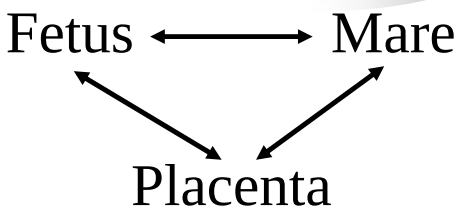
Timing of Birth

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



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

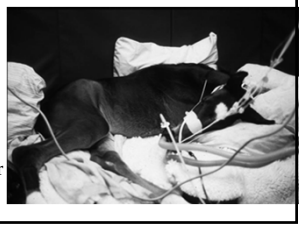
Readiness for Birth Role of Cortisol

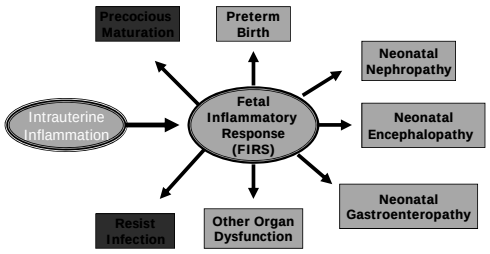
Cortisol orchestrates final development

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





Readiness for Birth Precocious maturation

Mare with placentitis/dying twin

- Precocious udder development
- Hastened preparation for foaling

Fetal response

If birth occurs soon

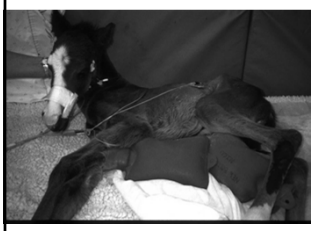
- Premature
- Poor prognosis

If birth is delayed

- Foal born vigorous
- Good prognosis
- Small size
- Incomplete ossification

Readiness for Birth
Precocious maturation

Foals born after prolonged placentitis



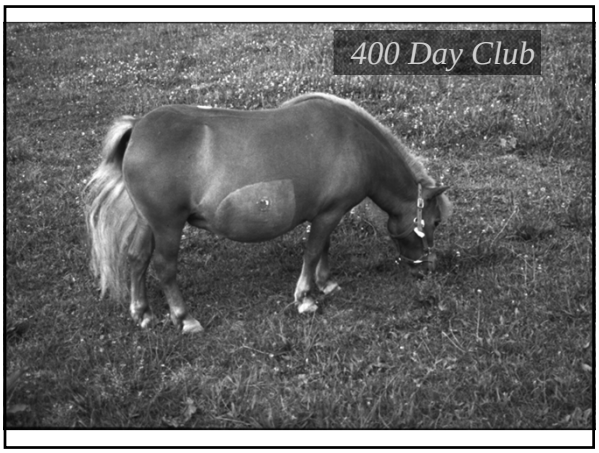
Hyperfibrinogenemia

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



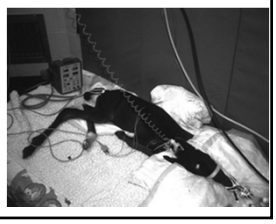
Prematurity
Clinical Characteristics

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

Hoof-to-Withers Test

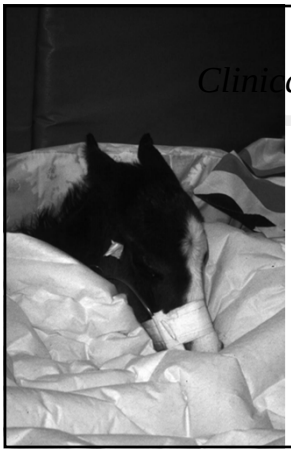
Prematurity
Clinical Characteristics

- 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

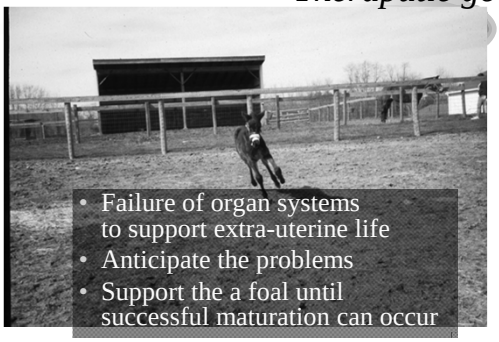
Postmaturity
Clinical Characteristics

- 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
Theraputic goal



- Failure of organ systems to support extra-uterine life
- Anticipate the problems
- Support the a foal until successful maturation can occur

Prematurity/Postmaturity
Treatment CNS

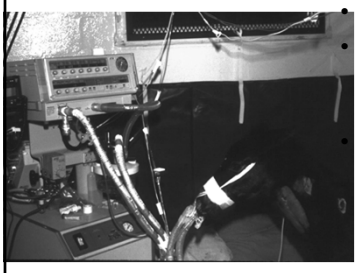
Adequate perfusion - oxygen, nutrient delivery

- 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

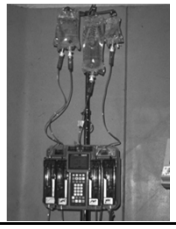
Prematurity/Postmaturity
Treatment respiratory system



- 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 GIt 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

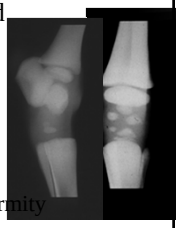
- Colostrum
  - Enteral feeding may not be possible
  - Trophic feeding
  - Absorption may not be efficient
  - Colostrum substitutes – don't work well
- Plasma transfusions are indicated

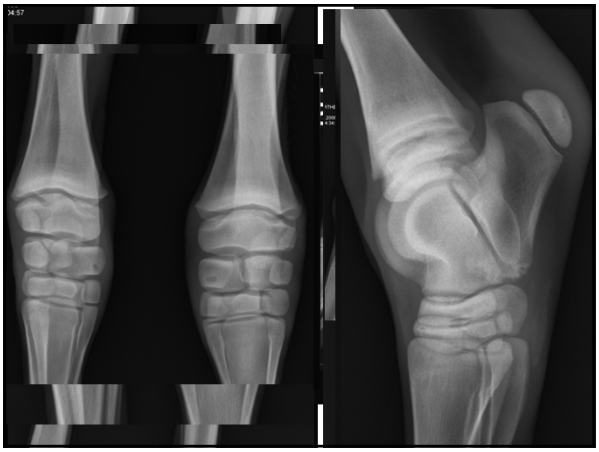
Prematurity
Incomplete ossification

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