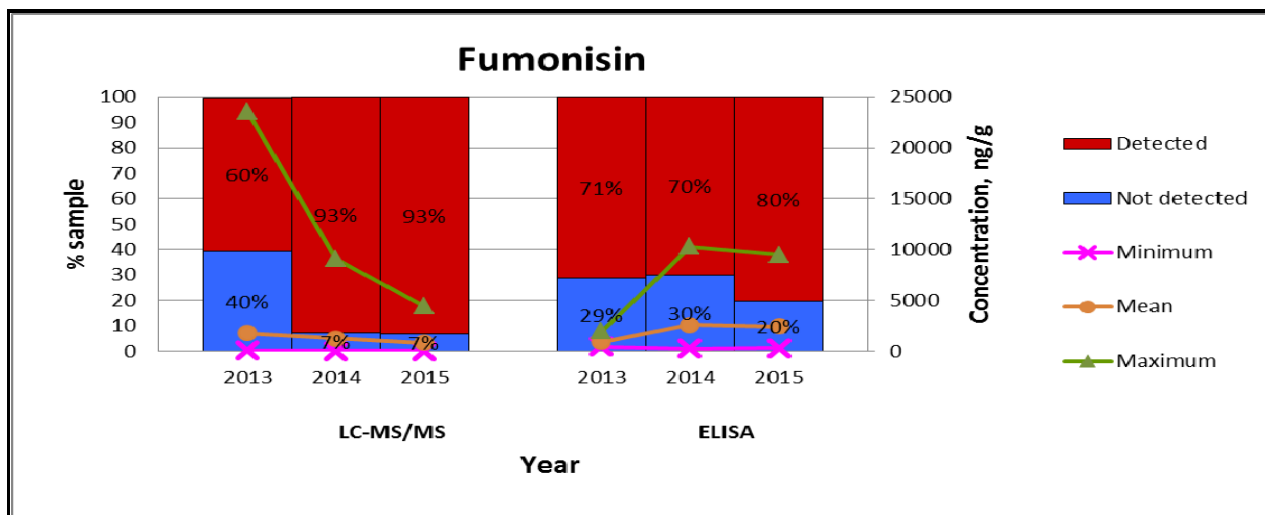
**Notes:**

- 1) Sample matrices tested were feed and raw materials [DDGS (dried distiller grains with solubles), soy bean meal, fishmeal, meat meal, corn gluten meal, corn, maize].
- 2) Feed sample contributed to the maximum result.
- 3) No. of samples for LC-MS/MS: 86, 109, 61 for 2013, 2014 and 2015 respectively.
- 4) No. of samples for ELISA: 13, 142, 106 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for Aflatoxin B1 by LC-MS/MS offered by VFAD is 2 ng/g.
- 6) Range of quantification for Total Aflatoxin (Aflatoxin B1, B2, G1, G2) by ELISA is 4-40 ng/g.
- 7) These tests are SAMM accredited.



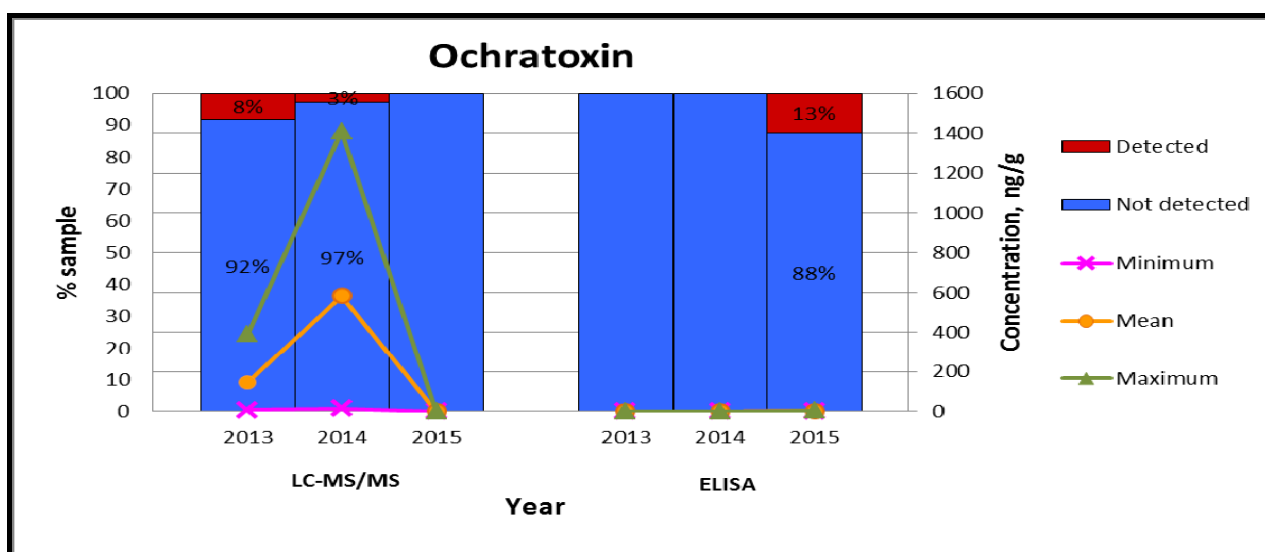
**Notes:**

- 1) Sample matrices tested were feed and raw materials [DDGS (dried distiller grains with solubles), soy bean meal, fishmeal, meat meal, corn gluten meal, corn, maize].
- 2) Maize sample contributed to the maximum result.
- 3) No. of samples for LC-MS/MS: 86, 109, 64 for 2013, 2014 and 2015 respectively.
- 4) No. of samples for ELISA: 5, 103, 116 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for Deoxynivalenol by LC-MS/MS offered by VFAD is 10 ng/g.
- 6) Range of quantification for Deoxynivalenol by ELISA is 250-5000 ng/g.
- 7) These tests are SAMM accredited.



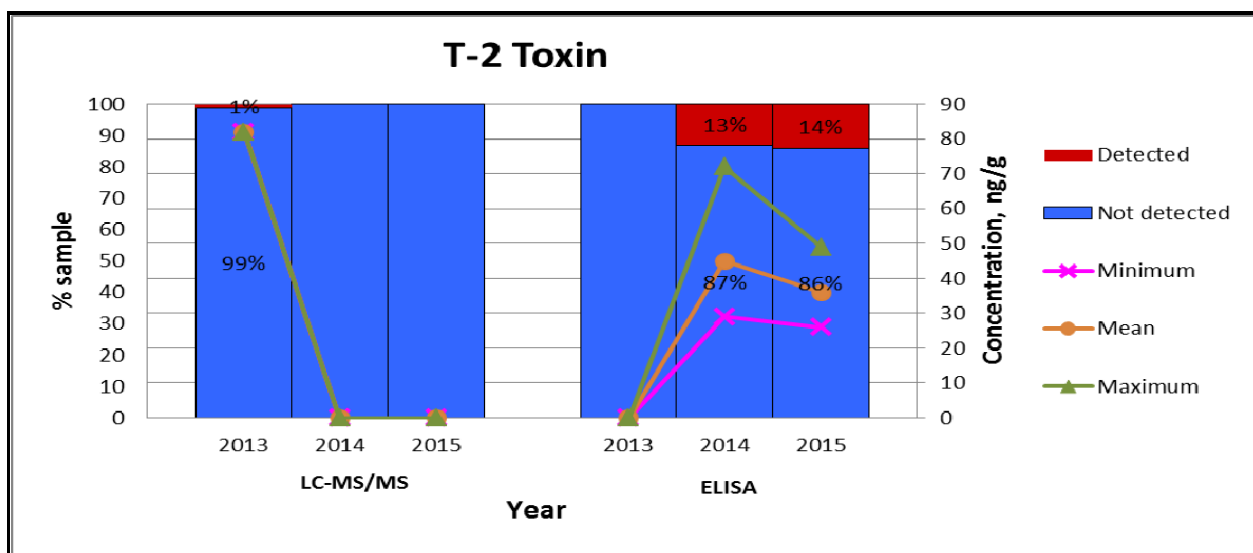
**Notes:**

- 1) Sample matrices tested were feed and raw materials [DDGS (dried distiller grains with solubles), soy bean meal, fishmeal, meat meal, corn gluten meal, corn, maize].
- 2) Maize sample contributed to the maximum result.
- 3) No. of samples for LC-MS/MS: 91, 112, 61 for 2013, 2014 and 2015 respectively.
- 4) No. of samples for ELISA: 7, 138, 116 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for Fumonisin B1 by LC-MS/MS offered by VFAD is 10 ng/g.
- 6) Range of quantification for Total Fumonisin (Fumonisin B1, B2, B3) by ELISA is 250-5000 ng/g.
- 7) These tests are SAMM accredited.



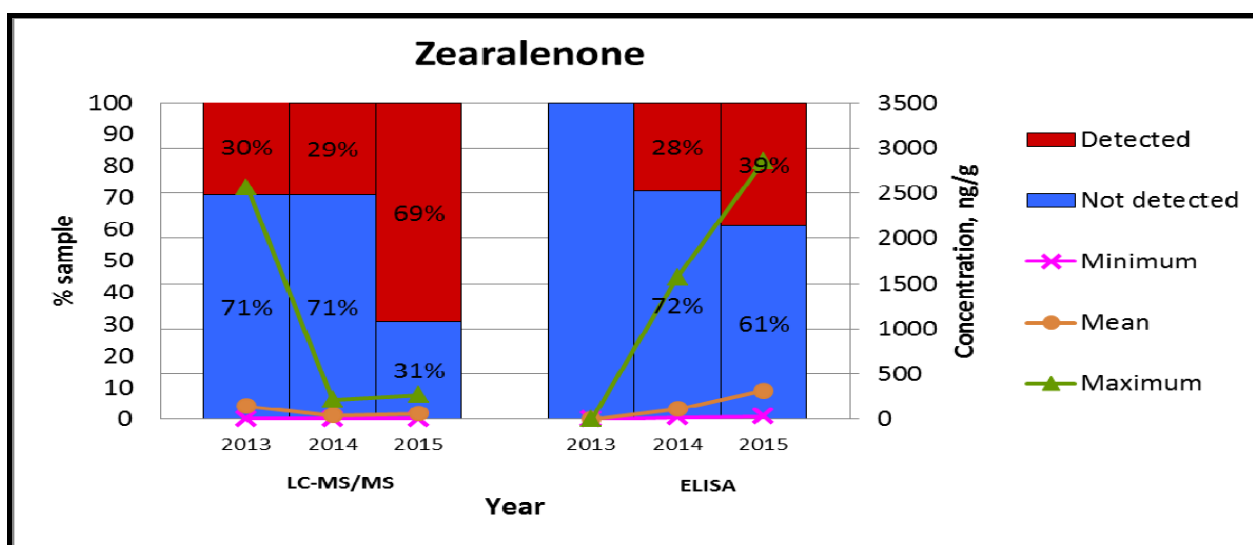
**Notes:**

- 1) Sample matrices tested were feed and raw materials [DDGS (dried distiller grains with solubles), soy bean meal, fishmeal, meat meal, corn gluten meal, corn, maize].
- 2) DDGS sample contributed to the maximum result.
- 3) No. of samples for LC-MS/MS: 86, 109, 61 for 2013, 2014 and 2015 respectively.
- 4) No. of samples for ELISA: 5, 65, 48 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for Ochratoxin A by LC-MS/MS offered by VFAD is 2 ng/g.
- 6) Range of quantification for Total Ochratoxin (Ochratoxin A & B) by ELISA is 2-40 ng/g.
- 7) These tests are SAMM accredited.



**Notes:**

- 1) Sample matrices tested were feed and raw materials [DDGS (dried distiller grains with solubles), soy bean meal, fishmeal, meat meal, corn gluten meal, corn, maize].
- 2) Soy bean meal sample contributed to the maximum result.
- 3) No. of samples for LC-MS/MS: 86, 109, 61 for 2013, 2014 and 2015 respectively.
- 4) No. of samples for ELISA: 6, 61, 57 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for T-2 Toxin by LC-MS/MS offered by VFAD is 10 ng/g.
- 6) Range of quantification for T-2 Toxin by ELISA is 75-500 ng/g.
- 7) These tests are SAMM accredited.

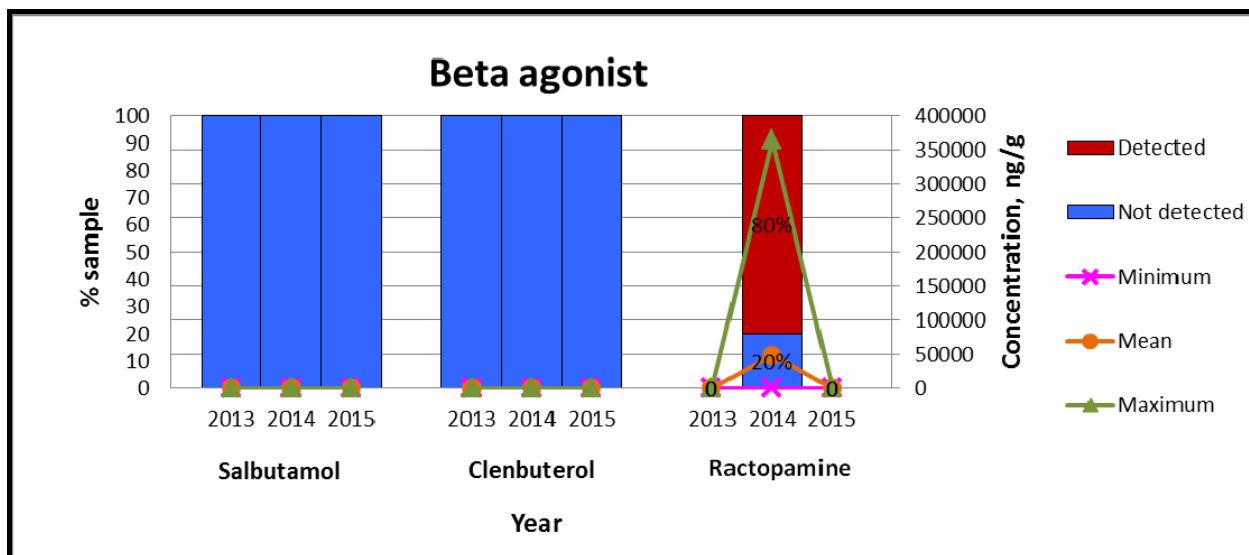


**Notes:**

- 1) Sample matrices tested were feed and raw materials [DDGS (dried distiller grains with solubles), soy bean meal, fishmeal, meat meal, corn gluten meal, corn, maize].
- 2) Corn gluten meal sample contributes to the maximum result.
- 3) No. of samples for LC-MS/MS: 90, 114, 64 for 2013, 2014 and 2015 respectively.
- 4) No. of samples for ELISA: 5, 72, 57 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for Zearalenone by LC-MS/MS offered by VFAD is 10 ng/g.
- 6) Range of quantification for Zearalenone by ELISA is 40-1000 ng/g.
- 7) These tests are SAMM accredited.

## COMPARISON BETWEEN LC-MS/MS AND ELISA METHODS FOR MYCOTOXINS TEST

Parameter	LC-MS/MS (Liquid Chromatography Tandem Mass Spectrometry)	ELISA (Enzyme Linked Immunosorbent Assay)
Detection	Detect 6 toxins in 1 test	Detect 1 type of toxin in 1 test
Test type	Gold-standard reference test (Confirmative test)	Non-confirmative test (Screening test)
Analytes	<ol style="list-style-type: none"> <li>1. Aflatoxin B1</li> <li>2. Deoxynivalenol</li> <li>3. Fumonisin B1</li> <li>4. Ochratoxin A</li> <li>5. T-2 toxin</li> <li>6. Zearalenone</li> </ol>	<ol style="list-style-type: none"> <li>1. Total Aflatoxin (Aflatoxin B1, B2, G1, G2)</li> <li>2. Deoxynivalenol</li> <li>3. Total Fumonisin (Fumonisin B1, B2, B3)</li> <li>4. Total Ochratoxin (Ochratoxin A &amp; B)</li> <li>5. T-2 toxin</li> <li>6. Zearalenone</li> </ol>

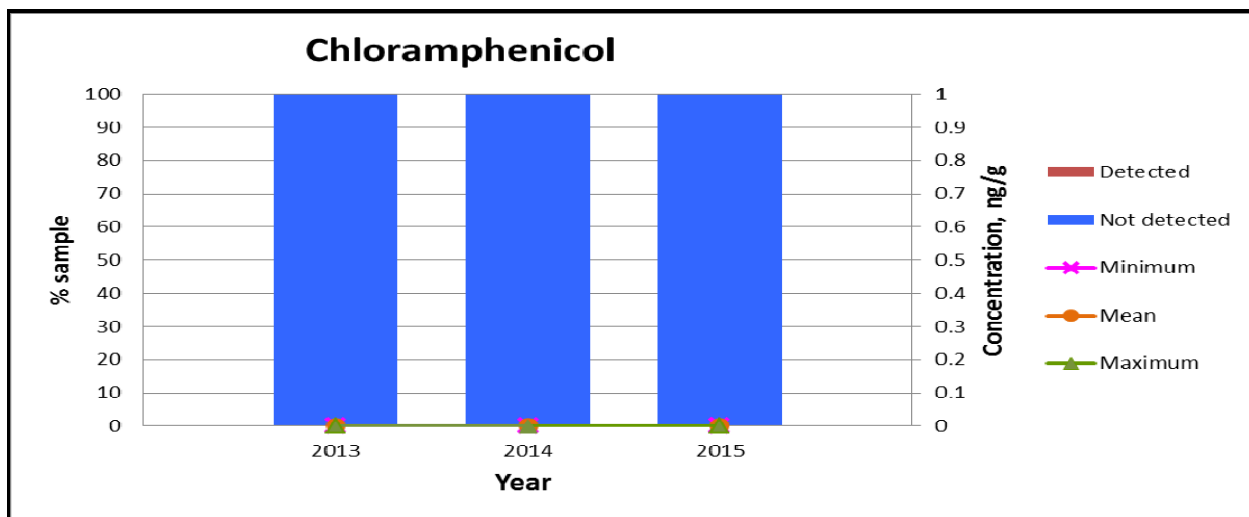


**Notes:**

- 1) Sample matrices tested were feed and premix.
- 2) Premix sample contributed to the maximum result.
- 3) Salbutamol and Clenbuterol are prohibited drugs, excerpted from Malaysian Feed (Prohibited Antibiotics, Hormones and other chemicals) Regulations 2012.
- 4) Maximum residue limit (MRL) of Ractopamine in pig, excerpted from [Food Act 1983 (ACT 281) & Regulations]

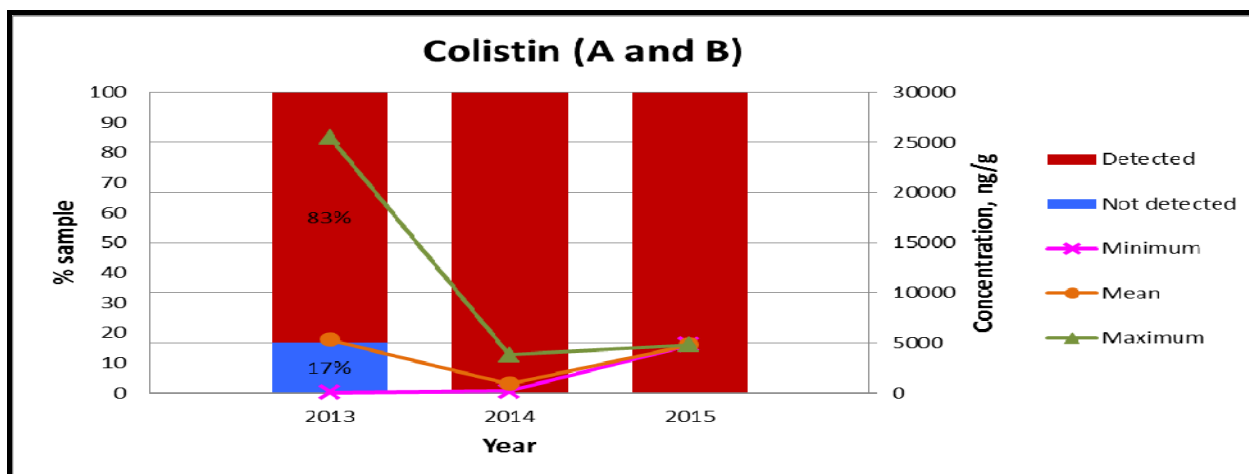
Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
Ractopamine	Pig	Muscle	10
		Fat	10
		Liver	40
		Kidney	90

- 5) No. of samples for Salbutamol: 4, 2 and 2 for 2013, 2014 and 2015 respectively.
- 6) No. of samples for Clenbuterol: 4, 2 and 2 for 2013, 2014 and 2015 respectively.
- 7) No. of samples for Ractopamine: 0, 10 and 0 for 2013, 2014 and 2015 respectively.
- 8) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS method
  - a) Salbutamol and Clenbuterol: 0.25 ng/g
  - b) Ractopamine: 1.25 ng/g
- 9) These tests are SAMM accredited.



**Notes:**

- 1) Sample matrices tested were feed and premix.
- 2) No positive detection from Jan 2013 to July 2015.
- 3) Chloramphenicol is a prohibited drug, excerpted from Malaysian Feed (Prohibited Antibiotics, Hormones and other chemicals) Regulations 2012.
- 4) No. of samples for Chloramphenicol: 5, 3 and 2 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS is 0.1 ng/g.
- 6) This test is not SMM accredited.

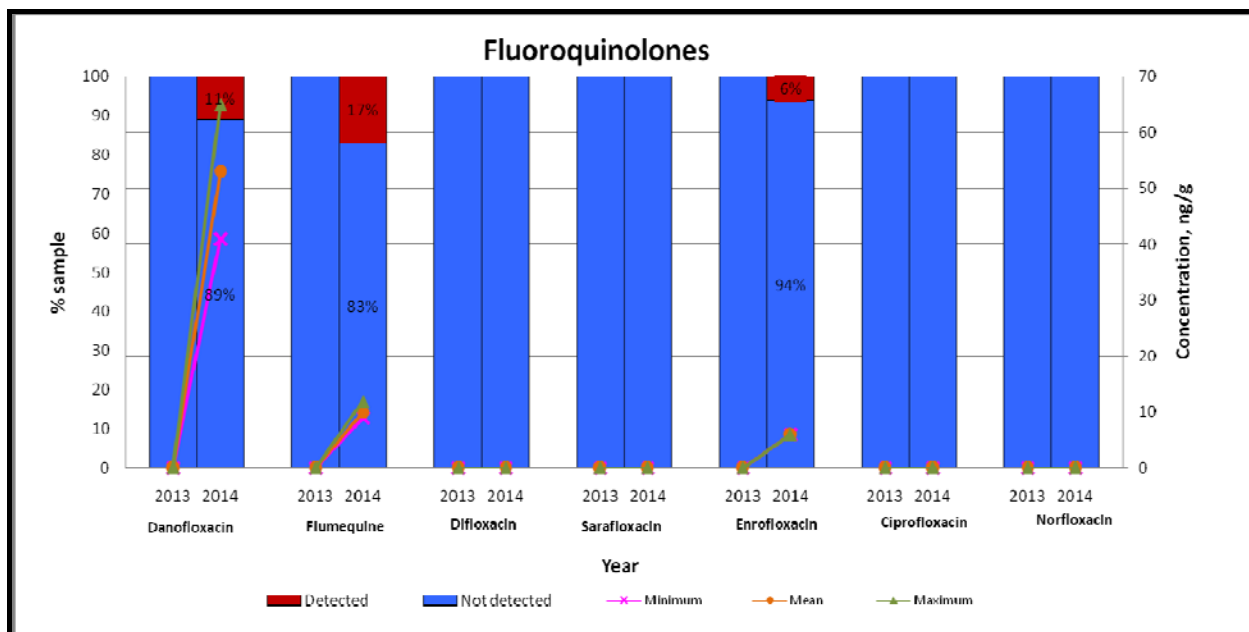


**Notes:**

- 1) Sample matrices tested were feed only.
- 2) Maximum residue limit (MRL) in food, excerpted from [Food Act 1983 (ACT 281) & Regulations]

Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
Colistin	Cattle	Milk	50
	Cattle, chicken, pig, rabbit	Muscle, liver, fat	150
	Cattle, chicken, pig, rabbit and sheep	Kidney	200
	Chicken	Egg	300

- 3) No. of samples for Colistin: 6, 6 and 1 for 2013, 2014 and 2015 respectively.
- 4) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS method is 25 ng/g.
- 5) This test is SMM accredited.



**Notes:**

- 1) Sample matrices tested were feed and raw materials.
- 2) Feed sample contributes to the maximum result.
- 3) Maximum residue limit (MRL) in food, excerpted from [Food Act 1983 (ACT 281) & Regulations].

No	Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
1	Danofloxacin	Cattle	Fat	200
		Cattle and chicken	Muscle	300
		Cattle	Kidney	500
		Chicken	Fat	600
		Cattle	Liver	900
		Chicken	Liver, kidney	1200
2	Enrofloxacin and Ciprofloxacin (sum)	Cattle, chicken and pig	Muscle, liver, kidney	30
3	Flumequine	Cattle, pig, poultry and sheep	Muscle, fat	50
		Cattle, pig, poultry and sheep	Liver	100
		Cattle, pig, poultry and sheep	Kidney	300



4) Maximum residue limit (MRL) in food [European Union COUNCIL REGULATION (EEC) No 2377/90].

No	Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
1	Danofloxacin	Bovine, ovine, caprine	Muscle	200
			Fat	100
			Liver	400
			Kidney	400
			Milk	30
		Poultry	Muscle	200
			Skin and fat	100
			Liver	400
2	Difloxacin	Porcine	Muscle	400
			Skin and Fat	100
			Liver	800
			Kidney	800
		Poultry (Not for use in animals from which eggs are produced for human consumption)	Muscle	300
			Skin and Fat	400
			Liver	900
			Kidney	600
3	Enrofloxacin (Sum of enrofloxacin and ciprofloxacin)	Bovine, ovine, caprine	Muscle	100
			Fat	100
			Liver	300
			Kidney	200
			Milk	100
		Porcine, rabbits	Muscle	100
			Fat	100
			Liver	200
			Kidney	300
		Poultry	Muscle	100
			Skin and Fat	100
			Liver	200
4	Flumequine	Bovine, porcine, ovine, caprine	Muscle	200
			Fat	300
			Liver	500
			Kidney	1500
		Poultry (Not for use in animals from which eggs are produced for human consumption)	Muscle	400
			Skin and Fat	250
			Liver	800
			Kidney	1000
5	Sarafloxacin	Chicken	Skin and fat	10
			Liver	100

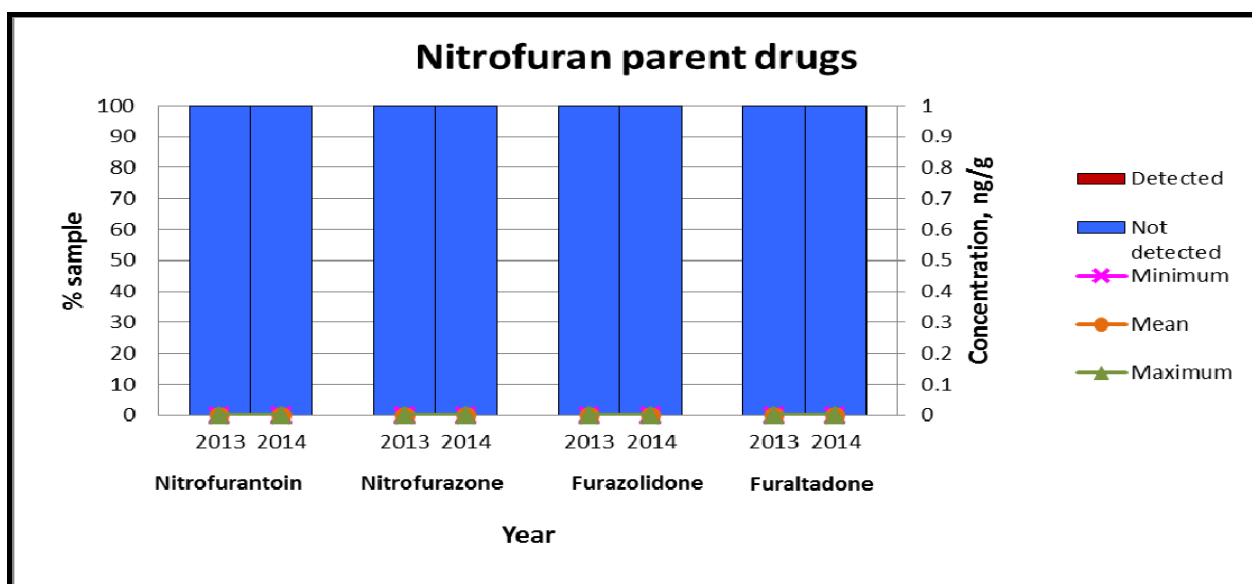
5) No. of samples for Fluoroquinolones: 4, 18 and 0 for 2013, 2014 and 2015 respectively.

6) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS method

a) Enrofloxacin, Flumequine and Sarafloxacin: 5 ng/g

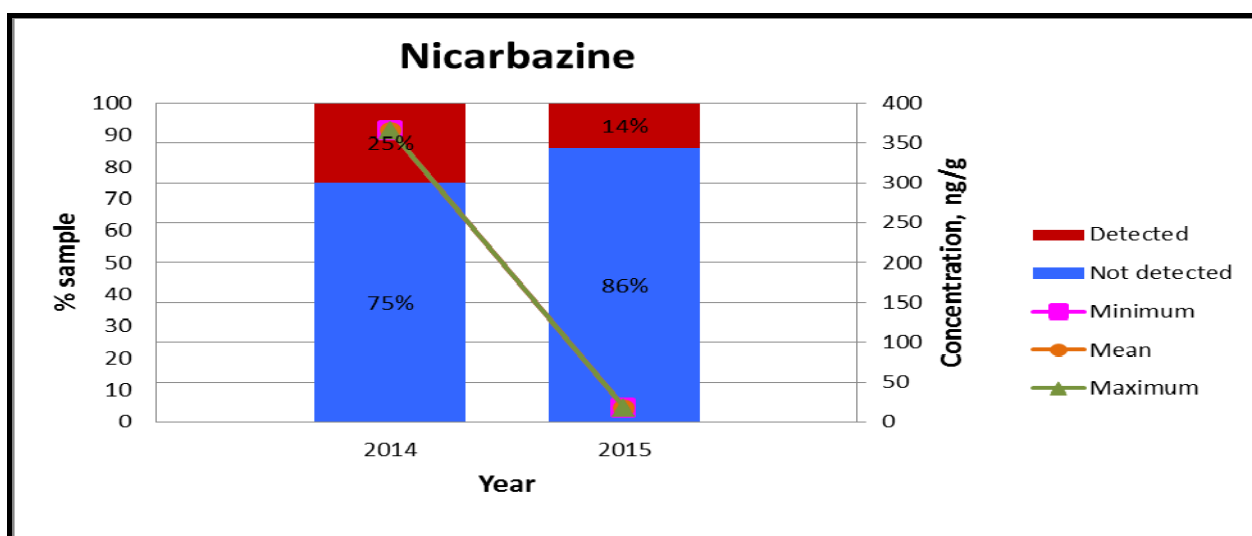
b) Ciprofloxacin, Danofloxacin, Difloxacin, Norfloxacin: 30 ng/g

7) This test is not SAMM accredited.



**Notes:**

- 1) Sample matrices tested were feed and premix.
- 2) Nitrofurantoin, Nitrofurazone, Furazolidone and Furaltadone are prohibited drugs, excerpted from Malaysian Feed (Prohibited Antibiotics, Hormones and other chemicals) Regulations 2012.
- 3) No. of samples for Nitrofuran parent drugs: 5, 33 and 0 for 2013, 2014 and 2015 respectively.
- 4) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS method is 5 ng/g.
- 5) This test is SAMM accredited.

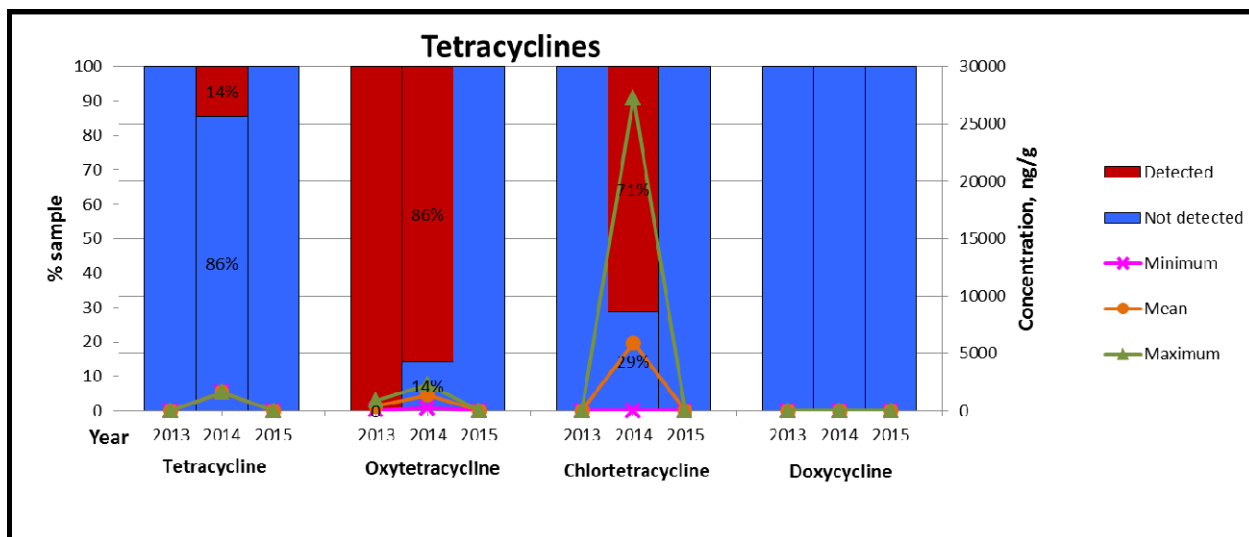


**Notes:**

- 1) Sample matrices tested were feed and premix.
- 2) Feed sample contributes to the maximum result.
- 3) Maximum residue limit (MRL) in food, excerpted from [Food Act 1983 (ACT 281) & Regulations]

Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
Nicarbazine	Chicken	Muscle, liver, kidney	4000

- 4) No. of samples for Nicarbazine: 4 and 7 for 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS method is 7 ng/g.
- 6) This test is not SAMM accredited.



**Notes:**

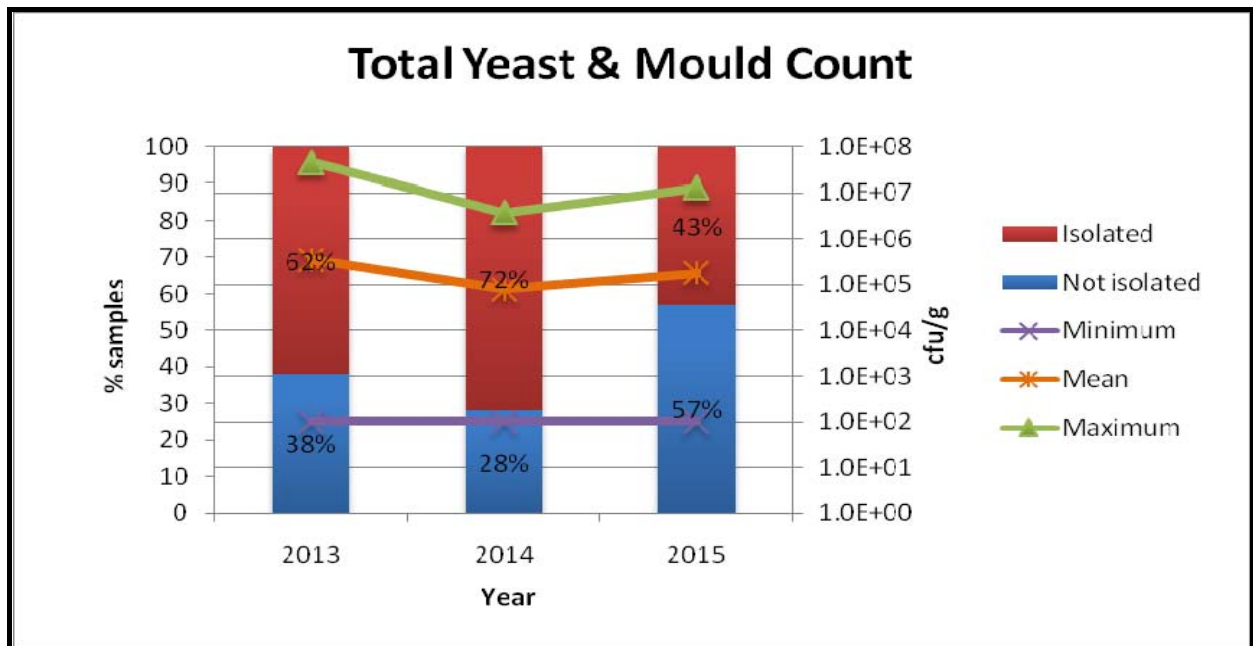
- 1) Sample matrices tested were feed and premix.
- 2) Feed sample contributed to the maximum result.
- 3) Maximum residue limit (MRL) in food, excerpted from [Food Act 1983 (ACT 281) & Regulations].

No	Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
1	Doxycycline	Cattle, pig and poultry	Muscle	100
		Cattle, pig and poultry	Liver	300
		Cattle, pig and poultry	Fat	300
		Pig and poultry	Kidney	600
2	Oxytetracycline	Cattle, sheep, pig, chicken and turkey	Fat	10
		Cattle	Milk	100
		Cattle, sheep, pig, chicken and turkey	muscle	100
		Chicken	Egg	200
		Cattle, sheep, pig, chicken and turkey	Liver	300
		Cattle, sheep, pig, chicken and turkey	Kidney	600
3	Tetracyclines	Cattle, poultry, pig and sheep	Muscle	100
		Cattle	milk	100
		Poultry	Egg	200
		Cattle, poultry, pig and sheep	Liver	300
		Cattle, poultry, pig and sheep	Kidney	600

4. Maximum residue limit (MRL) in food, excerpted from [European Union COUNCIL REGULATION (EEC) No 2377/90].

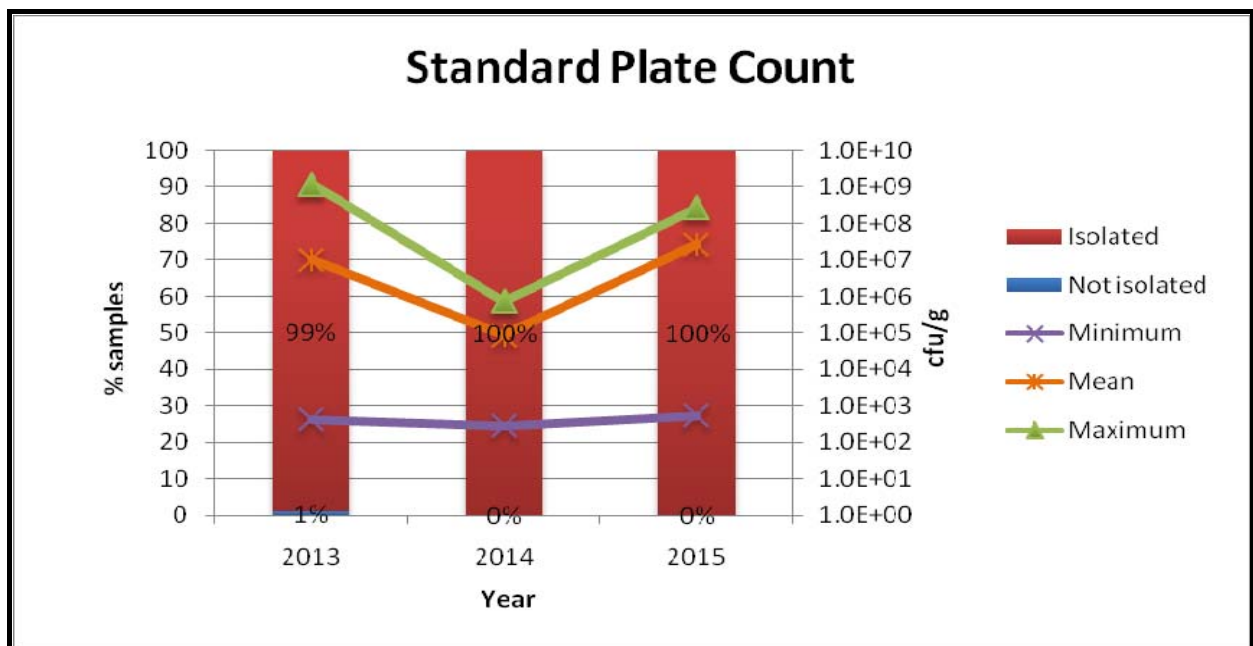
No	Antibiotic	Animal species	Target tissues	Maximum residue limits (ng/g)
1	Chlortetracycline	All food-producing species	Muscle	300
			Liver	600
			Kidney	100
			Milk	200
2	Doxycycline	Bovine (Not for use in animals from which milk is produced for human consumption)	Muscle	100
			Liver	300
		Porcine	Kidney	600
			Muscle	100
			Skin and Fat	300
			Liver	300
		Poultry (Not for use in animals from which eggs are produced for human consumption)	Muscle	100
			Skin and Fat	300
			Liver	300
			Kidney	600
3	Oxytetracycline (Sum of parent drug and its 4-epimer)	All food-producing species	Muscle	100
			Liver	300
			Kidney	600
			Milk	100
			Eggs	200
4	Tetracycline (Sum of parent drug and its 4-epimer)	All food-producing species	Muscle	100
			Liver	300
			Kidney	600
			Milk	100
			Eggs	200

- 4) No. of samples for Tetracyclines: 4, 7 and 1 for 2013, 2014 and 2015 respectively.
- 5) Limit of determination (LOD) for this test offered by VFAD by LC-MS/MS method is 20 ng/g.
- 6) This test is not SAMM accredited.



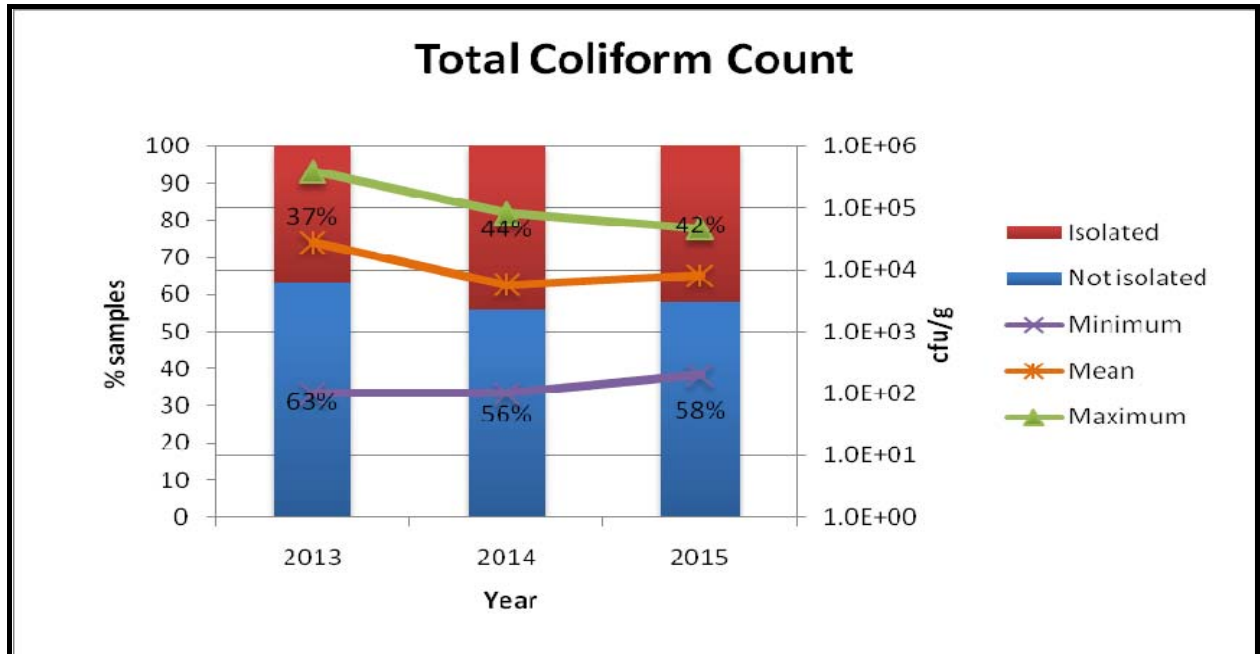
**Notes:**

1. Sample matrices tested were feed and raw materials.
2. No. of samples: 357, 385, 200 for 2013, 2014 and 2015 respectively.
3. Limit of determination (LOD) for this test offered by VFAD is 100 cfu/g.
4. This test is SAMM accredited.



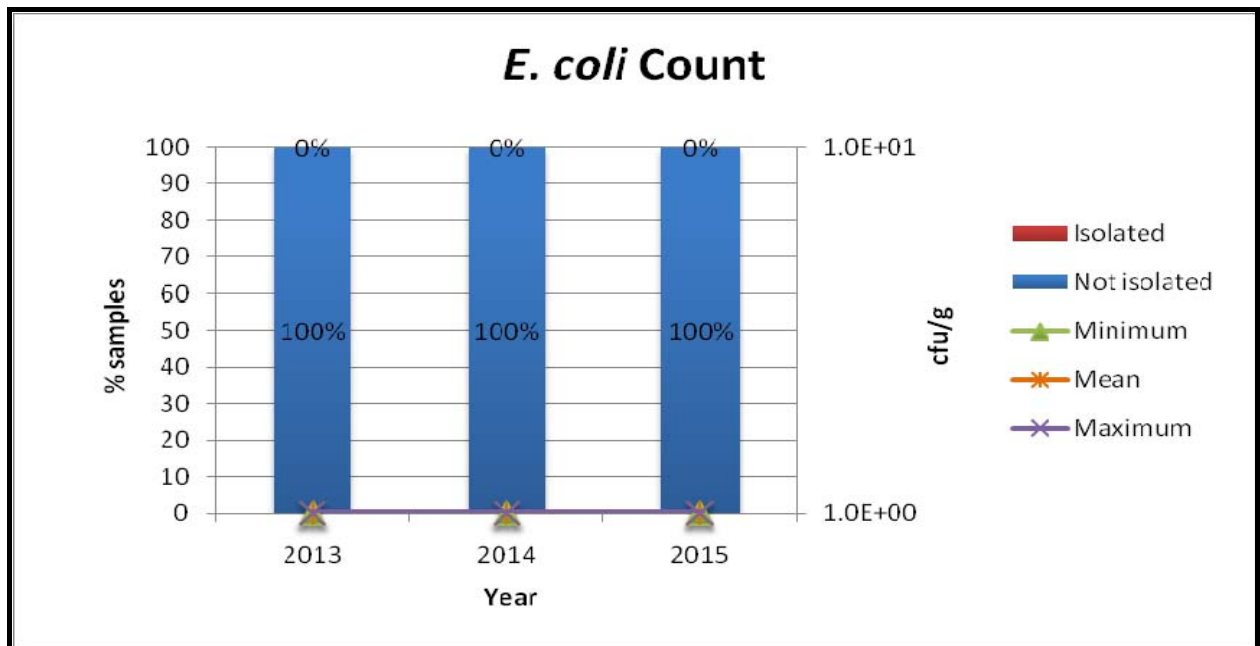
**Notes:**

1. Sample matrices tested were feed and raw materials.
2. No. of samples: 120, 77, 10 for 2013, 2014 and 2015 respectively.
3. Limit of determination (LOD) for this test offered by VFAD is 10 cfu/g.
4. This test is SAMM accredited.



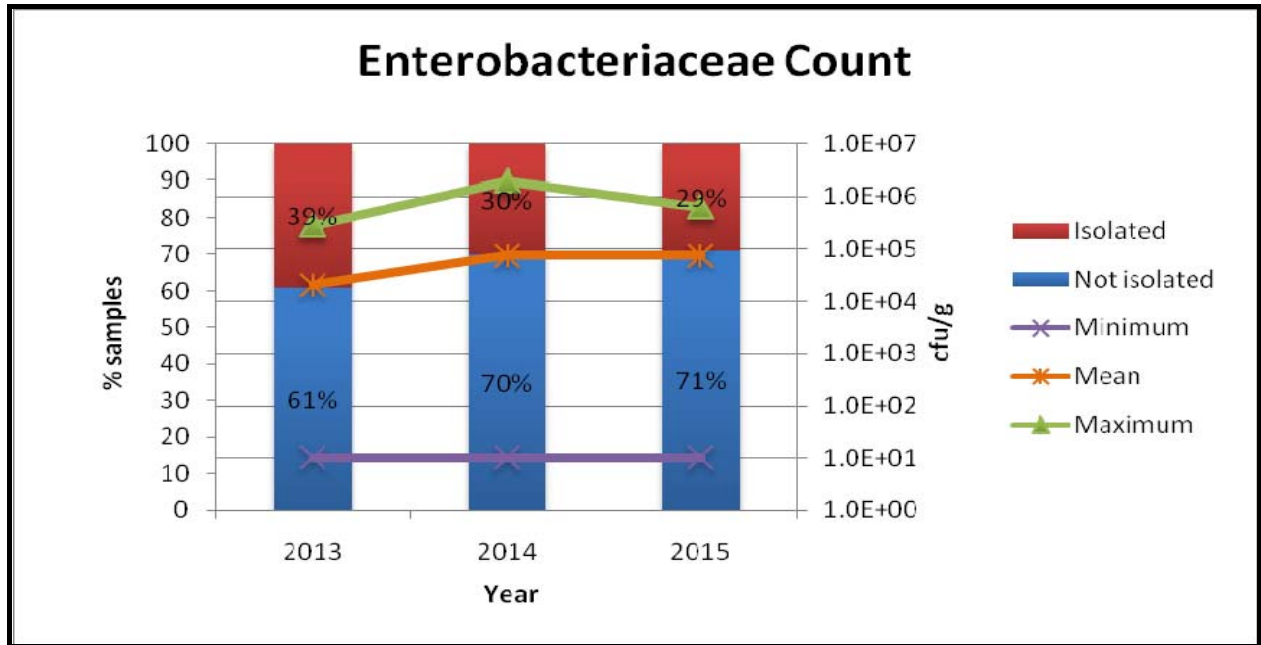
**Notes:**

1. Sample matrices tested were feed and raw materials.
2. No. of samples: 131, 100, 24 for 2013, 2014 and 2015 respectively.
3. Limit of determination (LOD) for this test offered by VFAD is 100 cfu/g.
4. This test is SAMM accredited.



**Notes:**

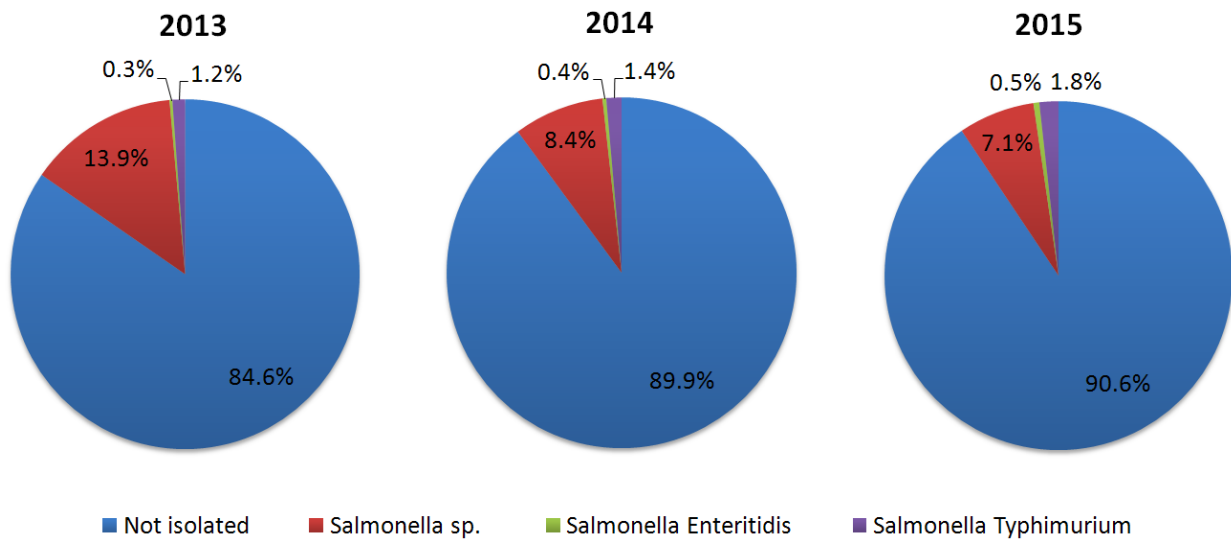
1. Sample matrices tested were feed and raw materials.
2. No. of samples: 139, 59, 14 for 2013, 2014 and 2015 respectively.
3. Limit of determination (LOD) for this test offered by VFAD is 100 cfu/g.
4. This test is SAMM accredited.



**Notes:**

1. Sample matrices tested were feed and raw materials.
2. No. of samples: 177, 302, 99 for 2013, 2014 and 2015 respectively.
3. Limit of determination (LOD) for this test offered by VFAD is 10 cfu/g.
4. This test is SMMM accredited.

### Salmonella



**Notes:**

1. Sample matrices tested were feed and raw materials.
2. No. of samples: 1112, 1424, 734 for 2013, 2014 and 2015 respectively.
3. This test is SMMM accredited.