Timing of Birth

Prematurity
Dysmaturity
Postmaturity
Prematurity

- Average gestational length: 334 to 340 days
- Traditionally premature: < 320 days
- Each mare - own normal range: 310 – 390 days
- Can have an apparently mature foal at 315 days
- Can have an apparently premature foal at 360 days
Coordination of maturation
Timing of foaling

Fetus  ←  Placenta  →  Mare
Coordination of maturation
Maternal Preparation for foaling

- Myometrium preparation
  Antepartum contractions
  Hormonal preparations
- Relaxin production
- Mammary gland preparation
  Glandular development
  Colostrum production
- Behavioral adaptation
Coordination of maturation

Fetal Preparation for foaling

- Lung maturation
  - Final parenchymal development
  - Cellular differentiation
  - Surfactant appearance
- Cardiovascular transition
- Adrenal maturation
- Metabolic transition
- Renal transition
- Gastrointestinal maturation
Cortisol orchestrates final development
In the fetal foal there is a late cortisol surge

Fetal foal

- Final maturation occurs in a 48 hr window
- Foal born before this
  - Premature
  - Stress responsiveness poor
  - Poor prognosis
Intrauterine Inflammation

Fetal Inflammatory Response (FIRS)

- Precocious Maturation
- Preterm Birth
- Neonatal Nephropathy
- Neonatal Encephalopathy
- Neonatal Gastroenteropathy
- Resist Infection
- Other Organ Dysfunction
Readiness for Birth
Precocious maturation

Mare with placentitis/dying twin
- Precocious udder development
- Hastened preparation for foaling

Fetal response
If birth occurs soon
- Premature
- Poor prognosis
If birth is delayed
- Foal born vigorous
- Good prognosis
- Small size
- Incomplete ossification
Readiness for Birth
Precocious maturation

Foals born after prolonged placentitis

Hyperfibrinogenemia
Leukocytosis - often > 20,000
Presuckle IgG > 800 mg/dl
Readiness for Birth Coordination of maturation

- If mare gives birth before foal can mature
  Premature foal
- If foal is mature before mare is ready
  Continues to grow
  May outgrow placenta
  Postmature foal
- If mare and foal mature together
  Normal foal
  Even when gestation length > 400 days or < 320
- Gestation length usually follows history
Prematurity
Clinical Characteristics

- Low birth weight
- Small frame
  May appear thin
  Poor muscle development
- Periarticular laxity
  Hoof-to-withers Test
  General flexibility
Prematurity

Clinical Characteristics

- Usually flexor laxity
  Occasional contracture

- Usually hypotonia
  Occasional hypertonia

- High compliance to chest wall
  Soft ribcage

- Low compliance to lungs
  Stiff lungs
  Respiratory distress secondary to fatigue
Prematurity
Clinical Characteristics

- General muscle weakness
  
  Delayed time to standing

- Short, silky hair coat

- Domed forehead

- Poor ear cartilage development

- Weak suckle
Prematurity
Clinical Characteristics

• Poor thermoregulation
• GI tract dysfunction
• Delayed maturation of renal response
  Low urine output
• Entropion with secondary corneal ulcers
• Poor glucose regulation
Prematurity
Laboratory findings

Decreased PCV
Leukopenia, neutropenia
  • Associated with low cortisol, sepsis
Abnormal glucose homeostasis
Low IgG
  • Poor absorption?
  • Dysmotility
  • Sepsis
  • Not nursing
Electrolyte disturbances
Postmaturity
Clinical Characteristics

- Normal to high birth weight
- Large frame but thin with muscle wasting
- Often flexor contracture
  Occasionally flexor laxity
- Usually hypertonia
  Occasional hypotonia
- Delayed time to stand
  Hyperreactive state
  Poor postural reflexes
Postmaturity
Clinical Characteristics

- Long hair coat
- Fully erupted incisors
- Weak suckle
- Poor thermoregulation
- GI tract dysfunction
- Delayed maturation of renal response
  - Low urine output
- Poor glucose regulation
Prematurity/Postmaturity

Therapeutic goal

- Failure of organ systems to support extra-uterine life
- Anticipate the problems
- Support the foal until successful maturation can occur
Prematurity/Postmaturity
Treatment CNS

Adequate perfusion - oxygen, nutrient delivery
- Maintaining intravascular fluid volume
- Maintain tissue perfusion - pressors and inotropes

Hypoxic ischemic asphyxial or inflammatory insult
- Prenatal, intranatal, or neonatal period
- Treat as a foal with neonatal syndrome
Prematurity/Postmaturity

**Treatment respiratory system**

- Surfactant
- Complaint chest wall, weak muscles, and stiff lungs
- **Respiratory failure**
  - Intranasal oxygen
  - Positional support
  - Mechanical ventilation
Prematurity/Postmaturity

Treatment cardiovascular system

- Poor or marginal cardiovascular function
  - Lack of responsiveness of vessels to pressors

- Cardiovascular failure
  - Fluid support
  - Inotropes and pressors
    - Vasopressin, dobutamine, dopamine, norepinephrine, epinephrine
Prematurity/Postmaturity
Treatment renal system

- Poor renal function initially
  Foals are born with unique renal function
  Maintain fetal renal response pattern
  True prematurity of the kidneys
  Neonatal Vasogenic Nephropathy
  Hypoxic ischemic damage
  Inflammatory damage
- Do not fluid/sodium overload
Prematurity/Postmaturity
Treatment gastrointestinal system

May not be ready to function fully
- Lack of GI tract maturity
  Dysmotility
- Hypoxic insult
- Inflammatory insult

Dysmotility
Necrotizing Enterocolitis
Before feeding is attempted
- Metabolic, cardiovascular, respiratory stability

Volumes fed should be slowly increased
Parenteral nutritional support is often needed
Prematurity/Postmaturity

Treatment glucose instability

- Blood glucose monitoring
- Intravenous glucose
- Insulin therapy

Constant IV infusion of regular insulin
Prematurity/Postmaturity

Treatment hypothermia

- Premature neonates have difficulty with thermoregulation
- Control environmental temperature
- Warm the neonate
  - Heat lamps
  - Hot water bottles
  - Warm air blanket
- Iatrogenic hyperthermia
Prematurity/Postmaturity
Transfer of Immunoglobulins

- Colostrum
  Enteral feeding may not be possible
  Trophic feeding
  Absorption may not be efficient
  Colostrum substitutes – don’t work well

- Plasma transfusions are indicated
Prematurity
Incomplete ossification

Should always check
- Even in precocious premature foals

Various approaches have been used

Current approach
- No splints or casts
- Confine to padded stall
- Allow limited, supervised exercise
  - Initially 5 minutes or less
  - Gradually increase periods standing
- Carefully monitor for angular deformity
Prematurity/Postmaturity Complications

- Secondary bacterial infections
- Fungal infections
- Self trauma
- Limb deformities
- Gastrointestinal problems
- Aspiration pneumonia