

Louisiana State University Ag Center
Louisiana Department of Agriculture and
Forestry

Agricultural Chemistry Laboratory

Reference Methods and Instruments

Unit Conversions

MATRIX	Feed / Pet food	Instrument Used
ANALYSIS	REFERENCE METHOD	
Protein	AOAC Method 976.06	Thermo Scientific Flash 2000 N/P Analyzer
Crude Fat (feed)	AOAC Methods 2003.05 and 2003.06	Foss Sox-tech 2050 Foss Sox-tech 8000
Total Fat (pet food)	Operator's Manual for ANKOM HCl Hydrolysis System AOCS Official Procedure Am 5-04	ANKOM HCl Hydrolysis System ANKOM XT15 Extractor
Crude Fiber	AOCS approved Ba6a-05	ANKOM 2000 Automated Fiber Analyzer
Acid Detergent Fiber	Acid Detergent Fiber (ADF Method 12) in Feeds - Filter Bag Technique (for A2000 and A2000I) by ANKOM	ANKOM 2000 Automated Fiber Analyzer
Ash	AOAC Method 942.05	Thermolyne F 6000
Mineral ICP Group 1 (B, Ca, Cu, Fe, Mg, Mn, P, K, Na, S, Zn)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Mineral ICP Group 2 (Al, Ba, Cd, Cr, Co, Pb, Mo, Ni, Se, As)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Aflatoxin	AOAC Method 994.08 "Modified"	Waters 2695 and 2475
Fumonisin	8830 - Veratox for Fumonisin	BioTek ELx808
Salt/ NaCl	AOAC Methods 935.47 and 941.18 USDA FSIS Analytical Chemistry Laboratory Guidebook: Food Chemistry. (To determine salt content in meat and poultry samples manually refer to the Volhard method SLT, Pages SLT-1 : SLT-8, May 1993)	Metrohm 907 Titrando
Chloride	AOAC Methods 935.47 and 941.18 USDA FSIS Analytical Chemistry Laboratory Guidebook: Food Chemistry. (To determine salt content in meat and poultry samples manually refer to the Volhard method SLT, Pages SLT-1 : SLT-8, May 1993)	Metrohm 907 Titrando
Mercury	EPA Method 7473	Milestone DMA-80
Nitrate (as NO ₃) in hay sample	EPA Method 351.2 (Colorimetric, semi-automated block digester, AAll)	Seal AutoAnalyzer 3
Moisture	AOAC Method 934.01	IsoTemp 180L Oven FA

MATRIX	Feed / Pet food	Instrument Used
ANALYSIS	REFERENCE METHOD	
Yttrium	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
MATRIX	Lime	Instrument Used
ANALYSIS	REFERENCE METHOD	
CCE	AOAC Method 955.01	Metrohm 907 Titrando
Sieve Size	ASTM Method C136/136M	Retsch AS 200 digit With No. 10, No. 60, and No. 100 Sieves
pH	Methods of Soil Analysis: Chapter 12 Soil pH and Lime Requirement	Orion Star A211 pH Benchtop Meter
Mercury	EPA Method 7473	Milestone DMA-80
Alternative Lime Registration Set	CCE, Moisture, Sieve, ICP 1+2, Total Salts, pH	See Methods
MATRIX	Miscellaneous	Instrument Used
ANALYSIS	REFERENCE METHOD	
Gentamicin	Micro Determination of Gentamicin in Serum by High-Performance Liquid Chromatography with Ultraviolet Detection. J of Chromatography, 182 (1980) 201-210	Waters 2695 and 2489
Total Soluble Salts (alternative limes)	Methods of Soil Analysis: Chapter 10 Soluble Salts "Modified" See Chloride	Metrohm 907 Titrando
MATRIX	Soil	Instrument Used
ANALYSIS	REFERENCE METHOD	
Nitrogen TKN	AOAC Method 976.06	Thermo Scientific Flash 2000 N/P Analyzer
Mineral ICP Group 1 (B, Ca, Cu, Fe, Mg, Mn, P, K, Na, S, Zn)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Mineral ICP Group 2 (Al, Ba, Cd, Cr, Co, Pb, Mo, Ni, Se, As)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Mercury	EPA Method 7473	Milestone DMA-80
pH	Methods of Soil Analysis: Chapter 12 Soil pH and Lime Requirement	Orion Star A211 pH Benchtop Meter
Total Solids	See Moisture	IsoTemp 60L oven FA

Nitrate (Nitrogen NO ₃ -N)	EPA Method 351.2 Total Nitrogen in Fertilizers by Technicon, Industrial Method No. 560-79A Methods of Soil Analysis, Part 2 Nitrogen-Inorganic EPA Method 353.2	Seal AutoAnalyzer 3
Nitrite (Nitrogen NO ₂ -N)	EPA Method 353.2	Seal AutoAnalyzer 3
Ammonia (Nitrogen NH ₃ -N)	EPA Method 351.2 Total Nitrogen in Fertilizers by Technicon, Industrial Method No. 560-79A Methods of Soil Analysis, Part 2 Nitrogen-Inorganic	Seal AutoAnalyzer 3
MATRIX	Fertilizer	Instrument Used
ANALYSIS	REFERENCE METHOD	
Chicken Litter	N, P, K in %	See Methods
Chicken Litter with Moisture	N, P, K in % + Moisture	See Methods
Nitrogen	AOAC Method 993.13	Thermo Scientific Flash 2000 N/P Analyzer
Phosphorus	AOAC Method 978.01	Seal AutoAnalyzer 3
Potassium	AOAC Method 971.01	Cole Parmer Model 2655-00 Flame Photometer
Moisture	AOAC Method 930.15	IsoTemp 180L Oven FA
Mineral ICP Group 1 (B, Ca, Cu, Fe, Mg, Mn, P, K, Na, S, Zn)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Mineral ICP Group 2 (Al, Ba, Cd, Cr, Co, Pb, Mo, Ni, Se, As)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Nitrate (as Nitrogen)	EPA Method 351.2 Total Nitrogen in Fertilizers by Technicon, Industrial Method No. 560-79A Methods of Soil Analysis, Part 2 Nitrogen-Inorganic	Seal AutoAnalyzer 3
Ammonia (as Nitrogen)	EPA Method 351.2 Total Nitrogen in Fertilizers by Technicon, Industrial Method No. 560-79A Methods of Soil Analysis, Part 2 Nitrogen-Inorganic	Seal AutoAnalyzer 3
MATRIX	Food	
ANALYSIS	REFERENCE METHOD	
Protein	AOAC Method 976.06	Thermo Scientific Flash 2000 N/P Analyzer

Crude Fat (feed)	AOAC Methods 2003.05 and 2003.06	Foss Sox-tech 2050 Foss Sox-tech 8000
Crude Fiber	AOCS approved Ba6a-05	ANKOM 2000 Automated Fiber Analyzer
Salt	AOAC Methods 935.47, 941.18 USDA FSIS Analytical Chemistry Laboratory Guidebook: Food Chemistry. (To determine salt content in meat and poultry samples manually refer to the Volhard method SLT, Pages SLT-1 : SLT-8, May 1993)	Metrohm 907 Titrand
Water activity	Operator's Manual Version 2.0 for AquaLab Series 3 AquaLab Series 3 Quick Start.	AquaLab Series 3
MATRIX	Water	Instrument Used
ANALYSIS	REFERENCE METHOD	
Nitrogen TKN	EPA Method 351.2 (Colorimetric, semi-automated block digester, AAll) AOAC Method 976.06	Seal AutoAnalyzer 3 Flash 2000 N/P Analyzer
Total Phosphorus (<ppm)	EPA method 365.2 and 365.3	Seal AutoAnalyzer 3
Dissolved Phosphorus	EPA method 365.2 and 365.3	Seal AutoAnalyzer 3
LAGOON WATER	N, P, K in ppm	See Methods
Mineral ICP Group 1 (B, Ca, Cu, Fe, Mg, Mn, P, K, Na, S, Zn)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Mineral ICP Group 2 (Al, Ba, Cd, Cr, Co, Pb, Mo, Ni, Se, As)	EPA Method 200.7 AOAC Method 985.01 EPA Method 3052	Perkin Elmer Optima 8300
Mercury	EPA Method 7473	DMA-80
Total Solids	EPA Method 160.3	IsoTemp 60L Oven FA
Suspended Solids	EPA Method 160.2 Standard Methods for the Examination of Water and Wastewater, 14th Ed., Page 92, Method 208B (1975)	IsoTemp 60L Oven FA
Dissolved Solids	EPA Method 160.1	IsoTemp 60L Oven FA
Volatile Solids	EPA Method 160.4	Thermolyne F 6000

Nitrate (Nitrogen NO ₃ -N)	EPA Method 351.2 Total Nitrogen in Fertilizers by Technicon, Industrial Method No. 560-79A Methods of Soil Analysis, Part 2 Nitrogen-Inorganic EPA Method 353.2 Technicon AutoAnalyzer II manual 1971.	Seal AutoAnalyzer 3
Nitrite (Nitrogen NO ₂ -N)	EPA Method 353.2 Technicon AutoAnalyzer II manual 1971.	Seal AutoAnalyzer 3
Ammonia (Nitrogen NH ₃ -N)	EPA Method 351.2 Total Nitrogen in Fertilizers by Technicon, Industrial Method No. 560-79A Methods of Soil Analysis, Part 2 Nitrogen-Inorganic	Seal AutoAnalyzer 3
Alkalinity	AOAC Method 973.43 EPA Method 310.1	Metrohm 907 Titrando
Turbidity	EPA Method 180.1	LaMotte 2020 Turbidimeter/ HACH TL2350
Conductivity	SM 2510B ASTM D1125 EPA Method 120.1	Thermo Scientific Orion 4-Star Benchtop pH/Conductivity Meters
Salinity	Redefinition of Salinity See Chloride	Metrohm 907 Titrando
pH	EPA Method 150.1 EPA Method 150.2	Thermo Scientific Orion 4-Star Benchtop pH/Conductivity Meters
MATRIX	Microbiology	Instrument Used
ANALYSIS	REFERENCE METHOD	
Listeria	MLG Methods 8.11 (8.10) and 8A.06	Hygiena BAX System Q7
E. Coli	MLG Methods 5.09 , 5A.04 & 5C.00 (5B.05)	Hygiena BAX System Q7
Salmonella	MLG Methods 4.10 and 4C.07	Biomerieux VIDAS
Vibrio	Hygiena KIT2010 FDA Bacteriological Analytical Manual Chapter 9	Hygiena BAX System Q7
Several analytical balances are used in the laboratory, if balance information is needed please call or email 225-342-5812 AgChemistryQA@agcenter.lsu.edu		

How to convert percent (%) to parts per million (ppm) to parts per billion (ppb)

Percent: $1/100 = 1\%$

Parts per million: $1/1000000 = 1\text{ppm}$

Parts per billion: $1/1000000000 = 1\text{ppb}$

$1\% = 10,000\text{ppm} = 10,000,000\text{ppb}$

Example:

$0.123\% = 1,230\text{ppm} = 1,230,000\text{ppb}$

Common units that can be associated with ppm and ppb

$1\text{mg/kg} = 1\text{ppm}$

$1\mu\text{g/g} = 1\text{ppm}$

$1\text{ng/mg} = 1\text{ppm}$

$1\text{mg/L} = 1\text{ppm}$

$1\mu\text{g/mL} = 1\text{ppm}$

$1\text{ng}/\mu\text{L} = 1\text{ppm}$

$1\mu\text{g/kg} = 1\text{ppb}$

$1\text{ng/g} = 1\text{ppb}$

$1\mu\text{g/L} = 1\text{ppb}$

$1\text{ng/mL} = 1\text{ppb}$