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## Managing Compromised and Weak Calves at Birth

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## Managing Compromised and Weak Calves at Birth

Franklyn Garry, DVM, MS



## Cow/calf income/profit

- ◆ Pounds of weaned calf sold
- ◆ For every calf that dies, that would have been sold at 550 lbs, you need to increase weaning weight of the next 11 calves by 50 lbs to make up the difference.

## Beef Calf Death Loss Estimates

- ◆ 5 - 8% from delivery to weaning
- ◆ Age distribution
  - 50% within 24 hr
  - 70% by three days
  - 75% within 1 week

## Adapting to life outside the uterus



- ◆ Tremendous physiologic transition
- ◆ Not always successful



## Neonatal adaptation

### Organ system changes

- ◆ Respiratory
- ◆ Cardiovascular
- ◆ Metabolic
- ◆ Fluid balance
- ◆ Thermoregulation
- ◆ Musculo-skeletal
- ◆ Neurologic

## Blood oxygenation Oxygen delivery

- ◆ Pulmonary (Lung) blood flow
- ◆ Ventilation
  - ◆ lung expansion
  - ◆ lung fluid
- ◆ Physical/muscular activity
- ◆ Blood volume – oxygen delivery

## Fluid volume and balance

- ◆ 'Swimming pool' environment
- ◆ Normal tissue hydration
- ◆ Blood volume contraction
- ◆ Need fluid supplementation to maintain circulatory volume

## Thermogenesis (= heat generation)

- ◆ Non-shivering
- ◆ Shivering
- ◆ Physical activity

## Thermogenesis

### Non-Shivering

- ◆ "Brown fat" = about 2% of BW in calves
- ◆ Aerobic metabolism = requires oxygen
- ◆ Blood shunted through brown fat to increase body temperature

## Thermogenesis

### Shivering

- ◆ Shivering of skin and skeletal muscle
- ◆ Increases heat production by 33-100%
- ◆ Hypoxemic calves do not shiver

## Thermogenesis

### Physical activity

- ◆ Trying to stand calf increases heat production by 33-100%
- ◆ In first 10 min of standing calf increases heat production by 100%
- ◆ Calves that do not try to stand get very cold, very fast

## Consequences of poor adaptation

- ◆ Decreased activity, lethargy
- ◆ Low blood oxygen
- ◆ Heat loss, low body temperature
- ◆ Delayed intake of colostrum
  - ◆ decreased energy/ nutrient intake
  - ◆ decreased fluid volume
  - ◆ decreased Ig consumption
- ◆ Decreased disease resistance

## Slow to adapt

Lethargic, inactive

- ◆ Time to Stand

Delayed suckling

- ◆ Time to Nurse

Low body temperature

## Assessment of Vigor

- ◆ Head-right, sternal recumbence, attempt to stand, standing

- ◆ 3, 5, 20, 60 minutes, respectively

- ◆ ↑ 15 min to sternal =

84% predictive of nonvitality

◆ Schuijt G., Taverne MA. Vet Record. 1994; 135.

## Normal newborn calves

- ❖ Uncomplicated vaginal delivery
- ❖ Time to stand < 1 hour
- ❖ Good mothering
- ❖ Body temperature maintenance
  - ❖ 101-102F
- ❖ Active suckling < 2 hours
- ❖ Attentive, responsive, active

## Normal calves at birth

- ◆ Transient hypoxia/ischemia
- ◆ Mild respiratory and metabolic acidosis
- ◆ Mild hypoxemia
- ◆ Lactic acidosis



## Role of the dam in postnatal survival

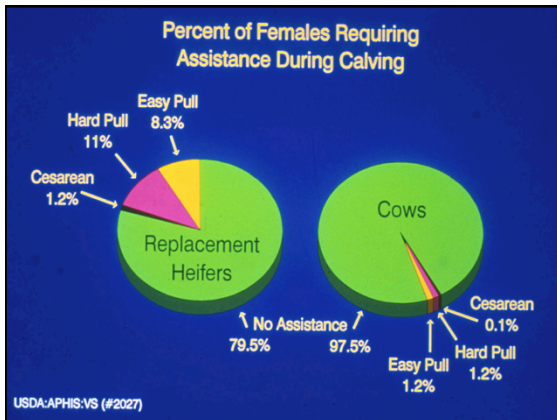
- ◆ “Mothering”
- ◆ Maternal-neonatal bonding



## Abnormal Neonatal Adaptation

- Dystocia
- Premature birth
- Illness in dam
- In-utero problems





### Effects of Dystocia

- ◆ Prolonged hypoxia, ischemia  
⇒ asphyxia
- ◆ Lactic acidosis

### Management to decrease calf losses

- ◆ Decrease occurrence of dystocia
- ◆ Manage dystocia to decrease impact on calves and dams
- ◆ Identify abnormal calves and provide more care

### Neonatal Assistance

- ✓ Stimulate and enhance respiration
  - ✓ Assist in ventilation of the lungs (breathing)
  - ✓ Stimulate by rubbing / drying calf
- ✓ Maintain body temperature (thermoregulation)
  - ✓ Provide supplemental heat
- ✓ Increase blood volume and provide energy
  - ✓ Administer colostrum

### Neonatal Assistance

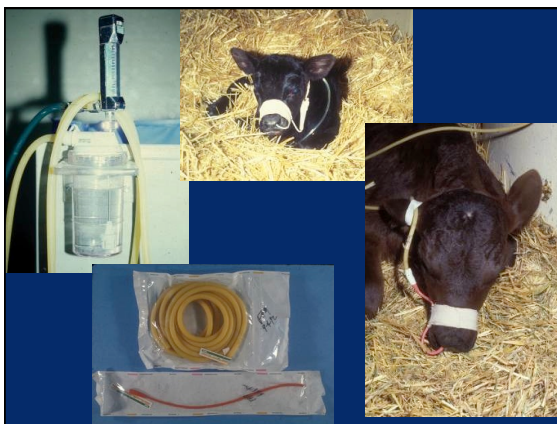
- ✓ Stimulate and enhance respiration
  - ✓ Place in sternal recumbency
  - ✓ Remove mucus from airway
  - ✓ Vigorous drying/rubbing on chest
  - ✓ Provide positive pressure ventilation
  - ✓ Administration of oxygen





### Oxygen Administration

O<sub>2</sub> flow rate=  
2-4L/min



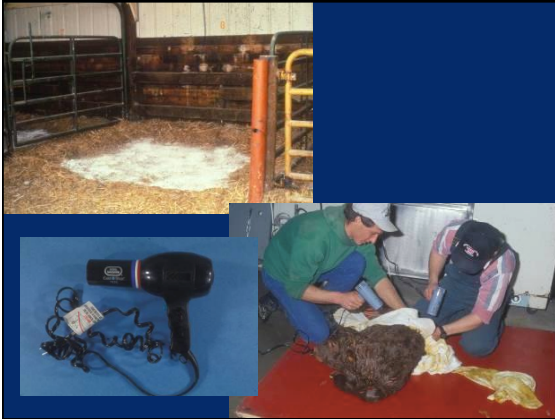
### Neonatal Assistance

- ✓ Maintain body temperature (thermoregulation)
  - ✓ Calves generate heat (thermogenesis) via:
    - Physical activity – most important source of heat
    - Shivering – involuntary muscle contractions
    - Nonshivering (1° Brown fat)
  - ✓ Calves lose heat via:
    - Evaporation – reduce by drying calves (also stimulates respiration)
    - Conduction – reduce by providing straw or other bedding
    - Convection – reduce exposure to wind; dry calves

### Neonatal Assistance

- ✓ Maintain body temperature
  - ✓ Supplemental heat sources
    - Heaters, hot water bottles; warming hut
    - Colostrum – also provides energy for activity
    - Calf jacket
  - ✓ If calf's temp is 100° or less – provide heat source
  - ✓ Drying, stimulation, heat supplementation, shelter

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### Food for Thought: Thermogenesis

- ◆ Infrared heater for 24 hrs postpartum
- ◆ Significant improvements to:
  - ◆ Rectal temp,  $SO_2$ (%), tidal volume, dynamic lung compliance, & respiratory rate

Uystepruyst CH, et al. Vet J (2002) 52.

### Neonatal Assistance

- ✓ Increase blood volume and provide energy

### Acidosis

- ◆ Metabolic and respiratory
- ◆ Low blood volume
- ◆ Lactic acidosis
  - ◆ Blood volume expansion, energy metabolism
- ◆ Respiratory acidosis
  - ◆ Increased ventilation

### Non-immunoglobulin Components of Colostrum

- ◆ Other immune-active agents
- ◆ Optimum source of standard nutritional elements
- ◆ Concentrated energy, protein, vitamins, minerals
- ◆ Fluid, warmth



## Neonatal Assistance

- ✓ Stimulate and enhance respiration
  - ✓ Sternal recumbency
  - ✓ Mechanical ventilation
  - ✓ Oxygen therapy
- ✓ Maintain body temperature
  - ✓ Heaters
  - ✓ Blankets
- ✓ Increase blood volume and provide energy
  - ✓ Colostrum

