

TABLE OF CONTENTS

List of Contributors xiii

Preface xv

Part I Non-Pregnant Mare 1

1 Reproductive Evaluation 3

Patrick M. McCue

2 Teasing 7

Patrick M. McCue

3 Tail Wrap and Preparation/Washing of the Perineum 11

John J. Dascanio

4 Placement of a Tail Rope 17

John J. Dascanio

5 Perineal Conformation Evaluation 21

John J. Dascanio

6 Removal of a Persistent Hymen 25

John J. Dascanio

7 Palpation of the Reproductive Tract 27

Patrick M. McCue

8 Ultrasound Evaluation 31

Patrick M. McCue

9 Prediction of Ovulation 37

Patrick M. McCue

10 Speculum Examination of the Vagina 41

John J. Dascanio

11 Digital Examination of the Vagina/Cervix 45

Sofie Sitters

12 Uterine Culture Collection: Swab/Brush 49

John J. Dascanio

13 Antimicrobial Sensitivity Testing 53

Jillian Bishop and Patrick M. McCue

- 14 Microbiology: Microbial Culture 5
Patrick M. McCue and Jillian Bishop
- 15 Microbiology: Gram Stain 59
Jillian Bishop and Patrick M. McCue
- 16 qPCR Assay for the Diagnosis of Infectious Endometritis 61
Ryan A. Ferris and Patrick M. McCue
- 17 Uterine Cytology Collection: Swab/Brush 67
John J. Dascanio and Ryan A. Ferris
- 18 Uterine Culture/Cytology: Low Volume Lavage 73
John J. Dascanio
- 19 Endometrial Biopsy 77
Patrick M. McCue
- 20 Hysteroscopic Examination of the Uterus 81
Patrick M. McCue
- 21 Endometrial Cyst Removal 85
John J. Dascanio
- 22 Chromosomal Analysis 89
Terje Raudsepp
- 23 Endocrinological Examination 97
Patrick M. McCue
- 24 Laparoscopic Examination of the Female Reproductive Track with Ovarian Biopsy 99
Dean A. Hendrickson
- 25 Evaluation of the Mammary Gland 103
Patrick M. McCue
- 26 Antisperm Antibody Testing 107
Patrick M. McCue
- 27 Starch Granule Test for the Evaluation of Oviductal Patency 109
Sofie Sitters and John J. Dascanio
- 28 Fluorescent Microspheres Test for Evaluation of Oviductal Patency 111
Sofie Sitters and John J. Dascanio

- 29 Oviductal Flush Procedure for the Evaluation of Oviductal Patency 113
Sofie Sitters and Patrick M. McCue
- 30 Prostaglandin E2 Treatment for Blocked Oviducts 117
Patrick M. McCue, Sofie Sitters and Charles F. Scoggin
- 31 Prostaglandin E1 Treatment for Blocked Oviducts 119
Patrick M. McCue and Charles F. Scoggin
- 32 Hysteroscopic Hydrotubation of the Oviducts 121
Charles F. Scoggin
- 33 Transvaginal Ovarian Biopsy 123
Claire E. Card
- 34 Uterine Lavage 127
John J. Dascanio
- 35 Uterine Infusion 131
John J. Dascanio
- 36 Therapeutics for Infectious Endometritis 133
Ryan A. Ferris
- 37 Bacterial Biofilm and Endometritis 137
Ryan A. Ferris
- 38 Latent Uterine Bacterial Infections 141
Morten Rønn Petersen and Anders Miki Bojesen
- 39 Acupuncture in Mare Reproduction 143
Kristina Lu and Lauren Javernick
- 40 Restraint for Breeding 149
John J. Dascanio
- 41 Natural Service: Pasture Breeding 151
Patrick M. McCue
- 42 Natural Service: In-hand Breeding 153
Charles F. Scoggin
- 43 Breeding Stitches 157
Charles F. Scoggin
- 44 Reinforcement Breeding 159
Charles F. Scoggin

- 45 Breeding with Fresh or Cooled Semen 161
John J. Dascanio and Patrick M. McCue
- 46 Insemination Through a Vaginal Speculum 165
Patrick M. McCue
- 47 Breeding with Frozen Semen 167
John J. Dascanio
- 48 Deep Horn Insemination 171
John J. Dascanio
- 49 Hysteroscopic (Low Dose) Insemination 173
Patrick M. McCue
- 50 Transvaginal Oocyte Pickup 177
Jennifer N. Hatzel
- 51 Packaging and transport of oocytes 183
Jennifer N. Hatzel
- 52 Intracytoplasmic Sperm Injection 187
Jennifer N. Hatzel and JoAnne Stokes
- 53 Caslick Operation or Vulvoplasty 191
John J. Dascanio
- 54 Contagious Equine Metritis Testing 195
John J. Dascanio
- 55 Management of Seasonal Anestrus: Artificial Photoperiod 199
Patrick M. McCue
- 56 Management of Seasonal Anestrus: Hormone Therapy 201
Patrick M. McCue
- 57 Hormone Therapy in Cycling Mares 205
Patrick M. McCue
- 58 Estrus Suppression 211
Patrick M. McCue
- 59 Intrauterine Devices for Estrus Suppression 215
Carlos M. Gradil
- 60 Immunocontraception 221
Patrick M. McCue

61 Harvesting and Shipping Ovaries for Oocyte Recovery 223
Patrick M. McCue

Part II Pregnant Mare 225

62 Embryo Collection 227
Patrick M. McCue

63 Embryo Evaluation 231
Patrick M. McCue

64 Embryo Biopsy 235
Patrick M. McCue

65 Embryo Packaging for Cooled Transport 237
Patrick M. McCue

66 Embryo Cryopreservation 241
Patrick M. McCue

67 Non-Surgical Embryo Transfer 245
Patrick M. McCue

68 Autogenous Transfer of ICSI-Derived Embryos 249
Jennifer N. Hatzel

69 Palpation per Rectum of the Pregnant Reproductive Tract 253
Sofie Sitters

70 Ultrasound Examination of the Pregnant Reproductive Tract 257
Patrick M. McCue

71 Speculum Examination of the Pregnant Mare 263
Sofie Sitters

72 Determination of Fetal Sex at 55–200 days 265
Richard D. Holder

73 Assessment of Late-Term Fetal Well-being 273
John J. Dascanio

74 Combined Thickness of the Uterus and Placenta 277
Patrick M. McCue

75 Placentitis: Diagnosis and Treatment 281
Justin W. McNaughten and Margo L. Macpherson

- 76 Doppler Ultrasonography 287
John J. Dascanio
- 77 Prediction of Fetal Age 291
John J. Dascanio
- 78 Twin Reduction: Manual Technique 295
John J. Dascanio
- 79 Twin Reduction: Transvaginal Aspiration 299
John J. Dascanio
- 80 Twin Reduction: Cranio-Cervical Dislocation 303
Karen Wolfsdorf
- 81 Twin Reduction: Thoracic Compression 307
Patrick M. McCue
- 82 Twin Reduction: Transabdominal Fetal Cardiac Puncture 309
John J. Dascanio
- 83 Elective Termination of Pregnancy 313
John J. Dascanio
- 84 Abortion Diagnostic Evaluation: Sample Collection in the Field and Submission 317
Julie T. Cecere and John J. Dascanio
- 85 Endocrine Evaluation of Pregnancy 319
Patrick M. McCue
- 86 Treatment of Vaginal Varicosities 323
John J. Dascanio
- 87 Manual Correction of Uterine Torsion 327
John J. Dascanio
- 88 Preparation for Foaling 331
John J. Dascanio
- 89 Assessment of Mammary Gland Secretions to Predict Foaling 335
John J. Dascanio
- 90 Assessment of pH of Mammary Gland Secretions to Predict Foaling 339
Patrick M. McCue

91 Monitoring of Peri-Parturient Mares Using Video and Web Cameras 343

Ryan A. Ferris

92 Foaling Alert: Vulvar Device 345

John J. Dascanio

93 Positional Labor Alert Devices 347

Ryan A. Ferris

94 Induction of Parturition 351

John J. Dascanio

95 Normal Foaling 355

John J. Dascanio

96 Premature Separation of the Placenta 361

Patrick M. McCue

97 Dystocia Management 365

Patrick M. McCue and Sofie Sitters

98 Dystocia Correction 369

John J. Dascanio

99 Fetotomy 375

John J. Dascanio

100 Epidural 381

John J. Dascanio

101 Induction of Lactation to Create a Nurse Mare 383

Pouya Dini and Peter F. Daels

102 Screening to Prevent Neonatal Isoerythrolysis 385

Patrick M. McCue

Part III Postpartum Mare 387

103 Evaluation of Colostrum Specific Gravity 389

Patrick M. McCue

104 Evaluation of Colostrum Quality: Brix Refractometry 393

Patrick M. McCue

105 Colostrum Banking 395

Patrick M. McCue

106 Obtaining Milk from the Mare 399

John J. Dascanio

107 Placental Evaluation 401

Patrick M. McCue

108 Removal of Retained Placenta 407

John J. Dascanio

109 Abdominocentesis 413

John J. Dascanio

110 Uterine Prolapse Treatment 415

John J. Dascanio

111 Buhner Needle Placement of a Perivulvar Suture 419

John J. Dascanio

Part IV Stallion 423

112 Breeding Soundness Evaluation 425

Patrick M. McCue

113 Training the Stallion to Use a Phantom 429

John J. Dascanio

114 Missouri Artificial Vagina 433

John J. Dascanio and Lynda M. J. Miller

115 Colorado Model Artificial Vagina 437

Patrick M. McCue

116 Roanoke Artificial Vagina 441

John J. Dascanio

117 Hannover Artificial Vagina 445

Sofie Sitters

118 Teaser Stallions 447

Charles F. Scoggin

119 Standing Semen Collection 449

John J. Dascanio

120 Collection of Semen Using an Open-Ended Artificial Vagina 453

Patrick M. McCue

- 121 Chemical Ejaculation 455
Patrick M. McCue
- 122 Preparation of a Jump Mare or a Mare for Natural Cover 457
John J. Dascanio
- 123 Washing the Penis 459
John J. Dascanio
- 124 Evaluation of Sexual Behavior 463
John J. Dascanio and Sue M. McDonnell
- 125 Enhancement of Sexual Interest and Response 467
Sue M. McDonnell
- 126 Management of Ejaculation Difficulty 471
Sue M. McDonnell
- 127 Calibrated Spectrophotometer Evaluation of Sperm Concentration
475
John J. Dascanio
- 128 Hemocytometer Evaluation of Sperm Concentration 479
John J. Dascanio
- 129 NucleoCounter® Evaluation of Sperm Concentration and Viability 483
Patrick M. McCue
- 130 Visual Evaluation of Sperm Motility 489
Patrick M. McCue
- 131 Computer-Assisted Sperm Analysis 491
John J. Dascanio and Lynda M. J. Miller
- 132 Eosin-Nigrosin Staining in the Evaluation of Sperm 495
Julie T. Cecere
- 133 Evaluation of Sperm Morphology 499
Leonardo Brito
- 134 Determination of Daily Sperm Output 505
Patrick M. McCue
- 135 Measurement of Testicular Size and Estimation of Daily Sperm
Output 507
Patrick M. McCue

- 136 Wet Mount Evaluation of Sperm 511
John J. Dascanio
- 137 Diff-Quik® Evaluation of Round Cells and Sperm 513
John J. Dascanio and Lynda M. J. Miller
- 138 Electron Microscopy of Constituents of Seminal Ejaculates 515
D. N. Rao Veeramachaneni
- 139 Bacterial Culture 519
John J. Dascanio
- 140 Evaluation of pH and Osmolarity of Semen 521
Patrick M. McCue
- 141 Alkaline Phosphatase: A Marker for Ejaculation 523
Patrick M. McCue
- 142 Diagnosis and Management of Urospermia 525
John J. Dascanio
- 143 Hemospermia 529
Patrick M. McCue
- 144 Semen Extenders and Sperm Media 533
Patrick M. McCue
- 145 Preparation of Semen for Cooled Transport 537
Etta A. Bradecamp
- 146 Packing Semen for Cooled Transport 541
Etta A. Bradecamp
- 147 Longevity Testing of Sperm 547
John J. Dascanio
- 148 Calculation of g Force for Centrifuging Semen 549
John J. Dascanio
- 149 Centrifugation of Semen: Standard Technique 551
Etta A. Bradecamp
- 150 Centrifugation of Semen: Cushion Technique 557
Etta A. Bradecamp

151 Centrifugation of Semen: Selection of Motile Sperm Using a Single Layer Colloid Technique 561

Etta A. Bradecamp

152 Use of a SpermFilter 563

Marco A. Alvarenga and Lorenzo G. T. M. Segabinazzi

153 Semen Freezing 567

Patrick M. McCue

154 Refreezing Semen 573

Patrick M. McCue

155 Thawing Frozen Semen 577

John J. Dascanio

156 Semen Processing for Intracytoplasmic Sperm Injection 581

Patrick M. McCue

157 Preparing a Vapor Shipper 585

Julie T. Cecere and Paul Loomis

158 Loading a Vapor Shipper 589

Julie T. Cecere and Paul Loomis

159 Maintaining a Long-Term Frozen Semen Storage Tank 591

John J. Dascanio

160 International Transport of Frozen Semen 593

Paul Loomis

161 Harvesting and Shipping Testes 597

John J. Dascanio

162 Epididymal Sperm Recovery 599

John J. Dascanio and Lynda M. J. Miller

163 Endoscopic Examination of the Urethra 603

Patrick M. McCue

164 Endoscopic-Guided Cannulation of the Seminal Vesicles 607

Patrick M. McCue

165 Palpation and Ultrasonography of the Testis, Epididymis, and Spermatic Cord 609

Sofie Sitters

166 Palpation and Ultrasonography of the Accessory Sex Glands 615

Sofie Sitters

167 Radiographic Examination of the Penis 621

Patrick M. McCue

168 Testicular Biopsy and Aspiration 623

John J. Dascanio

169 Assessment of Sperm Plasma Membrane Integrity and Viability:
Propidium Iodide/SYBR-14 627

Amanda I. Glazar, and Patrick M. McCue

170 Sperm Chromatin Structure Assay 629

Charles Love

171 Hypo-Osmotic Swelling Test 633

Patrick M. McCue

172 Assessment of Sperm Acrosomal Status: PE-PNA 635

Amanda I. Glazar and Patrick M. McCue

173 Assessment of Sperm Mitochondrial Function: JC-1 and Rhodamine
123 637

Amanda I. Glazar, and Patrick M. McCue

174 Equine Viral Arteritis Testing 639

G. Reed Holyoak and Udeni B. R. Balasuriya

175 Diagnostic Endocrinology: Baseline Hormone Levels 645

Patrick M. McCue

176 Diagnostic Endocrinology: GnRH Stimulation Tests 647

Patrick M. McCue

177 Diagnostic Endocrinology: hCG Stimulation Test 649

Patrick M. McCue

178 Diagnostic Endocrinology: Estrogen Conjugate Assay 653

Patrick M. McCue

179 Diagnostic Tests for Cryptorchidism 655

Patrick M. McCue

180 Probang Apparatus 659

Julie T. Cecere

181 Support Apparatus for Paraphimosis 663

John J. Dascanio

182 Equine Castration Techniques 667

Stacy Anderson

183 Stallion Acupuncture 671

Rhonda A. Rathgeber

Part V Newborn Foal 675

184 Birth Resuscitation 677

Patrick M. McCue

185 Handling and Restraint 681

Undine Christmann

186 Madigan Foal Squeeze Technique 687

John Madigan

187 Evaluation of Passive Transfer 691

Patrick M. McCue

188 Colostral Administration via Naso-Gastric Intubation 695

John J. Dascanio

189 Sedation 699

Undine Christmann

190 Intravenous Catheter Placement 701

Undine Christmann

191 Plasma Therapy in the Foal 707

Undine Christmann

192 Acupuncture in the Neonate 711

Peter Morresey

193 Routine Care 713

Patrick M. McCue

194 Foal Rejection 719

Patrick M. McCue

195 Fostering a Foal onto a Nurse Mare 723

Peter F. Daels and Pouya Dini

196 Entropion 725

John J. Dascanio

197 Umbilical Ultrasound 727

Undine Christmann

198 Management of Soft Tissue Laxity 733

Stacy Anderson

199 Management of Angular Limb Deformities 735

Stacy Anderson

200 Management of Congenital Flexural Limb Deformities 739

Stacy Anderson

Part VI Appendices 745

Appendix A Society for Theriogenology Stallion Reproductive Evaluation Form 745

Appendix B Mare Breeding Soundness Evaluation Form 749

Appendix C Formulary for Equine Reproduction 751

Appendix D Foaling Kit and Associated Equipment and Supplies 759

Index 761