



ANNUAL REPORT

MONTANA DEPARTMENT OF LIVESTOCK

Montana Veterinary Diagnostic Laboratory

Mission Statement

To serve the State of Montana by providing high quality, accurate, financially accessible and timely veterinary diagnostic testing, results and consultation; to assist state animal health officials in the diagnosis, control, and prevention of animal disease; and to contribute to state and national efforts to protect both animal and public health.

FISCAL YEAR

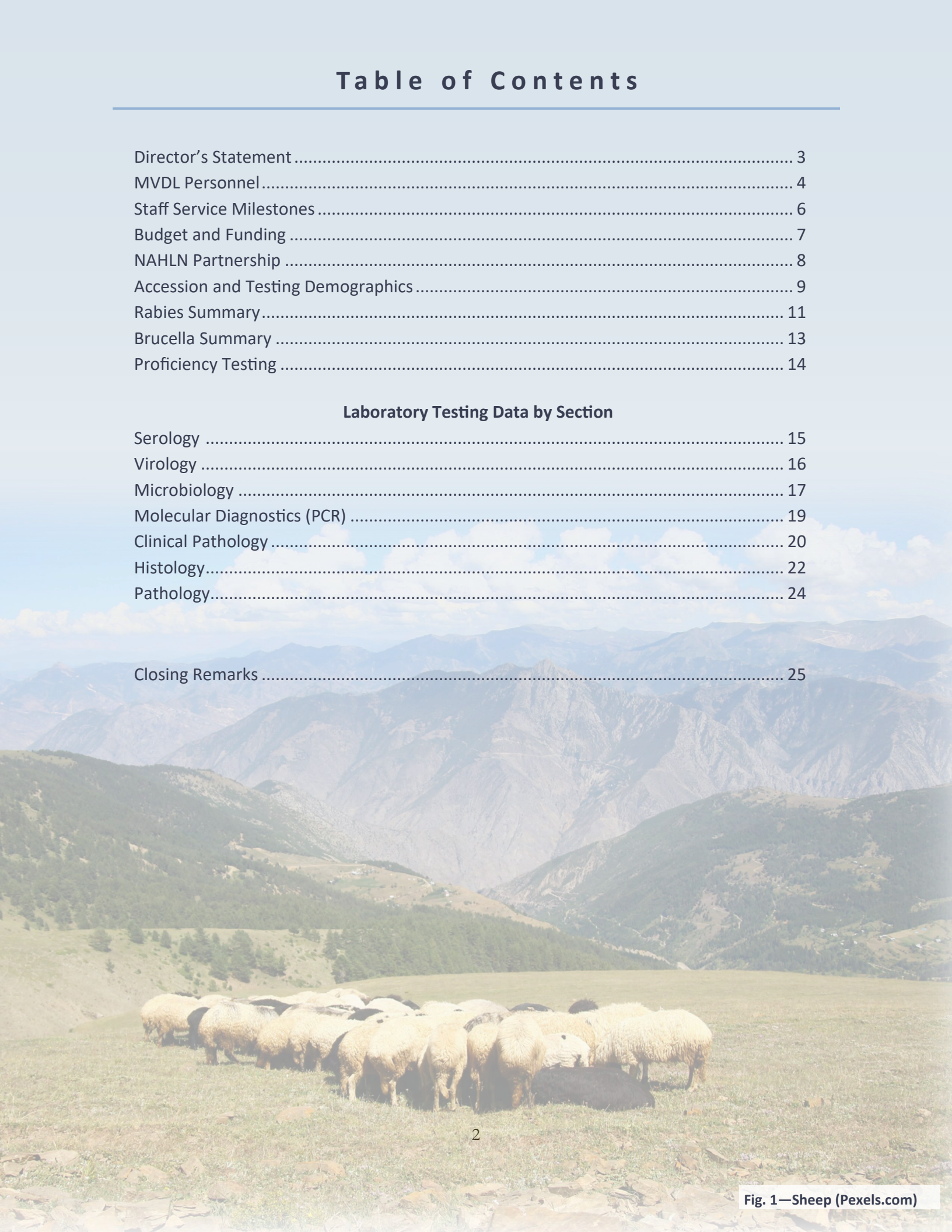
July 1, 2016 through June 30, 2017

Table of Contents

Director’s Statement	3
MVDL Personnel	4
Staff Service Milestones	6
Budget and Funding	7
NAHLN Partnership	8
Accession and Testing Demographics	9
Rabies Summary	11
Brucella Summary	13
Proficiency Testing	14

Laboratory Testing Data by Section

Serology	15
Virology	16
Microbiology	17
Molecular Diagnostics (PCR)	19
Clinical Pathology	20
Histology.....	22
Pathology.....	24
Closing Remarks	25



Director's Statement

The 2017 fiscal year was a time of significant change for the Montana Veterinary Diagnostic Laboratory. Multiple long-serving employees retired or stepped down from administrative duties, we continued to fine-tune the implementation of a much-needed new Laboratory Information Management System, and eight new staff members were hired. This is a particularly significant number when considered in light of our total staff of twenty-two.

During the last year we also successfully responded to a Legislative Performance Audit and maintained full laboratory accreditation with the American Association of Veterinary Laboratory Diagnosticians (AAVLD) as a result of a recent on-site accreditation review. Both of these milestones demonstrate the excellent team we have been able to build here, our outstanding Quality Management System, and our dedication to continued improvement to be the best provider of veterinary diagnostic services possible.

The Montana Milk Laboratory exists within the Veterinary Diagnostic Laboratory, but we are currently unable to export testing data from the software system being used, so no test data from the Milk Lab is included in this report.

It is my hope that this document provides useful information on the Veterinary Diagnostic Lab and the important work that is performed here.

Thank you for the opportunity to serve you and contribute to better disease diagnosis and surveillance in this great state!

Sincerely,



Steve Smith, DVM, DACVP
Acting Director and Veterinary Pathologist
Montana Veterinary Diagnostic Laboratory

DIAGNOSTIC LAB STAFF

Administration and Pathology

Steve Smith, DVM, DACVP

*Veterinary Pathologist;
Acting Director*

Bill Layton, DVM, DACVP

*Veterinary Pathologist;
Director*

Jeff Marshall, BVSc, PhD

Veterinary Pathologist



Fig. 2—Microscope (Pexels.com)

Administrative Support

Tess Moore

Quality Manager

Janet Malcott

Front Office Lead

Cathy Ortega

Front Office Assistant

Michelle McReynolds

Front Office Assistant

Lauren Larios

Pathology / Administrative Assistant

Microbiology

Jessica Rogers

Technician

Kaylee Krantz

Technician

Diana Florian-Ospina

Biological Laboratory Aide

Clinical Pathology

Cecilia Esparza

Clinical Laboratory Technologist

Katie Breen

Technician

DIAGNOSTIC LAB STAFF

Serology

Antonio Fuentes Sanchez
Technician; Section Lead

Virology

Sarah Horak
Technician; Section Lead

Bryan Tegner Jacobson
Technician

Histology

Tresa Goins, PhD
Technician; Section Lead

Dan Zou, PhD
Technician

Milk Laboratory

Julie Armstrong
Technician; Section Lead

Erin Burns
Technician

Molecular Diagnostics

Peggy Bunger
Technician; Section Lead

June Pounder, PhD
Technician



Fig. 3—BSC (MVDL)

STAFF SERVICE MILESTONES

25 Years of Service

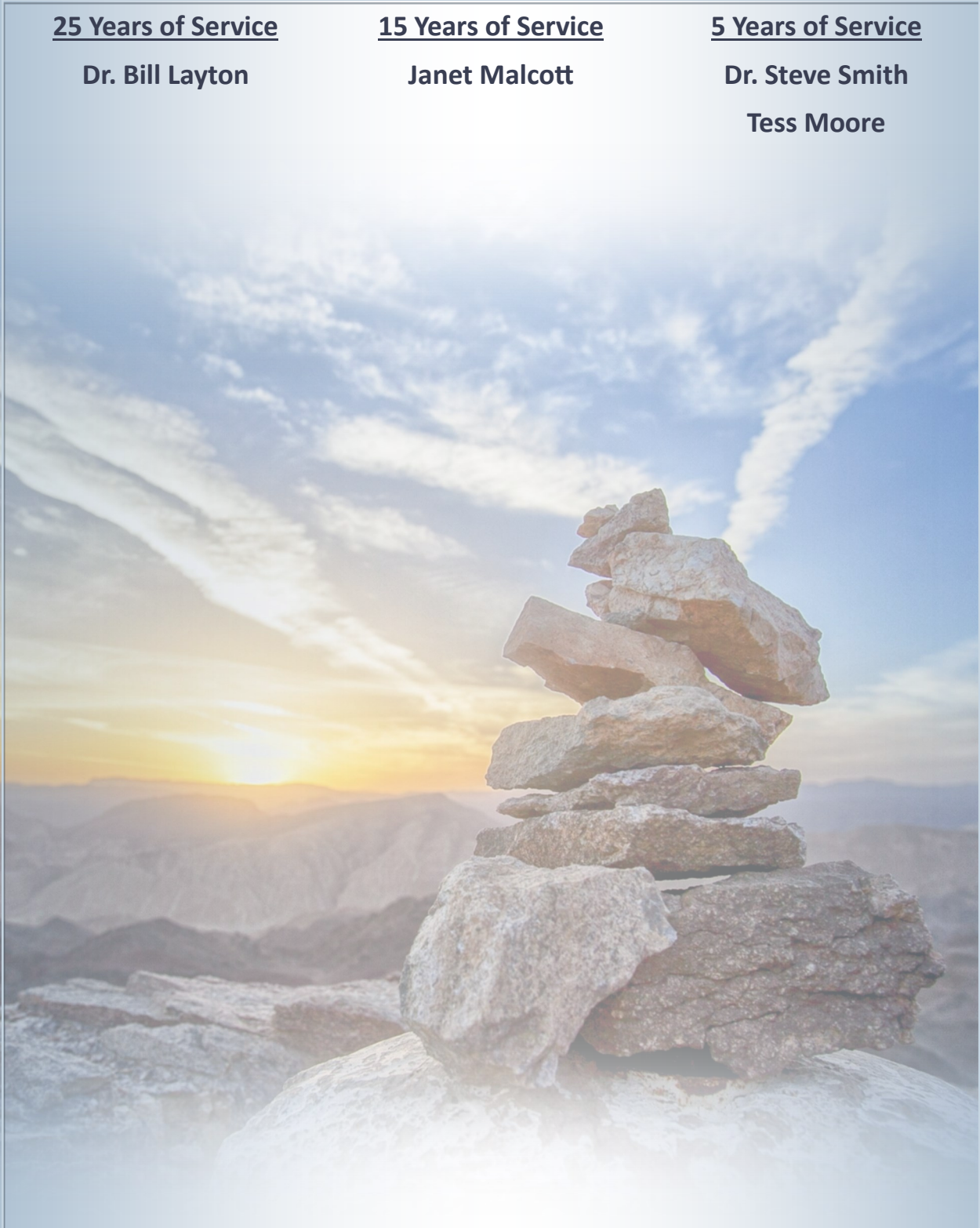
Dr. Bill Layton

15 Years of Service

Janet Malcott

5 Years of Service

**Dr. Steve Smith
Tess Moore**



BUDGET AND FUNDING

MVDL is funded by multiple sources. These include Fee Income from tests performed, Montana State General Funds, Montana State Special Revenue (livestock head tax), and Federal Grant funds.

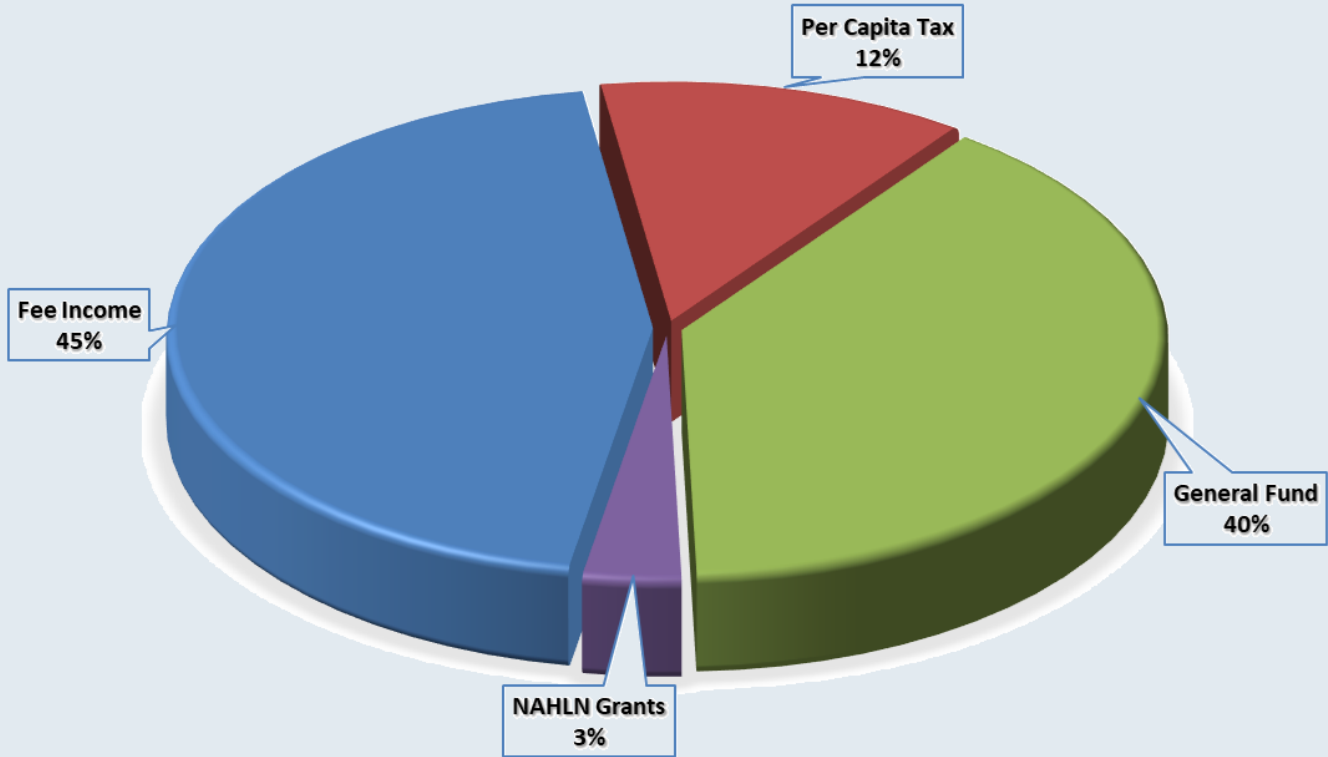


Fig. 5—Budget categories

2017 Fiscal Year	
Fee Income	\$1,037,000
General Fund	\$911,429
Per Capita Tax	\$287,288
NAHLN Grants	\$75,611

NAHLN

MVDL is a member of the National Animal Health Laboratory Network (NAHLN) and has the capacity to perform NAHLN testing for seven different high impact animal diseases.

These include:

- ◆ Foot and Mouth Disease
- ◆ Classical Swine Fever
- ◆ Vesicular Stomatitis
- ◆ Avian Influenza (IAV-A)
- ◆ Swine Influenza (IAV-S)
- ◆ Pseudorabies
- ◆ Newcastle Disease (Avian Paramyxovirus)

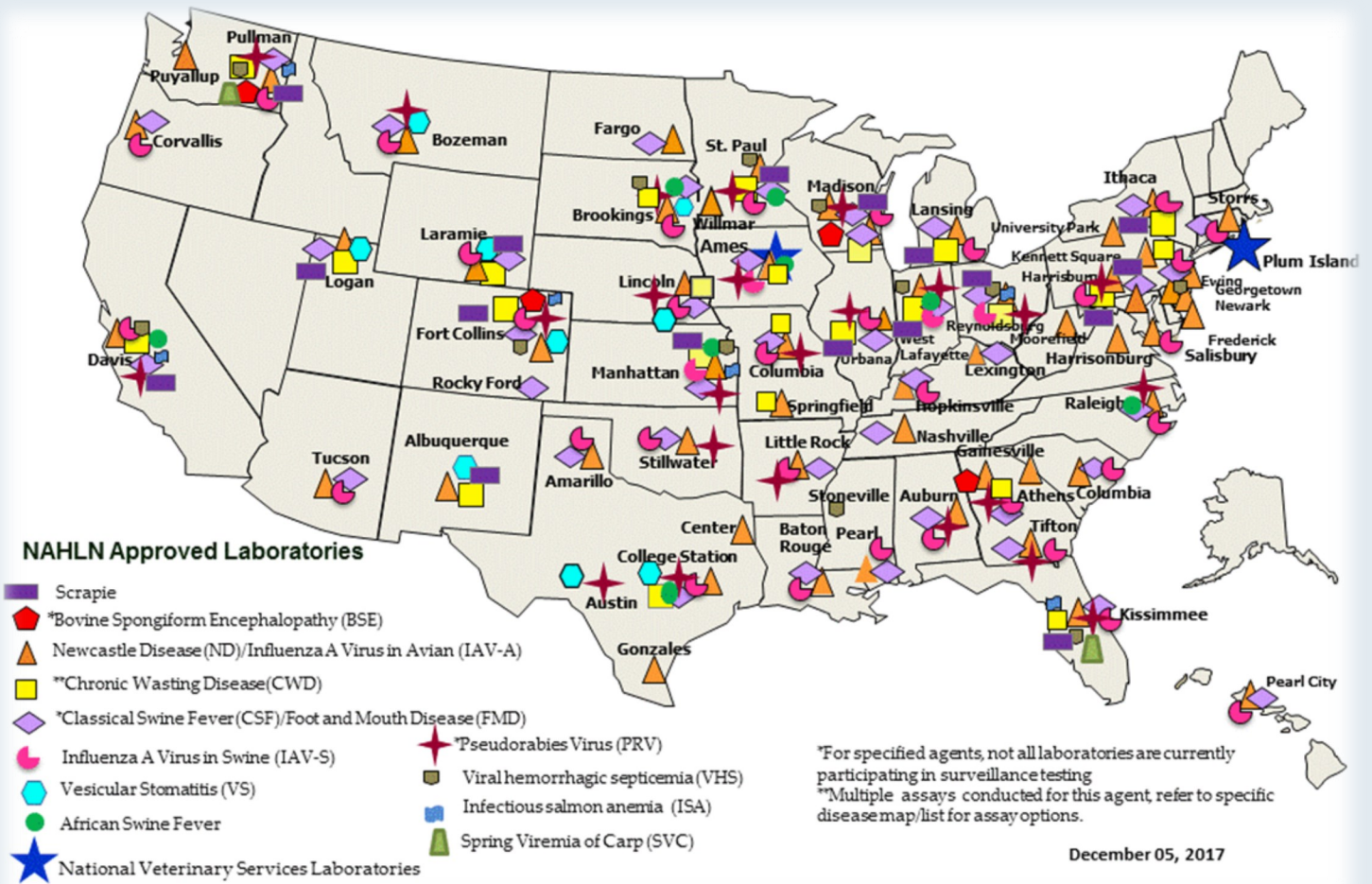


Fig. 6—NAHLN map (USDA)

ACCESSION AND TESTING DEMOGRAPHICS

An accession is a specimen or group of specimens from either a single animal or a herd, belonging to one owner, from a single submitter. Accessions are sometimes referred to as cases. Multiple individual tests may be performed on a single accession or specimen.

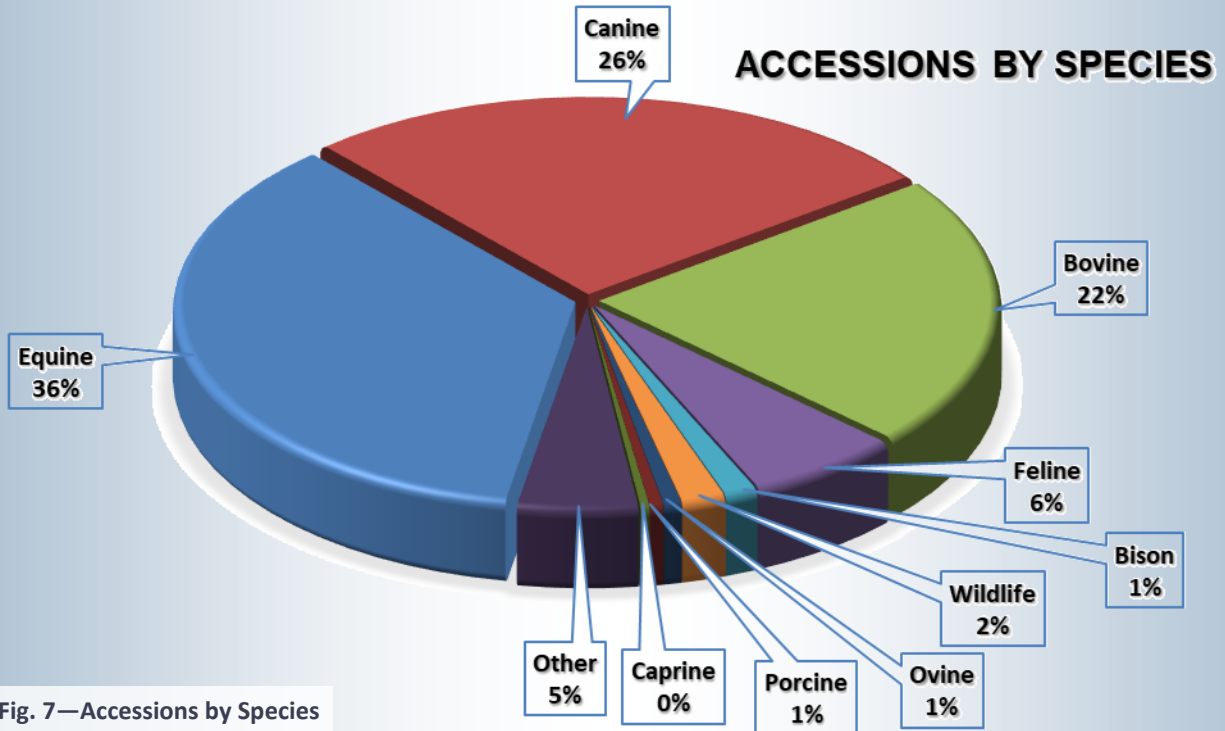


Fig. 7—Accessions by Species

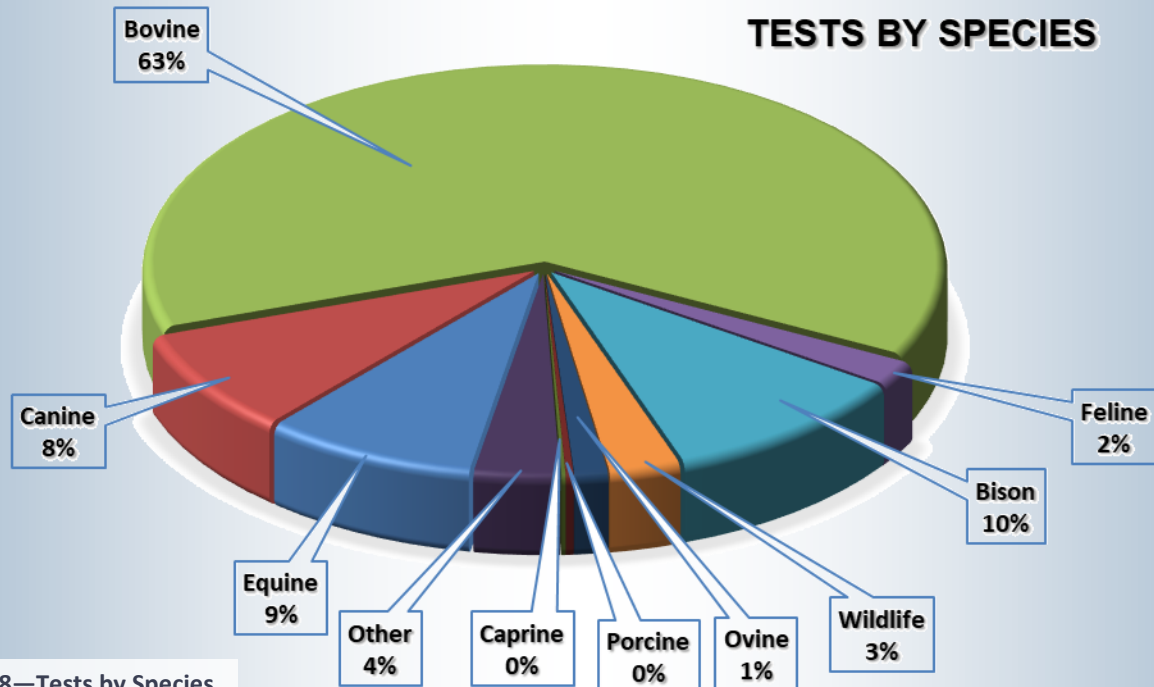


Fig. 8—Tests by Species

A C C E S S I O N A N D T E S T I N G D E M O G R A P H I C S

Total Accession and Test Data:

Species	Accessions	Tests
Bovine	4,843	119,052
Equine	7,812	16,321
Canine	5,806	15,807
Feline	1,372	3,690
Bison	287	19,083
Wildlife	387	5,432
Ovine	157	2,570
Porcine	119	588
Caprine	80	313
Other	1,060	6,534
Total	21,923	189,390

Total Referrals Sent to Other Laboratories: 1,285

Historical Accession and Testing Data:

With our recent change in Laboratory Information Management (LIM) Systems, we have changed our methodology for counting some individual tests, so historical test data is not yet relevant, though accession data can be compared to previous years. NOTE: Accession data for FY 2016 is based on an eleven-month period, due to our transition to the new LIMS.

	2017	2016	2015	2014	2013
Total Accessions	21,923	20,366	23,585	19,521	23,387

R A B I E S S U M M A R Y

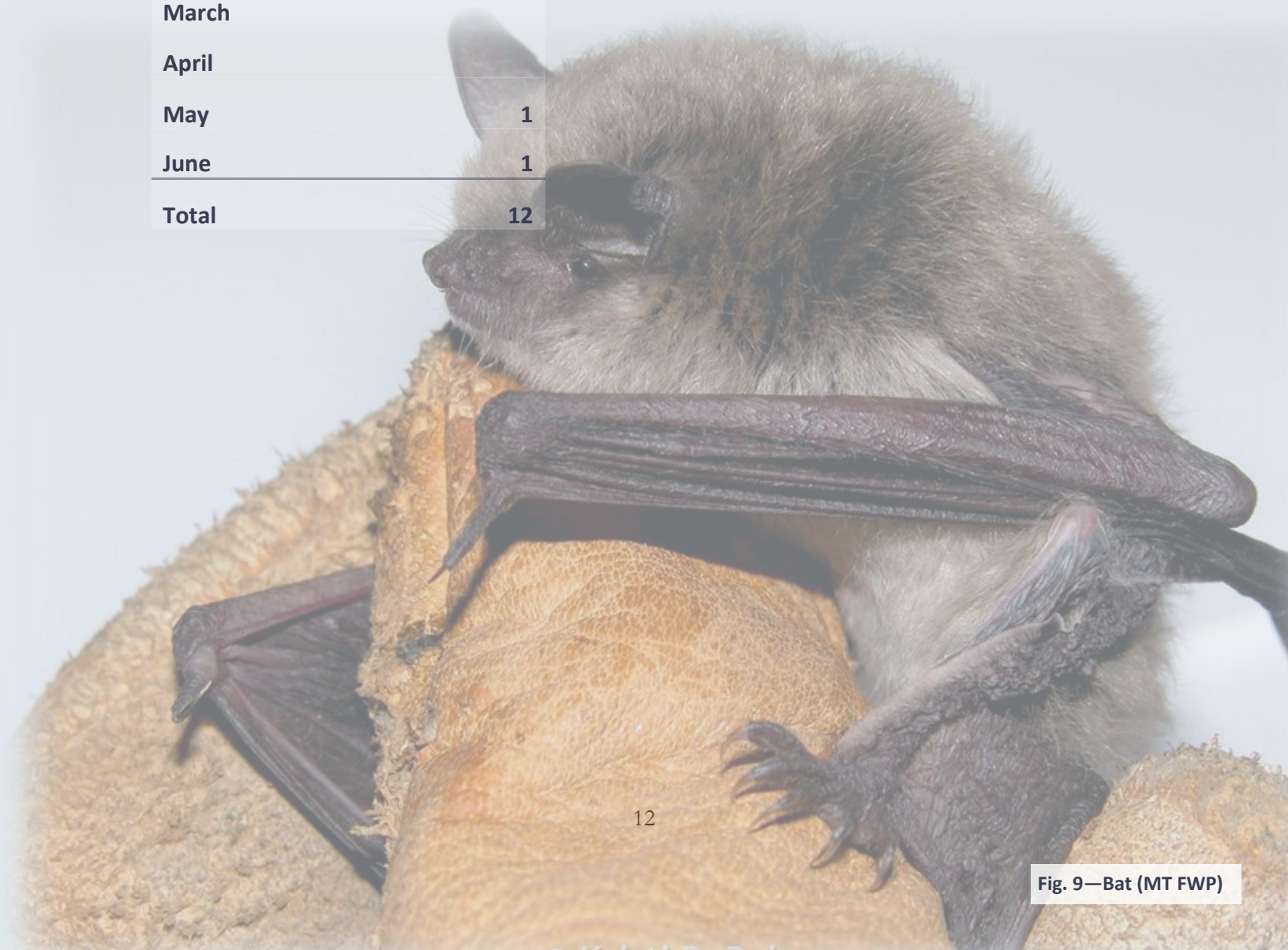
One very important public health function of the MVDL is rabies testing for the State of Montana.

Species	Positive	Negative	Unsuitable	Total
Bat	12	145	15	172
Moose		1		1
Black Bear		1		1
Ovine		2		2
Equine		9	1	10
Canine		126	1	127
Feline		97	2	99
Caprine		1		1
Coyote		1		1
Raccoon		22	1	23
Skunk		9	1	10
Bobcat		1		1
Mink		1		1
Muskrat		3		3
Bovine		16	2	18
Weasel		2		2
Chipmunk		1		1
Gopher		1		1
Mouse		1	1	2
Rat		1		1
Squirrel		3		3
Rabbit		1		1
Ferret		2		2
Peccary		1		1
Mountain Lion		3		3
Vole		1		1
Total	12	452	24	488

R A B I E S S U M M A R Y

During Fiscal Year 2017, all positive rabies tests were in bats, with the following distribution throughout the year (July 1, 2016 – June 30, 2017). The majority of rabies testing in bats and identification of positive samples occurs during warmer months, when bats are more active.

July	2
August	6
September	2
October	
November	
December	
January	
February	
March	
April	
May	1
June	1
Total	12



BRUCELLA SUMMARY

Several of our highest volume tests are for *Brucella abortus*, and these also serve our public health mission.

Tests by Month	RAP	BAPA	CF	FPA	Card
July	1,588	308	147	223	59
August	1,892	387	114	136	74
September	3,422	724	198	263	125
October	16,059	318	196	1,443	110
November	21,198	194	168	3,465	40
December	14,439	401	163	770	72
January	7,211	276	193	565	140
February	2,946	331	124	241	14
March	3,318	418	164	236	57
April	1,933	362	98	108	6
May	2,349	357	280	295	105
June	1,577	299	115	142	81



P R O F I C I E N C Y T E S T I N G

MVDL performs routine proficiency testing as a means of maintaining compliance with applicable regulations and as a means of assuring the integrity of its testing methods and personnel. The following table summarizes the proficiency tests completed in FY2018.

FY2017 MVDL Proficiency Testing Participation	Section
Anaplasmosis Serology	Clinical Serology
Avian Influenza AGID/ELISA	Clinical Serology
Avian Influenza Real Time RT-PCR	Molecular Diagnostics
Avian Parvovirus-1 Real Time RT-PCR	Molecular Diagnostics
B canis Serology	Clinical Serology
Bovine Leukosis Virus	Clinical Virology
Brucella ovis Serology	Clinical Serology
Brucellosis Serology	Clinical Serology
Chemistry Panel	Clinical Pathology
Classical Swine Fever Virus rRT PCR	Molecular Diagnostics
Endocrine Panel	Clinical Pathology
Equine Infectious Anemia Serology	Clinical Serology
Foot & Mouth Disease Virus rRT PCR	Molecular Diagnostics
Heartworm Serology	Clinical Microbiology
Hematology Panel	Clinical Pathology
Influenza A Virus (Swine) Real Time RT-PCR	Molecular Diagnostics
Inter-Laboratory Microbiology Quality Assurance Survey	Clinical Microbiology
Johnes Serology	Clinical Serology
Leptospira Microscopic Agglutination	Clinical Virology
Microbiology Quality Assurance	Clinical Microbiology
NVSL/NPIP Salmonella Group D Isolation	Molecular Diagnostics
NVSL/NPIP Salmonella Group D Isolation	Clinical Microbiology
Rabies DFA	Clinical Virology
Urinalysis Panel	Clinical Pathology
Vesicular Stomatitis Complement Fixation	Clinical Serology
Vesicular Stomatitis rRT-PCR	Molecular Diagnostics



Fig. 11—AAVLD logo (AAVLD)



Fig. 12—VLA logo (VLA)

T E S T D A T A — S E R O L O G Y

B. abortus RAP	78,678
B. abortus FPA	8,043
EIA AGID (total)	6,098
B. abortus BAPA	4,474
EIA ELISA (total)	1,278
Brucella abortus/suis - CF	1,840
M. avium paratuberculosis ELISA	1,823
Bluetongue ELISA	1,333
EHD AGID	1,324
Anaplasma cELISA	959
B. abortus Card	888
B. ovis ELISA	938
B. abortus SPT (1:50)	579
B. abortus STT (1:50)	361
CAE/OPP cELISA	385
B. canis RSAT	113
B. canis 2ME-RSAT	4
B. abortus Rivanol	12
Salmonella Pullorum	60
B. abortus STT (1:25)	51
Avian Influenza AGID	21
B. abortus SPT (1:25)	5
Bluetongue ELISA Retest	6
M. avium paratuberculosis ELISA Retest	3
Total	109,276

T E S T D A T A — V I R O L O G Y

Bovine Viral Diarrhea ELISA	1,846
Leptospira (5 Routine Serovars)	1,474
Bovine Leukemia Virus ELISA	1,010
Infectious Bovine Rhinotracheitis SN	807
Bovine Virus Diarrhea Type 1 SN	874
Bovine Virus Diarrhea Type 2 SN	874
Rabies - Small Animal	456
Bovine Respiratory Syncytial Virus SN	415
Pseudorabies ELISA	196
Parainfluenza-3 HI	442
FeLV/FIV Combo Rapid Immunoassay (SNAP)	155
Leptospira (7 Routine Serovars)	174
Bovine Leukemia Virus AGID	90
Feline Infectious Peritonitis ELISA	55
Vesicular Stomatitis (Ind)	25
Vesicular Stomatitis (NJ)	25
Bovine Viral Diarrhea - Virus Isolation	59
Large Animal Rabies	30
Canine Distemper Virus FA	12
West Nile Virus IgM ELISA	15
Leptospira FA	23
FeLV Rapid Immunoassay (SNAP)	3
Canine Parvovirus Rapid Immunoassay (SNAP)	10
Rabies Carcass Disposal	25
Bovine Respiratory Syncytial Virus FA	1
Feline Panleukopenia Virus FA	1
Leptospira Bratislava MAT	1
Leptospira Canicola MAT	1
Leptospira Pomona MAT	1
Bovine Rotavirus ELISA	53
Total	9,153

TEST DATA — MICROBIOLOGY

Campylobacter Culture	3,023
Aerobic Culture	2,027
Tritrichomonas foetus Culture	2,562
Fecal Flotation	741
Mycoplasma Culture	302
Gram Stain	430
Salmonella Culture	352
Salmonella Enteritidis Culture	304
Small Animal Enteric Sensitivity	233
Small Animal Staph Sensitivity	228
Brucella Culture	214
Cryptosporidia	150
Additional Isolate - Aerobic	207
Heartworm ELISA	114
Abortion panel	100
Giardia antigen ELISA	71
Small Animal Enterococcus Sensitivity	87
Small Animal Beta-Strep Sensitivity	99
Bovine Respiratory Disease Sensitivity	45
Equine Beta Strep Sensitivity	63
Dermatophyte/PAS	55
Small Animal Pseudomonas Sensitivity	35
Equine Enteric Sensitivity	28
Small Animal Pasteurella Sensitivity	19
Small Animal Alpha-Strep Sensitivity	18
Equine Staph Sensitivity	26
Mastitis Staph Sensitivity	14
Equine Enterococcus Sensitivity	8
Fungal, non-dermatophyte	15
Ecto-parasite Exam	19
Occult Blood Test	11
Anaerobic Culture	19
Small Animal Sensitivity	11
Bovine Enteric Sensitivity	14

TEST DATA — MICROBIOLOGY
(CONTINUED)

Bovine Staphylococcus Sensitivity	13
Bovine Salmonella Sensitivity	10
Endoparasite ID	8
Equine Pseudomonas Sensitivity	4
Equine Abortion Panel	3
Anthrax Lateral-Flow Test	3
Equine Alpha Strep Sensitivity	5
Liver Fluke Sedimentation	42
Heartworm Filtration	3
Bovine Enterococcus Sensitivity	2
Coccidia Smear	2
Equine Pasteurella Sensitivity	6
Mastitis Enteric Sensitivity	8
Trichinella - Pepsin Degradation	5
Bovine Alpha Strep Sensitivity	2
Acid Fast Exam	5
Small Animal Acinetobacter Sensitivity	3
Small Animal Salmonella Sensitivity	1
Additional Isolate - Anaerobic	2
Coliform Count	4
Electronic Somatic Cell Count	3
Mastitis Pasteurella Sensitivity	2
Total	11,780

TEST DATA — MOLECULAR DIAGNOSTICS (PCR)

Tritrichomonas foetus Individual PCR	3,006
Tritrichomonas foetus Pooled PCR	1,423
Salmonella Enteritidis PCR Screen	592
M. avium paratuberculosis PCR	251
Bovine Rotavirus/Coronavirus Multiplex PCR	178
BVD Pooled PCR	97
E. coli K99 PCR	35
BVD Individual PCR	86
Avian Influenza Matrix PCR	56
Avian Paramyxovirus (Matrix) PCR	7
Bovine Coronavirus PCR	9
IBR PCR	15
Swine Influenza PCR	3
Total	5,758



Fig. 14—Lab bench (MVDL)

TEST DATA — CLINICAL
PATHOLOGY

Small Animal CBC/Differential	1,520
Canine Small Animal Panel	1,297
Canine Clinical Profile	863
Urinalysis	461
Large Animal CBC/Differential	361
Large Animal Chemistry Panel	398
Canine Thyroid Panel	454
Total T4	371
Feline Small Animal Panel	374
Large Animal Profile	275
Urinalysis with Culture/Sensitivity	252
ACTH Stimulation	302
Dexamethasone Suppression	208
Total T4	375
Cortisol	158
Phenobarbital	199
Feline Small Animal Clinical Profile	167
Thyroid panel	157
Free T4	100
Bile Acid	75
Nitrate (Semi-quantitative)	73
Clin Path comment	74
Feline Infectious Anemia	109
Feline Profile	105
Small Animal Hepatic Panel	64
Small Animal Pre-Anesthetic Panel	56
Small Animal Pre-Anesthetic Profile	51
Fluid analysis	51
PLI	68
Canine Health Screen	67
Small Animal Renal Panel	23
TSH	32
Ck	14
AST	28
Prothrombin Time	28

TEST DATA — CLINICAL
PATHOLOGY
(CONTINUED)

Electrolytes	7
Feline Health Screen	12
Activated Partial Thromboplastin Time	27
Feline Geriatric Panel	17
Fibrinogen (Heat Precipitated)	5
Calcium	6
Coombs	15
Large Animal Health Screen	6
Albumin	7
Blood Count	13
ALP	14
Glucose	2
Magnesium	4
BUN	11
Reticulocytes	1
Total Bilirubin	3
Total T3	1
Creatinine	13
Amylase	15
Canine Endocrine Panel	4
Equine Fitness Profile	6
Gamma-glutamyl Transferase	7
Total Protein	3
ALT	15
Expanded Electrolytes Panel	10
Feline Anemia Panel	3
Globulin	1
Potassium	1
Cholesterol	2
Coagulation Panel	10
Creatine Kinase	11
Phosphorous	7
Sodium	1
TCO2	1
Total	9,471

T E S T D A T A — H I S T O L O G Y

Hematoxylin & Eosin	2,807
Slide Processing (number of slides)	240
Gram (Brown & Brenn)	126
CWD Tissue Processing	113
PAS	129
Phloxine B Eosin	56
Toluidine blue	79
Giemsa	47
Acid Fast (Ziehl Neelsen)	57
GMS	40
Warthin-Starry	47
Melanin Bleach	37
Decalcification	24
Slide Processing (hours)	16
CD-3 IHC	18
CD-79a IHC	19
Histology processing comment	10
Acid Fast (Fite's)	7
BVD IHC	7
Purl's Prussian blue	3
Canine Coronavirus IHC	4
Melan-A IHC	17
West Nile Virus IHC	0
IBR IHC	5
Cytokeratin IHC	11
Duplicate Hematoxylin & Eosin	4
Masson's Trichrome	14
MUM-1 IHC	8
Congo Red	5
MAC-387 IHC	9
CDV IHC	8
Factor VIII IHC	7
Gram (Brown & Hopps)	33
Mast Cell Tryptase IHC	1
Mucicarmine	2

TEST DATA — HISTOLOGY
(CONTINUED)

Alcian Blue pH 1.0	0
BCV IHC	6
BRSV IHC	2
e-Cadherin IHC	7
Fontana Masson	2
Lambda light chain IHC	2
Oil Red O	1
Rhodanine	1
Vimentin IHC	11
Von Kossa	2
Additional per slide	4
Alcian Blue PAS Hematoxylin	1
Brucella IHC	1
CD-117 IHC	1
CD-18 IHC	1
Desmin IHC	4
EHV IHC	1
Macchiavello	3
Steiner & Chapman	6
Total	4,066

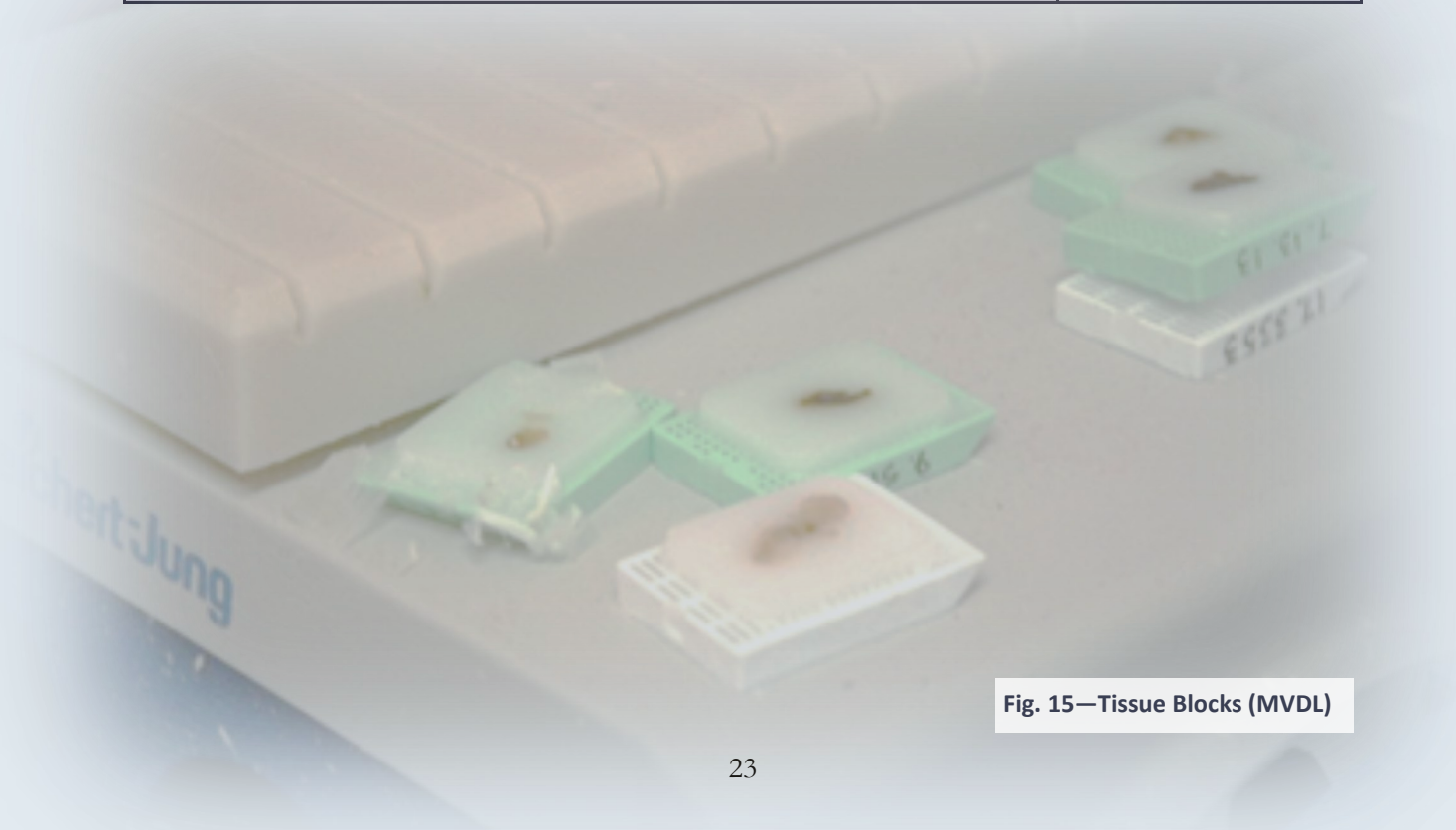


Fig. 15—Tissue Blocks (MVDL)

TEST DATA — PATHOLOGY

Carcass Disposal (lbs)	27,636
Case Summary	3,328
Histopathology 1-3 slides	2,469
Additional Information	438
Cytology	398
Histopathology 4-6 slides	165
Ruminant Diarrhea Panel (6-21d)	85
Necropsy Small Animal	47
Fetal Necropsy	49
Histopathology 7-10 slides	52
Necropsy Other Species	27
Ruminant Diarrhea Panel (1-5d)	26
Necropsy Large Animal >500#	16
Necropsy Large Animal <150#	14
Necropsy Large Animal <500#	10
Histopathology >10 slides	21
Diarrhea Panel (>31d)	7
Ruminant Diarrhea Panel (<30d)	17
Necropsy Small Ruminant >20#	7
Necropsy Small Ruminant <20#	4
Equine/Porcine Diarrhea Panel (1-5d)	2
Necropsy Swine <25#	3
Porcine Diarrhea Panel (6-30d)	1
Total	34,822


Closing Remarks

With all of the changes that have occurred recently, we have been fortunate to recruit a highly skilled and dedicated team here at the lab, and I believe that we are better poised to meet the diagnostic needs of the livestock producers and veterinarians of Montana than ever before.

There is certainly more change on the horizon, with the presence of Chronic Wasting Disease in Montana, the possibility for new tests and panels, the opportunity for new means of client communication, and the chance to welcome additional new staff members. We look forward to what the future has in store, and will strive to continue to provide the most accurate, timely, and cost-effective diagnostic results possible.

Thank you for granting us the opportunity to serve you!

Sincerely,



Steve Smith, DVM, DACVP
Acting Director and Veterinary Pathologist
Montana Veterinary Diagnostic Laboratory



Montana Veterinary Diagnostic Laboratory
1911 West Lincoln Street
Bozeman, MT 59718

Phone: 406-994-4885

FAX: 406-994-6344

<http://liv.mt.gov/Diagnostic-Lab>