

รายการทดสอบ อาหารประเภทเนื้อสัตว์และผลิตภัณฑ์ (Meat and meat products)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
เนื้อสัตว์และผลิตภัณฑ์ (Meat & meat product)	1. Tetracycline group	In-house method based on J. Chromatography A 2000; LC-MS	mg/kg	4
	2. Chlortetracycline		mg/kg	4
	3. Oxytetracycline		mg/kg	4
	4. Doxycycline		mg/kg	4
	5. Tetracycline		mg/kg	4
	6. Spinosad (Fat)	In-house method based on J. Agri Food Chem 2000; LC-MS	mg/kg	4
	7. Beta agonist - Clenbuterol - Ractopamine - Salbutamol	In-house method based on J. Chromatography; LC-MS/MS *	ug/kg (meat) ug/L (urine)	4
	8. Sodium Nitrite , Nitrite	In-house method based on Journal of AOAC International, Vol.83, No.2 2000; *	mg/kg	4
	9. Vitamin C (Ascorbic acid)	In-house method based on Compendium of Method for Food Analysis(2003), Vitamin C in Food; HPLC-UV	mg/100 g	4
	10. Arsenic (As)	Based on AOAC (2005), 986.15, Chapter 9, Hydride; ICP-OES *	mg/kg	5
	11. Tin (Sn)	Based on AOAC (2005), 985.10; ICP-OES *	mg/kg	5
	12. Iron (Fe)	Based on AOAC (2005), 999.10; IEC-OES	mg/kg	5

หมายเหตุ: * ได้รับรอง ISO/IEC 17025

รายการทดสอบ **อาหารประเภทเนื้อสัตว์ สัตว์น้ำ อาหารทะเลและผลิตภัณฑ์แปรรูป**
(Meat /Fisheries/ Seafood and their products)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
เนื้อสัตว์/สัตว์น้ำ /อาหารทะเลและ ผลิตภัณฑ์แปรรูป (Meat, fisheries seafood and their products)	1. Chloramphenicol	In-house method based on J. Chromatography B (2003), 791; LC-MS/MS *	ug/kg	4
	2. Nitrofurantol metabolites (Bound) - AHD (1-aminohydroxy)anthranilic acid - SEM (semicarbazide) - AOZ (3-amino-2-oxazolidinone) - AMOZ (3-amino-5-morpholinomethyl-2-oxazolidinone)	In-house method based on J. Chromatography B (1997), 691 ; LC-MS/MS *	ug/kg	4
	3. Nitrofurantol metabolites (Total residue)	In-house method based on J. Chromatography B (1997), 691; LC-MS/MS	ug/kg	4
	4. Carbohydrate (Calculation from Moisture, Ash, Crude Fat, Crude Protein)	Compendium of method for food analysis, DMSc and ACFS, Thailand, 1st edition, 2003 *	g/100g	3
	5. Energy (Calculation from Moisture, Ash, Crude Fat, Crude Protein)	Compendium of method for food analysis DMSc and ACFS, Thailand, 1st edition, 2003 *	kcal/100g	5
	6. Ash	AOAC (2005), 942.05 *	g/100g	3
	7. Moisture	AOAC (2005), 950.46 *	g/100g	3
	8. Crude Fat	In house method based on AOAC (2005), 920.39 *	g/100g	3
	9. Crude Protein	In house method based on ISO 5983-2: 2005 *	g/100g	3
	10. Cadmium (Cd)	Based on AOAC (2005), 999.10; ICP-OES *	mg/kg	5
	11. Copper (Cu)		mg/kg	5
	12. Lead (Pb)		mg/kg	5
	13. Zinc (Zn)		mg/kg	5
	14. Mercury (Hg)	Based on AOAC International Chapter 9 Methods 971.21, Hydride; ICP-OES *	mg/kg	5
	15. Calcium (Ca)	Based on AOAC (2005), 999.10; ICP-OES	mg/kg	5
	16. Sodium (Na)		mg/kg	5
อาหารทะเลและ ผลิตภัณฑ์สัตว์น้ำ (Seafood/Fisheries product)	17. Malachite Green and Leucomalachite Green	Analytical Chimica Acta 2005, 529; LC-MS/MS *	ug/kg	3

หมายเหตุ: * ใ้รับรอง ISO/IEC 17025

รายการทดสอบทางเคมี (Chemistry)

**BETAGRO**

รายการทดสอบ อาหารทั่วไป (Food)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)	
อาหาร (Food)	1.Acetic Acid	ISO 753/2:1981 Determination of Acetic acid Content; Titration	%	2	
	2.Acid Value (in Oil)	In-house method based on A.O.C.S Official method Cd 3a-63; Wet Chem	mg KOH/g	3	
	3.Brix	Refractometer	%	2	
	4.Chloride	In-house method based on ISO/WD 6495-2	g/100g	2	
	5. Carbohydrate (Calculation from Moisture, Ash, Crude Fat, Crude Protein)	Compendium of methods for Food Analysis (2003), Food Composition and Nutrition Labeling Chapter, p 2-9; Calculation *	g/100g	3	
	6.Energy (Calculation from Moisture, Ash, Crude Fat, Crude Protein)	Compendium of methods for Food Analysis (2003), Food Composition and Nutrition Labeling Chapter, p 2-18; Calculation *	kcal/100g	5	
	7.Ash	AOAC (2005), 942.05, 18th Edition; Furnance *	g/100g	3	
	8.Moisture	ISO 1442:1997 (E) Determination of moisture content; Hot air oven	g/100g	3	
		AOAC (2005), 950.46 *	g/100g	3	
	9.Crude fat	In-house method based on AOAC (2005), 920.39, 18th Edition; Fat extractor *	g/100g	3	
	10.Crude Fiber	In-house method based on AOAC (2005), 978.10, 18th Edition; Fibertec	g/100g	3	
	11.Crude Protein	In-house method based on ISO 5983-2:2005; Kjeldal *	g/100g	3	
	12.Dietary Fiber	AOAC (2005), 985.29, 18th Edition; Dietary Fibertec	g/100g	5	
	13.Total Fat	Application Sub Note FOSS, ASN 3166, ASN 3445; Wet Chem	g/100g	5	
	14.Cholesterol	In-house method based on Compendium of Methods for food Analysis Thailand, Edition 1,2003; GC-MS	mg/100 g	5	
	15.Fatty acid composition (4,7,10,13,16,19-Docosahexaenoic)	In-house method based on AOAC (2005), 996.06; GC-FID <i>More detail on Appendix I</i>	g/100g	5	
	16.Saturated Fat		g/100g	5	
	17.Unsaturated Fat - Monounsaturated Fat - Polyunsaturated Fat		g/100g	5	
	18.Trans Fat		g/100g	5	
	19.Omega 3		g/100g	5	
	20.Omega 6		g/100g	5	
	21.Omega 9		g/100g	5	
	22.DHA		g/100g	5	
	23.Free fatty acid (in Oil)		A.O.C.S. Official method Ca 5a-40; Wet Chem	%	3
	24.Iodine Value		In-house method based on AOAC Official method 993.20 Iodine value of Fats and Oils; Wet Chem	-	3
	25.Nitrogen (N)	In-house method based on ISO 5983-2:2005; Kjeldahl	g/100g	3	
26.Nitrite	In-house method based on AOAC 973.31; UV/Vis spectrophotometer	mg/kg	4		

หมายเหตุ:

* ใ้รับรอง ISO/IEC 17025

**BETAGRO**

รายการทดสอบ อาหารทั่วไป (Food)(ต่อ)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
อาหาร (Food)	27.pH	APHA (2005), pH meter	-	2
	28.Phosphate	In-house method based on AOAC (2005), 965.17, 18th Edition; UV/Vis spectrophotometer	g/100g	5
	29.Phosphorus (P2O5) Di-phosphorus penta oxide	In-house method based on AOAC (2005), 965.17, 18th Edition; UV/Vis spectrophotometer	-	5
	30.Peroxide Value	A.O.C.S. Official method Ca 8-53; Wet Chem	meq/kg	3
	31.Pesticide	GT Test Kit	-	2
	32.Pesticide-Organochlorine (in Animal Fat) - Aldrin - Dieldrin - Endrin - Heptachlor - Heptachlor epoxide - Total Chlordane - Total DDT - HCB - alpha-BHC - beta-BHC - gamma-BHC	In-house method based on LUKE ET AL.:J. ASSOC. OFF ANAL. CHEM. VOL.67 , NO.2 , 1984,Page 295-298; GC-ECD *	ug/kg	3
	33.Sodium Chloride (NaCl)	ISO 6495:1999 (E) Potentionmetic method; Autotitrator	g/100g	2
ผัก (Vegetable)	34.Carbamates Group - Aldicarb - Bediocab - Carbofuran - Carbaryl - Fenobucarb - Isoprocarb - Methomyl - Methiocarb - Metolcarb - Oxamyl - Propoxur	In-house method based on AOAC 2007; LC-MSD	mg/kg	5
Seasoning, Soft drink	35.Benzoic acid/ Sodium Benzoate	J. Chromatography A (2005) ; HPLC-UV *	mg/kg	4
	36.Sorbic acid/ Potassium Sorbate		mg/kg	4

หมายเหตุ: * ได้รับรอง ISO/IEC 17025

รายการทดสอบ ยาและเวชภัณฑ์สำหรับสัตว์ (Veterinary drugs & chemicals)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
ยาและเวชภัณฑ์ สำหรับสัตว์ (Veterinary drugs & chemicals)	1. Amoxicillin assay	In-house method based on USP 34; HPLC-UV	%w/w	3
	2. Chloramphenicol	In-house method based on J.Chromatography A:1997 ;HPLC-UV	mg/kg	4
	3. Doxycycline assay	In-house method based on USP 28; HPLC-UV	%w/w	3
	4. Lincomycin HCL	In-house method based on USP 34; HPLC-UV	%	3
	5. Nitrofurantoin parent drug - Furaltadone - Furazolidone - Nitrofurantoin - Nitrofurazone	In-house method based on J.Chromatography A:1997; HPLC-UV	mg/kg	4
	6. Tiamulin Fumarate (as Anhydrous)	In-house method based on USP 34; HPLC-UV	%	3
	7. Turbidity	APHA (2005), 2130 (B) Nephelometric; Turbid meter	-	5
	8. Vitamin C	USP 28, page 178-179; Titration	g/kg	3
	9. Water content	USP 32; Karl Fischer	%	4
	10. Loss on drying	USP 34, (731); Vacuum Oven	%	4
		British Pharmacopoeia 2004, page 1479-1481; Dry matter; Hor air oven	%	4
	11. Iodine	USP 28, page 1030; Titration	%	3
	12. Formalin	Antec Testing of Formaldehyde Fumigation Practice, Titration	%w/v	3
13. Sodium Chloride (NaCl)	USP 28, page 1780; Titration	%	3	
ซีรัมสุกร (Swine serum)	14. Sulfamethazine	In-house method based on J. Agri Food Chem : 2011; LC-MS/MS	ug/L	5

รายการทดสอบ อาหารสัตว์ (Feed)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
Feed (อาหารสัตว์)	1. Amoxicillin	In-house method based on Amoxicillin, USP 34; HPLC-UV *	mg/kg	3
	2. Chloramphenicol	In-house method based on J. Chromatography B (2003), 791; LC-MS/MS	ug/kg	4
	3. Colistin sulfate	In-house method based on Chromatographia (1998), 48; HPLC-UV	mg/kg	3
	4. Nitrofurantoin parent drug - Furaladone - Furazolidone - Nitrofurantoin - Nitrofurazone	Analytical Chimica Acta 2007 586 ;LC-MS/MS	ug/kg	3
	5. Melamine Group - Ammelide - Ammiline - Cyanuric acid - Melamine	USFDA, Vol.24, 2008; GC-MS	mg/kg	4
	6. pH	APHA (2005), pH meter	-	2
	7. Carbohydrate (Calculation from Moisture, Ash, Crude Fat, Crude Protein)	Compendium of methods for Food Analysis (2003), Food Composition and Nutrition Labeling Chapter, p 2-9; Calculation	g/100g	3
	8. Energy (Calculation from Moisture, Ash, Crude Fat, Crude Protein)	Compendium of methods for Food Analysis (2003), Food Composition and Nutrition Labeling Chapter, p 2-18; Calculation	kcal/100g	3
	9. Ash	AOAC (2005), 942.05, 18th Edition; Furnance *	g/100g	3
	10. Moisture	ISO 6496:1999; Hot air oven *	g/100g	3
	11. Crude Fat	In house method based on AOAC (2005), 920.39, 18 th Edition; Fat extractor *	g/100g	3
	12. Crude Fiber	In house method based on AOAC (2005), 978.10, 18th Edition; Fibertec *	g/100g	5
	13. Crude Protein	In-house method based on ISO 5983-2:2005; Kjeldahl *	%	3
	14. Protein by Nitrogen	AOAC (2005), 990.03, 18th Edition; Nitrogen combustion	%	3
	15. Phosphate	In-house method based on AOAC (2005), 965.17, 18th Edition; UV/Vis spectrophotometer	g/100g	5
	16. Phosphorus (P)	Based on AOAC (2000), 965.17; UV/Vis spectrophotometer *	g/100g	5
	17. Phosphorus (P2O5) Di-phosphorus penta oxide	In-house method based on AOAC (2005), 965.17, 18th Edition; UV/Vis spectrophotometer *	g/100g	5

หมายเหตุ: * ใ้รับรอง ISO/IEC 17025

รายการทดสอบ อาหารสัตว์ (Feed), (ต่อ)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
อาหารสัตว์(Feed)	1. Ammonia (NH ₃)	A. HLLIGER DR. 1998, 15th Edition; Kjeldahl	%	3
	2. Acid Detergent Fiber (ADF)	Inhouse method based on AOAC (2005), 973.18, 18 th Edition	g/100g	3
	3. Acid Detergent Lignin (ADL)		g/100g	3
	4. Calcium (Ca)	In-house method based on AOAC (2005), 927.02, 18th Edition; Titration *	g/100g	5
	5. Chloride (Cl)	In-house method based on ISO/WD 6495-2; Autotitrator	g/100g	2
	6. Ethoxyquin	J.AOAC OFF ANAL CHEM VOL.59, No.4, P.185-188,1982; Titration; Wet Chem	ppm	3
	7. Total Fat	Application Sub Note FOSS, ASN 3166, ASN 3445; Wet Chem	g/100g	5
	8. Free fatty acid (Oil)	A.O.C.S. Official method Ca 5a-40	%	3
	9. Insoluble	Modified By AOAC (2005), 942.05, 18th Edition; Wet Chem	%	5
	10. Nitrogen	In-house method based on ISO 5983-2:2005; Kjeldahl	g/100g	3
	11. Pepsin Digest	AOAC (2005), 971.09, 18th Edition; Kjeldahl & Fat extrator	%	8
	12. Peroxide Value	A.O.C.S. Official method Ca 8-53; Titration	-	3
	13. Sodium Chloride (NaCl)	ISO 6495:1999 (E) Potentionmic method; Autotitrator *	g/100g	3
	14. Total volatile base nitrogen (TVBN)	A. HLLIGER DR. 1998, 15th Edition; Kjeldahl	mg.N/100g.Sample	3
	15. Urease Activity	A.O.C.S. Official method 1998, Vol 5, BA 9-58; Wet Chem	%	3
	16. Arsenic (As)	Based on BS EN 14627 : 2005; ICP-OES	mg/kg	5
	17. Cadmium (Cd)	Based on BS EN 14084 : 2003; ICP-OES	mg/kg	5
	18. Chromium (Cr)		mg/kg	5
	19. Copper (Cu)		mg/kg	5
	20. Iron (Fe)		mg/kg	5
	21. Lead (Pb)		mg/kg	5
	22. Mercury (Hg)		mg/kg	5
	23. Manganese (Mn)	Based on BS EN 14084 : 2003; ICP-OES	mg/kg	5
	24. Nickel (Ni)		mg/kg	5
	25. Selenium (Se)	Based on BS EN 14627 : 2005; ICP-OES	mg/kg	5
	26. Zinc (Zn)	Based on BS EN 14084 : 2003; ICP-OES	mg/kg	5

หมายเหตุ: * ได้รับรอง ISO/IEC 17025

รายการทดสอบ วัตถุดิบและสารเสริมสำหรับสัตว์ (Raw material & animal supplement)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
วัตถุดิบอาหาร สัตว์ (Raw material)	1. Arsenic (As)	In-house method based on EPA 3052; ICP-OES	mg/kg	5
	2. Cadmium (Cd)	In-house method based on EPA 3052; UV/Vis spectrophotometer	mg/kg	5
	3. Chromium (Cr)	In-house method based on EPA 3052; ICP-OES	mg/kg	5
	4. Copper (Cu)	In-house method based on EPA 3052; ICP-OES	mg/kg	5
	5. Iron (Fe)		mg/kg	5
	6. Lead (Pb)		mg/kg	5
	7. Manganese (Mn)		mg/kg	5
	8. Mercury (Hg)		mg/kg	5
	9. Nickel (Ni)		mg/kg	5
	10. Zinc (Zn)		mg/kg	5
	11. Zinc Oxide	USP 28, page 2054; Titration	%	4
	12. Moisture	ISO 771: 1977; Hot air oven *	g/100g	3
		ISO 6496:1999; Hot air oven *	g/100g	3
	13. Phosphorus (P)	Based on AOAC (2000), 965.17; ICP-OES	%	5
	14. Sodium Chloride (NaCl)	USP 28, page 1780; Titration	%	3
	15. Vitamin C	USP 28, page 178-179; Titration	g/kg	3
16. Water content	USP 32; Karl Fischer	%	4	
สารผสมล่วงหน้า (Premix)	17. Copper (Cu)	AOAC (2000), 942.03; ICP-OES	g/kg	4
	18. Manganese (Mn)	Based on AOAC (2000), 917.04; ICP-OES	g/kg	4

หมายเหตุ: * ใต้รับรอง ISO/IEC 17025

รายการทดสอบ น้ำดี/น้ำเสีย/น้ำจากแหล่งน้ำธรรมชาติ (water, waste water, natural water)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
น้ำดี/น้ำเสีย/น้ำ จากแหล่งน้ำ ธรรมชาติ (water, waste water, natural water)	1. Acidity (pH 8.3)	APHA (1998), 2310 B Titration Method	mg/L as CaCO ₃	3
	2. Total Alkalinity	APHA (2005), 2320 (B) Titration Method	mg/L as CaCO ₃	3
	- Alkalinity -Hydroxide, Bicarbonate and Carbonate			
	- Alkalinity - Methyl Orange			
	- Alkalinity - Phenolphthalein			
	3. Ammonia	APHA (2005), 4500-NH ₃ (B and C) Preliminary Distillation Step, Titrimetric Method	mg/L	3
	4. BOD	APHA (2005), 5210 (B); 5-Day BOD Test **	mg/L	7
	5. COD	APHA (2005) 5220(C) Closed Reflux, Titrimetric Method **	mg/L	3
	6. Color	APHA (2005) 2120 (B) Visual Comparison Method	Color Unit	2
	7. Conductivity (25 °C)	Conductivity Meter	uS	3
	8. Chloride	APHA (2005), 4500-Cl-(B) Argentometric Method	mg Cl-/L	3
	9. Chromium Hexavalent	APHA (2005), 3500-Cr (B) Colorimetric Method; UV/Vis spectrophotometer***	mg Cr/L	3
	10. Chromium Trivalent	APHA (2005), 3500-Cr (B) Colorimetric Method; Calculation	mg Cr/L	3
	11. Dissolved Oxygen (DO)	APHA (2005), 4500-O (C) Azide Modification	mg/L	3
	12. Fixed Solids (FS)	APHA (2005), 2540E Fixed and Volatile Solids Ignited at 550 °C	mg/L	4
	13. Fixed Suspended Solids (FSS)		mg/L	4
	14. Fluoride	APHA (2005), 4500-F-(D) SPADNS Method	mg/L as F-	3
	15. Formaldehyde	Colorimetric Method**	mg/L	3
16. Residual Free Chlorine	APHA (2005), 4500-Cl (F) DPD Ferrous Titrimetric Method**	mg/L as Cl ₂	3	
	APHA (2005), 4500-Cl (B) Iodometric Method**	mg/L	3	
17. Hardness	APHA (2005), 2340(C) EDTA Titrimetric method	mg CaCO ₃ /L	3	
- Total Hardness	APHA (2005) 3500-Ca(B) EDTA Titrimetric Method	mg/L as CaCO ₃	3	
- Calcium Hardness				
- Carbonate and Non Carbonate Hardness				
- Magnesium Hardness				
18. Mixed Liquor Suspended Solids (103-105 °C)	APHA (2005), 2540 (D) Total Suspended Solids Dried at 103 - 105 °C	mg/L	3	

หมายเหตุ : ** ได้รับการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนจากกรมโรงงานอุตสาหกรรม เลขทะเบียน ๖-208
*** ได้รับการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนจากกรมโรงงานอุตสาหกรรม เลขทะเบียน ๖-234

รายการทดสอบ น้ำดี/น้ำเสีย/น้ำจากแหล่งน้ำธรรมชาติ (water, waste water, natural water),(ต่อ)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
น้ำดี/น้ำเสีย/ น้ำจากแหล่งน้ำ ธรรมชาติ (water, waste water, natural water)	19. Nitrate	APHA (2005), 4500-NO3- (E) Cadmium Reduction Method	mg NO3- N/L	3
	20. Nitrite	APHA (2005), 4500-NO2- B Colorimetric Method	mg/L	3
	21. Odour	มอก. 257 เล่ม 2-2521	-	3
	22. Oil and Grease	APHA (2005), 5520(B) Liquid-Liquid, Partition-Gravimetric Method **	mg/L	3
	23. pH	pH Meter **	-	2
	24. Phenol	APHA (2012), 5530(D) Direct Photometric Method**	mg/L	4
	25. Phosphate	APHA (2005) 4500-P(C) Vanadomolybdophosphoric acid colorimetric method	mg/L as P	4
	26. Salinity	คู่มือวิเคราะห์คุณภาพน้ำ ภาควิศวกรรมสิ่งแวดล้อม คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย พิมพ์ครั้งที่ 3	mg/kg	3
	27. Settleable Solids	APHA (2005), 2540 F : Settleable solids	mg/L	2
	28. Silica	APHA (1998), 4500-SiO2 (C), Molybdosilicate Method	mg/L as SiO2	3
	29. Sludge Volume 30	APHA (2005), 2540F : Settleable solids	ml/L	2
	30. Sludge Volume Index	APHA (1998), 2710 D	ml/g	3
	31. Soluble COD	APHA (2005), 5220 (C) Closed Reflux, Titrimetric Method	mg/L	3
	32. Soluble phosphorus	APHA (2005), 4500-P C : Vanadomolybdophosphoric Acid Colorimetric Method	mg/L	3
	33. Soluble Total Kjeldahl Nitrogen	APHA (2005), 4500-Norg (B) Macro-Kjeldahl Method and 4500-NH3 (C) Titrimetric Method	mg/L	3
	34. Sulfate	APHA (2005), 4500-SO4 (E) Turbidimetric Method	mg/L as SO4	3
	35. Sulfide	APHA (2012), 4500-S2 (F) Iodometric Method**	mg/L as S2-	3
	36. Sulfite	APHA (1998), 4500-SO32- (B) Iodometric Method	mg/L as SO3 2-	2
	37. Temperature (Field sampling)	APHA (2005), 2550(B) Laboratory and Field Method; Thermometer	°C	1
	38. Total Dissolve Solids	Conductivity Meter	mg/L	3
39. Total Dissolved Solids(103-105 °C)	คู่มือวิเคราะห์น้ำเสีย สมาคมวิศวกรรมศาสตร์แห่งประเทศไทย, 2547; Gravimetric Method **	mg/L	4	
40. Total Kjeldahl Nitrogen	APHA (2005), 4500-Norg (B) Macro-Kjeldahl Method and 4500-NH3 (C) Titrimetric Method**	mg/L	4	

หมายเหตุ : ** ได้รับการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนจากกรมโรงงานอุตสาหกรรม เลขทะเบียน ว-208

รายการทดสอบ น้ำดี/น้ำเสีย/น้ำจากแหล่งน้ำธรรมชาติ (water, waste water, natural water)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
น้ำดี/น้ำเสีย/ น้ำจากแหล่งน้ำ ธรรมชาติ (water, waste water, natural water)	41. Total phosphorus	APHA (2005), 4500-P (C) : Vanadomolybdophosphoric Acid Colorimetric Method	mg/L	3
	42. Total Solids (103-105 °C)	APHA (2005), 2540 B : Total Solids Dried at 103- 105 °C	mg/L	4
	43. Total Suspended Solids	APHA (2005), 2540(D) Total Suspended Solids Dried at 103 - 105 °C **	mg/L	4
	44. Turbidity	APHA (2005), 2130(B) Nephelometric method	NTU	4
	45. Volatile Solids (VS)	APHA (2005), 2540(E) Fixed and Volatile Solids Ignited at 550 °C	mg/L	4
	46. Volatile Suspended Solids (VSS)			
	47. Volatile and Fixed Solids (550 °C)			
	48. Aluminium (Al)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	49. Antimony (Sb)	Based on APHA (2005), 3030E; ICP-OES *	mg/L	5
	50. Arsenic (As)	Based on APHA (2005), 3030E; ICP-OES * Based on APHA (2005), 3120B; ICP-OES ***	mg/L	5
	51. Barium (Ba)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	52. Boron (B)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	53. Cadmium (Cd)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	54. Calcium (Ca)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	55. Chromium (Cr)	Based on APHA (2005), 3120B; ICP-OES *,***	mg/L	5
	56. Copper (Cu)	Based on APHA (2005), 3120B; ICP-OES *,***	mg/L	5
	57. Iron (Fe)	Based on APHA (2005), 3120B; ICP-OES *,***	mg/L	5
	58. Lead (Pb)	Based on APHA (2005), 3120B; ICP-OES *,***	mg/L	5
	59. Magnesium (Mg)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	60. Manganese (Mn)	Based on APHA (2005), 3120B; ICP-OES *,***	mg/L	5
	61. Mercury (Hg)	Based on APHA (2005), 3112B, Hydride; ICP-OES *	mg/L	5
	62. Nickel (Ni)	Based on APHA (2005), 3120B; ICP-OES***	mg/L	5
	63. Potassium (K)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	64. Selenium (Se)	Based on APHA (2005), 3030E; ICP-OES * Based on APHA (2005), 3120B; ICP-OES***	mg/L	5
	65. Silver (Ag)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	66. Sodium (Na)	Based on APHA (2005), 3120B; ICP-OES *	mg/L	5
	67. Zinc (Zn)	Based on APHA (2005), 3120B; ICP-OES *,***	mg/L	5

หมายเหตุ:

* ได้รับรอง ISO/IEC 17025,

** ได้รับการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอนกชนจากกรมโรงงานอุตสาหกรรม เลขทะเบียน ว-208

*** ได้รับการขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอนกชนจากกรมโรงงานอุตสาหกรรม เลขทะเบียน ว-234

**BETAGRO**

รายการทดสอบ ปุ๋ย (Fertilizer)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
ปุ๋ยอินทรีย์/ ปุ๋ยอินทรีย์เคมี (Organic and Organic Chemical Fertilizer)	1. Conductivity	In-house method based on Soluble Salt Analysis for and waters. Soil chemical analysis, M.L.Jackson, 1958.	dS/m	7
	2. C/N ratio	In house method based on Bibham, J.M. et.al. 1996. Methods of soil analysis. Soil Science Society of America, Inc. American Society of Agronomy, Inc. Madison, Wisconsin. 1320 pp.; Calculation (Titration)	%w/w	7
	3. Germination Index	Agricultural Standard.TAS 9503-2005.National Bureau of Agricultural Commodity and Food Standards Ministry of Agriculture and Cooperatives; Physical	%	7
	4. Total Nitrogen	In-house method based on AOAC Official Methods of Analysis ,19 th ed., 2012 , method 955.04.	%w/w	7
	5. Total Phosphate	In-house method based on AOAC Official Methods of Analysis ,19 th ed., 2012 , method 958.01.	%w/w	7
	6. pH	In-house method based on AOAC (2005) 18th Ed. 994.16 and 994.18; pH meter	-	7
	7. Organic Matter	In-house method based on AOAC (2005), 18 th Ed.967.05; Titration	%w/w	7
	8. Moisture	In-house method based on AOAC (2005) 18th Ed. 965.08; Hot Air Oven	%w/w	7
	9. Potassium (Total K ₂ O)	In-house method based on AOAC (2005) 18th Ed. 983.02; ICP-OES	%w/w	7
	10. Sodium (Na)	In-house method based on AOAC (2005) 18th Ed. 983.02; ICP-OES	%w/w	7
	11. Arsenic (As)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	12. Cadmium (Cd)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	13. Chromium (Cr)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	14. Copper (Cu)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	15. Lead (Pb)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	16. Zinc (Zn)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	17. Iron (Fe)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	18. Manganese (Mn)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
	19. Mercury (Hg)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	mg/kg	7
ตรวจสอบธาตุอาหารหลัก	20. Total Nitrogen (N)	In-house method based on AOAC (2005) 18th Ed. 955.04; Titration	%w/w	7
	Total Phosphate (P)	In-house method based on AOAC (2005) 18th Ed. 957.02 and 958.01; UV/Vis spectrophotometer		
	Potassium (K)	In-house method based on AOAC (2005) 18th Ed. 983.02; ICP-OES		

รายการทดสอบ ตัวอย่างปุ๋ย (Fertilizer)

ชนิดตัวอย่าง (Sample types)	รายการทดสอบ (Testing items)	วิธีทดสอบ (Reference methods)	หน่วยรายงานผล (Reporting unit)	ระยะเวลา (Hold days)
ปุ๋ยเคมี (Chemical fertilizer)	1. Ammonia Nitrogen	The National Institute of Agro-environmental Science. 1987. Official Method of Analysis of Fertilizer. Foundation Norin Kosaikai, Tasukuba-shi, Ibaraki-ken.130pp; Titration	%w/w	5
	2. Boron (B)	In-house method based on AOAC (2005) 18th Ed. 982.01; UV/Vis spectrophotometer	%w/w	5
	3. Biuret	The National Institute of Agro-environmental Science. 1972. Official Method of Analysis of Fertilizer. Kogusuri Printing Co. Ltd. Irifune, Chuo-Ku, Tokyo. 96 pp.; Titration	%w/w	5
	4. Citrate Insoluble Phosphate	The National Institute of Agro-environmental Science. 1987. Official Method of Analysis of Fertilizer. Foundation Norin Kosaikai, Tasukuba-shi, Ibaraki-ken.130pp; UV/Vis spectrophotometer	%w/w	5
	5. Chloride (Cl ⁻)	In-house method based on APHA (1998) 20 th Ed. Part 4000; Inorganic Nonmetallic Constituents. United Book Press, Inc., Baltimore, Maryland.181	%w/w	5
	6. Molybdenum (Mo)	The National Institute of Agro-environmental Science. 1987. Official Method of Analysis of Fertilizer. Foundation Norin Kosaikai, Tsukuba-shi, Ibaraki-ken.130pp.; UV/Vis spectrophotometer	%w/w	5
	7. Nitrate nitrogen	The National Institute of Agro-environmental Science. 1987. Official Method of Analysis of Fertilizer. Foundation Norin Kosaikai, Tasukuba-shi, Ibaraki-ken.130pp; Titration	%w/w	5
	8. Total Nitrogen	In-house method based on AOAC (2005) 18th Ed. 955.04; Titration	%w/w	7
	9. Total Phosphate	In-house method based on AOAC (2005) 18th Ed. 957.02 and 958.01; UV/Vis spectrophotometer	%w/w	7
	8. Available phosphate	The National Institute of Agro-environmental Science. 1987. Official Method of Analysis of Fertilizer. Foundation Norin Kosaikai, Tsukuba-shi, Ibaraki-ken.130pp.; UV/Vis spectrophotometer	%w/w	7
	11. Water soluble Phosphate	In-house method based on AOAC (2005) 18th Ed. 957.02 and 958.01; UV/Vis spectrophotometer	%w/w	5
	12. Sodium (Na)	In-house method based on AOAC (2005) 18th Ed. 983.02; ICP-OES	%w/w	5
	13. Potassium (Water soluble K ₂ O)		%w/v	5
	14. Calcium (Ca)	In-house method based on AOAC (2005) 18th Ed. 999.10 and 990.08; ICP-OES	%w/w	5
	15. Copper (Cu)		%w/w	5
	16. Cobalt (Co)		%w/w	5
	17. Iron (Fe)		%w/w	5
	18. Magnesium (Mg)		%w/w	5
	19. Manganese (Mn)		%w/w	5
	20. Zinc (Zn)		%w/w	5

Appendix I

No	Fatty Acid Composition
1	Butyric Acid C4:0
2	Caproic Acid C6:0
3	Caprylic Acid C8:0
4	Capric Acid C10:0
5	Undecanoic Acid C11:0
6	Lauric Acid C12:0
7	Tridecanoic Acid C13:0
8	Myristic Acid C14:0
9	Myristoic Acid C14:1
10	Pentadecanoic Acid C15:0
11	cis-10-Pentadecenoic Acid C15:1
12	Palmitic Acid C16:0
13	Palmitoleic Acid C16:1
14	Heptadecanoic Acid C17:0
15	cis-10-Heptadecenoic Acid C17:1
16	Stearic Acid C18:0
17	Elaidic Acid C18:1n9t
18	Oleic Acid C18:1n9c
19	Linolelaidic Acid C18:2n6t
20	Linoleic Acid C18:2n6c
21	Arachidic Acid C20:0
22	V-Linolenic Acid C18:3n6
23	cis-11-Eicosenoic Acid C20:1
24	Linolenic Acid C18:3n3
25	Heneicosanoic Acid C21:0
26	cis-11,14-Eicosadienoic Acid C20:2
27	Behenic Acid C22:0
28	cis-8,11,14-Eicosatrienoic Acid C20:3n6
29	Erucic Acid C22:1n9
30	cis-11,14,17-Eicosatrienoic Acid C20:3n3
31	Arachidonic Acid C20:4n6
32	Tricosanoic Acid C23:0
33	cis-13,16 Docosadienoic Acid C22:2
34	Lignoceric Acid C24:0
35	cis-5,8,11,14,17-Eicosapentaenoic C20:5n3
36	Nervonic Acid C24:1
37	cis-4,7,10,13,16,19-Docosahexaenoic Acid C22:6n3

Omega-3	
1	Linolenic Acid C18:3n3
2	cis-5,8,11,14,17-Eicosapentaenoic C20:5n3
3	cis-11,14,17-Eicosatrienoic Acid C20:3n3
4	cis-4,7,10,13,16,19-Docosahexaenoic Acid C22:6n3

Omega-6	
1	Linoleic Acid C18:2n6c
2	V-Linolenic Acid C18:3n6
3	cis-11,14-Eicosadienoic Acid C20:2
4	cis-8,11,14-Eicosatrienoic Acid C20:3n6
5	Arachidonic Acid C20:4n6
6	cis-13,16 Docosadienoic Acid C22:2
7	Linolelaidic Acid C18:2n6t

Omega-9	
1	Oleic Acid C18:1n9c
2	cis-11-Eicosenoic Acid C20:1
3	Erucic Acid C22:1n9
4	Nervonic Acid C24:1
5	Elaidic Acid C18:1n9t

Saturated fatty acid	
1	Butyric Acid C4:0
2	Caproic Acid C6:0
3	Caprylic Acid C8:0
4	Capric Acid C10:0
5	Undecanoic Acid C11:0
6	Lauric Acid C12:0
7	Tridecanoic Acid C13:0
8	Myristic Acid C14:0
9	Pentadecanoic Acid C15:0
10	Palmitic Acid C16:0
11	Heptadecanoic Acid C17:0
12	Stearic Acid C18:0
13	Arachidic Acid C20:0
14	Heneicosanoic Acid C21:0
15	Behenic Acid C22:0
16	Tricosanoic Acid C23:0
17	Lignoceric Acid C24:0

Mono-unsaturated fatty acid	
1	Myristoic Acid C14:1
2	cis-10-Pentadecenoic Acid C15:1
3	Palmitoleic Acid C16:1
4	cis-10-Heptadecenoic Acid C17:1
5	Elaidic Acid C18:1n9t
6	Oleic Acid C18:1n9c
7	cis-11-Eicosenoic Acid C20:1
8	Erucic Acid C22:1n9
9	Nervonic Acid C24:1

Poly-unsaturated fatty acid	
1	Linolelaidic Acid C18:2n6t
2	Linoleic Acid C18:2n6c
3	V-Linolenic Acid C18:3n6
4	Linolenic Acid C18:3n3
5	cis-11,14-Eicosadienoic Acid C20:2
6	cis-8,11,14-Eicosatrienoic Acid C20:3n6
7	cis-11,14,17-Eicosatrienoic Acid C20:3n3
8	Arachidonic Acid C20:4n6
9	cis-13,16 Docosadienoic Acid C22:2
10	cis-5,8,11,14,17-Eicosapentaenoic C20:5n3
11	cis-4,7,10,13,16,19-Docosahexaenoic Acid C22:6n3

Trans Fat	
1	Elaidic Acid C18:1n9t
2	Linolelaidic Acid C18:2n6t

cis	
1	Oleic Acid C18:1n9c
2	Linoleic Acid C18:2n6c

DHA	
1	cis-4,7,10,13,16,19-Docosahexaenoic Acid C22:6n3