Perinatology

Care of the mother and fetus during pregnancy, labor, delivery, and early neonatal period, particularly when the mother and/or fetus are at a high risk for complications.

Perinatology

Perinatology in Human Medicine

Origins of Veterinary Perinatology

High Risk Pregnancy

History of previous problems

Development of problems during current pregnancy

Perinatology

What is the threat to the fetus/neonate?

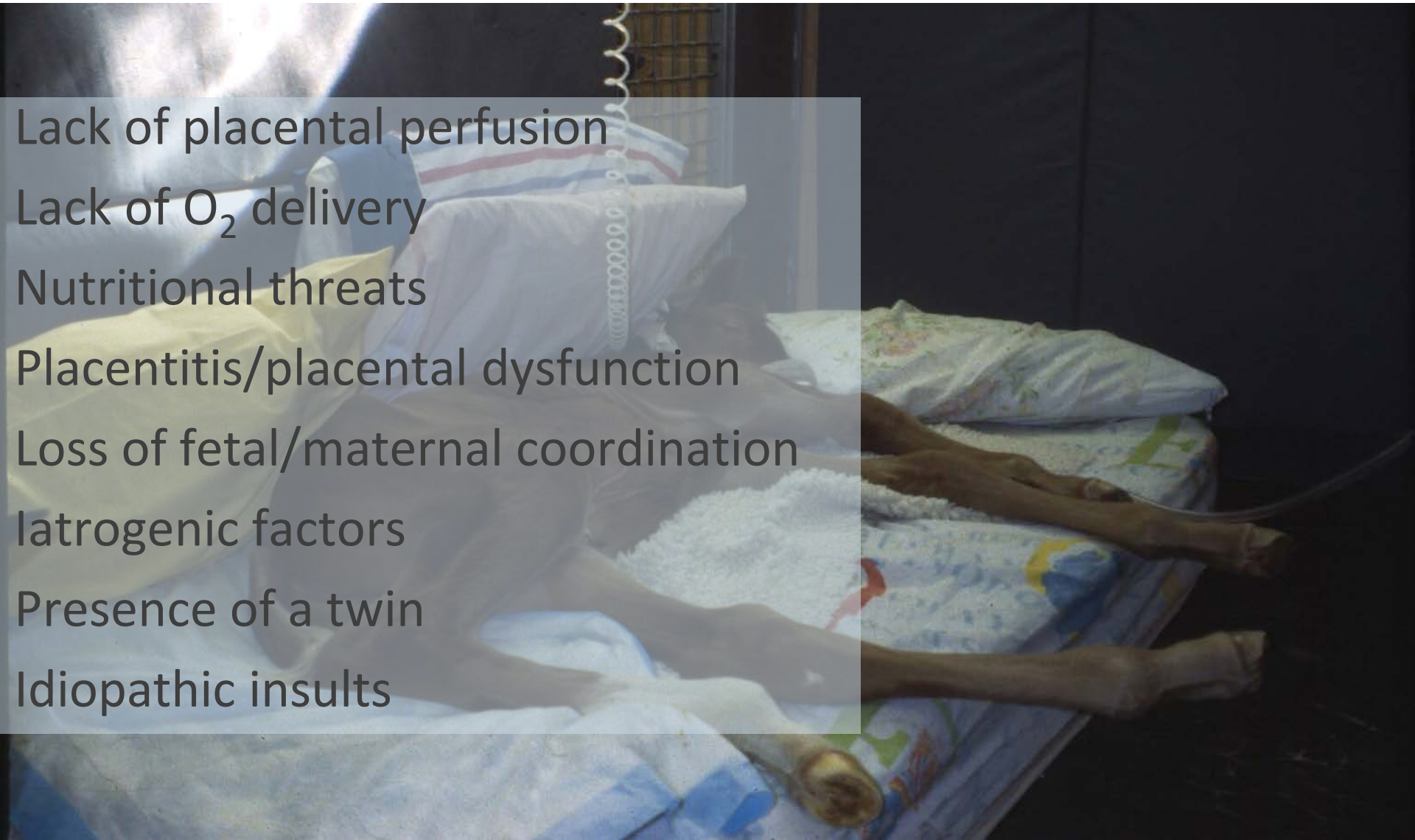
How can the threat be eliminated?

Fetal Resuscitation

Identify the fetal problem

Direct therapy at the problem's source

High Risk Pregnancy
Threats to Fetal Well-being



- Lack of placental perfusion
- Lack of O_2 delivery
- Nutritional threats
- Placentitis/placental dysfunction
- Loss of fetal/maternal coordination
- Iatrogenic factors
- Presence of a twin
- Idiopathic insults

Threats to Fetal Well-being
Lack of Placental Perfusion

Late term fetus
- High oxygen demand
- Must receive constant perfusion
- Margin of safety in late pregnancy small

Maternal compromise
- Dehydration/Shock
- Decreased perfusion for any reason

Placental response limited

Compromised placental circulation
- Hypoxic ischemic insult

Fetal Resuscitation
Maintenance of Placental Perfusion

Aggressively treat

hypovolemia in dam

Aggressively treat

hypotension in the dam

Avoid anesthesia

in late term mares

Threats to Fetal Well-being Lack of O_2 Delivery

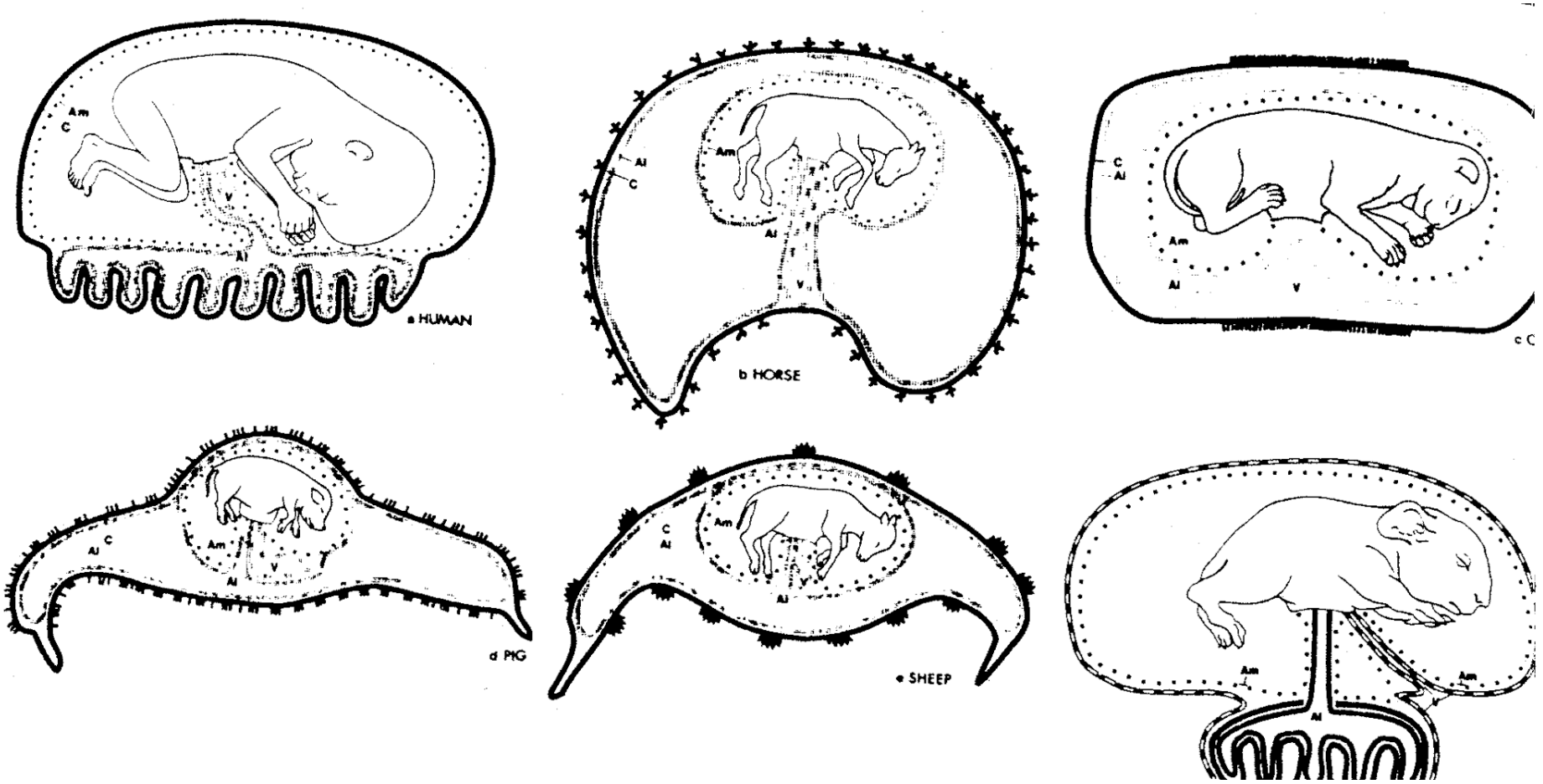
Maternal threats

- Maternal anemia
- Maternal hypoxemia
- Decreased perfusion

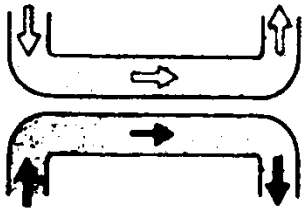
Fetal response

- Unique aspect of placentation
- Placental oxygen transport mechanisms

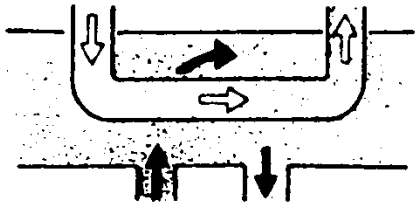
Placentation



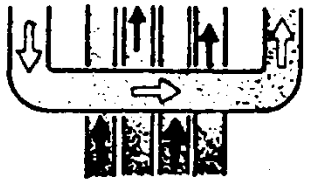
Placental Circulation



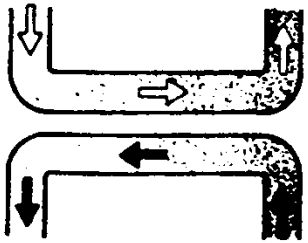
concurrent



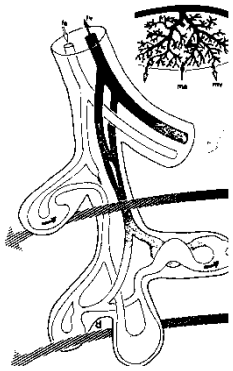
multivillous

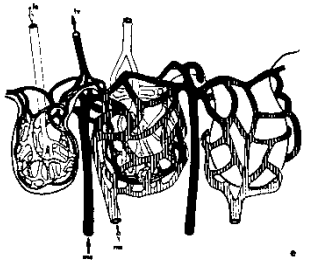


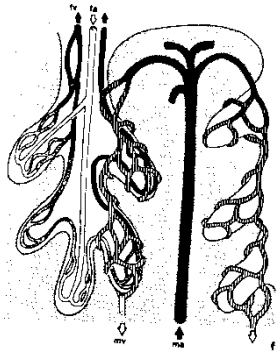
crosscurrent

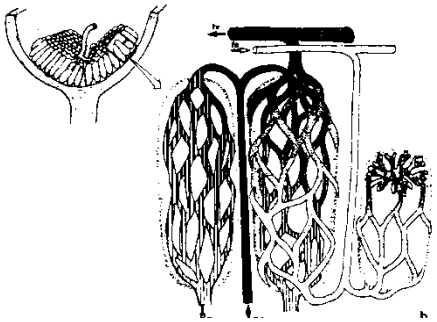


countercurrent

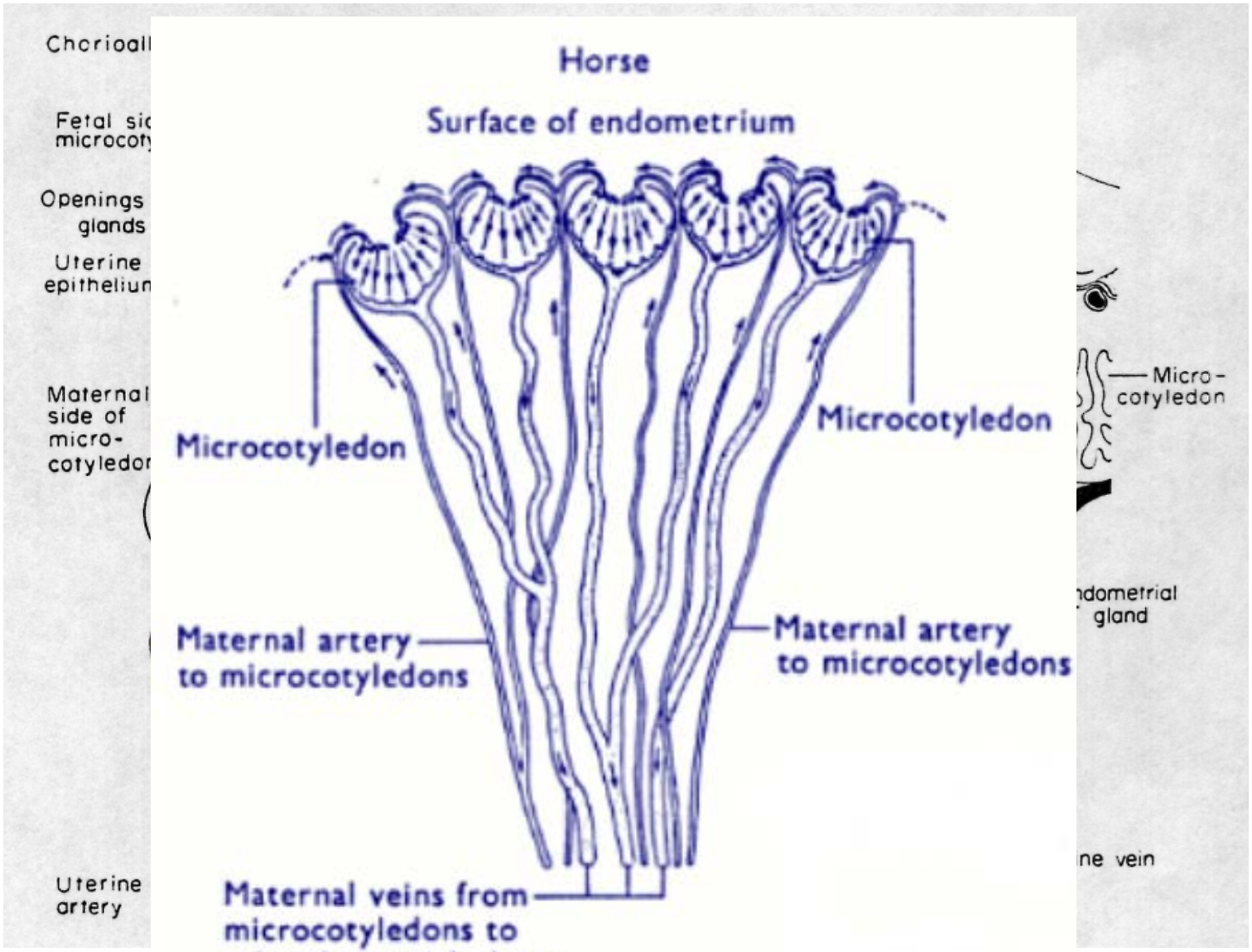








Equine Placentation



Effect of Maternal Oxygen Therapy

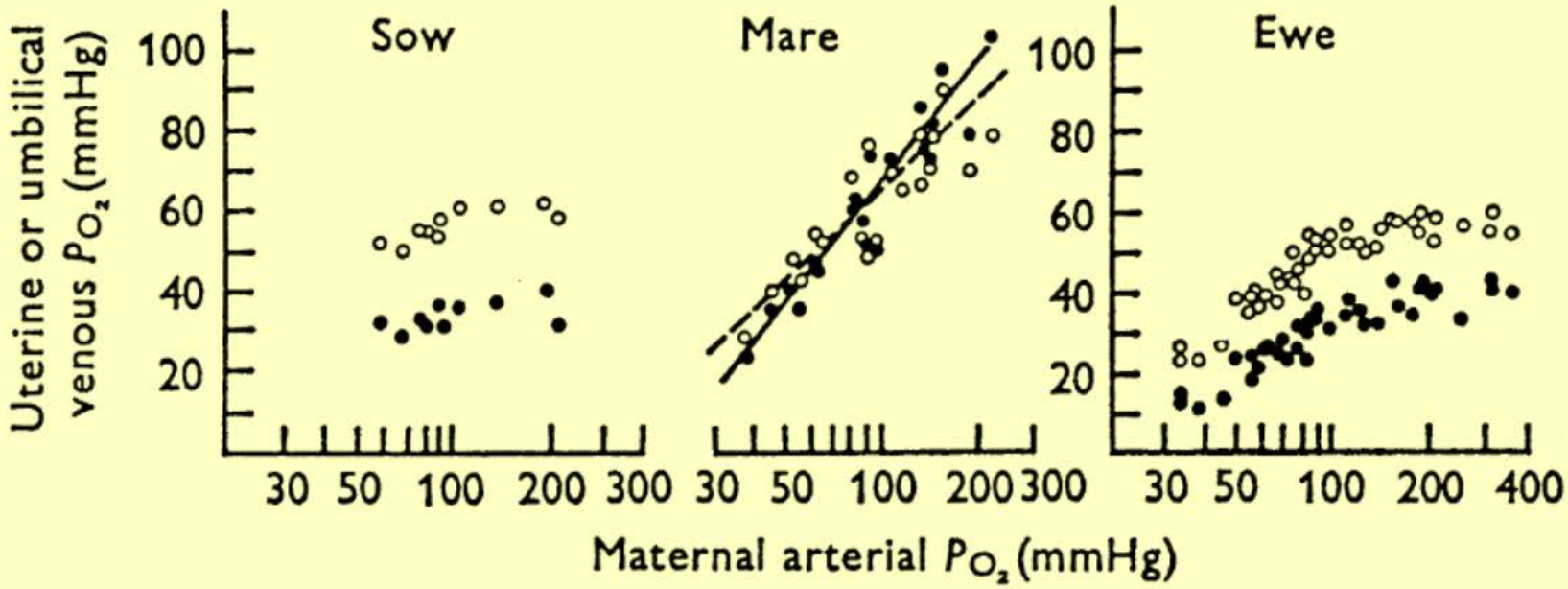


Fig. 4. The relationship between P_{O_2} in maternal arterial blood (log scale) and that in the uterine vein (○) and umbilical vein (●) in seven ewes and seven mares (data from Comline & Silver 1970*b*), and in five sows.

Placental Blood Gas Transport
Fetal Blood Oxygen Affinity

Higher than maternal blood

- Umbilical blood becomes highly saturated
- Even at a low Po2

Fetal Hemoglobin - in ruminants

Erythrocyte Concentration of 2,3-DPG (lower)

- Fetal pig
- Fetal Foal - small effect (2 torr)

Fetal Resuscitation Lack of O_2 Delivery

Fetal hypoxemia - supplement with INO_2

- Take advantage of the countercurrent system
- Even if normal Pao_2 in mare, foal may benefit
- Could be important with placental edema
- May see improved FHR parameters

Maternal Oxygen Therapy

Nutritional Threats Glucose Utilization

The placenta

- Actively metabolic tissue
- High glucose utilized by placenta in horse
- Glucose for placenta also comes from fetus

Maternal distress – less glucose

- More glucose delivered from fetus
- Can lead to negative net glucose transport to fetus

IUGR
Intrauterine Growth Restriction

Threats to Fetal Well-being Nutritional Threats

Chronic malnutrition of the dam

- Lack of intake
- Malabsorption
- Tumor cachexia

Acute fasting of the dam

- Forced fasting
- Capricious appetite - late gestation

Threats to Fetal Well-being
Nutritional Threat of Acute Fasting

Fasting the mare for 30-48 hr

- Decreased glucose delivery
- Rise in plasma FFA
- Increased PG's in uterine and fetal tissues

Increased risk of preterm delivery

- Within one week of ending the fast
  - Associated with myometrial sensitivity to hormones

Fetal Resuscitation Nutritional Threats

Support the mare's nutritional needs
- Enteral supplementation
- Parenteral supplementation
- Encourage a high plain of nutrition

Avoid acute fasting
- Avoid elective procedures requiring fasting
- Encourage anorexic late term mares to eat

If acute fasting is unavoidable – colic, anorexia
- Supplement with intravenous glucose therapy
- Consider flunixin meglumine therapy

Threats to Fetal Well-being Placentitis/Placental Dysfunction

Premature placental separation

Infection

Inflammation

Degeneration

Edema

Hydrops

Threats to Fetal Well-being
Placentitis

Percentage of abnormal placenta

- Not a predictor of fetal outcome

Presence of abnormal placental tissue

- Is enough to cause serious problems

Fetal foals born with placentitis

- More likely to have neonatal diseases

Fetal Resuscitation Placentitis/Placental Dysfunction

Treat as infectious

- Trimethoprim potentiated sulfa drugs

Try to minimize PG formation

- NSAIDs - flunixin meglumine

Hormone supplementation therapy

- Altrenogest (ReguMate)

Threats to Fetal Well-being

Iatrogenic Factors

- Early delivery
- Drugs

Presence on a Twin

Other peripartum hypoxic

ischemic asphyxial events

Fetal Monitoring History

Intrapartum fetal monitoring

- Rational decision to hasten parturition - C-section
- Explosive nature of parturition in the mare

Prepartum fetal monitoring

- Allow prediction of intrauterine hypoxia and distress
- Result in effective fetal resuscitation
- Rational decision about early delivery

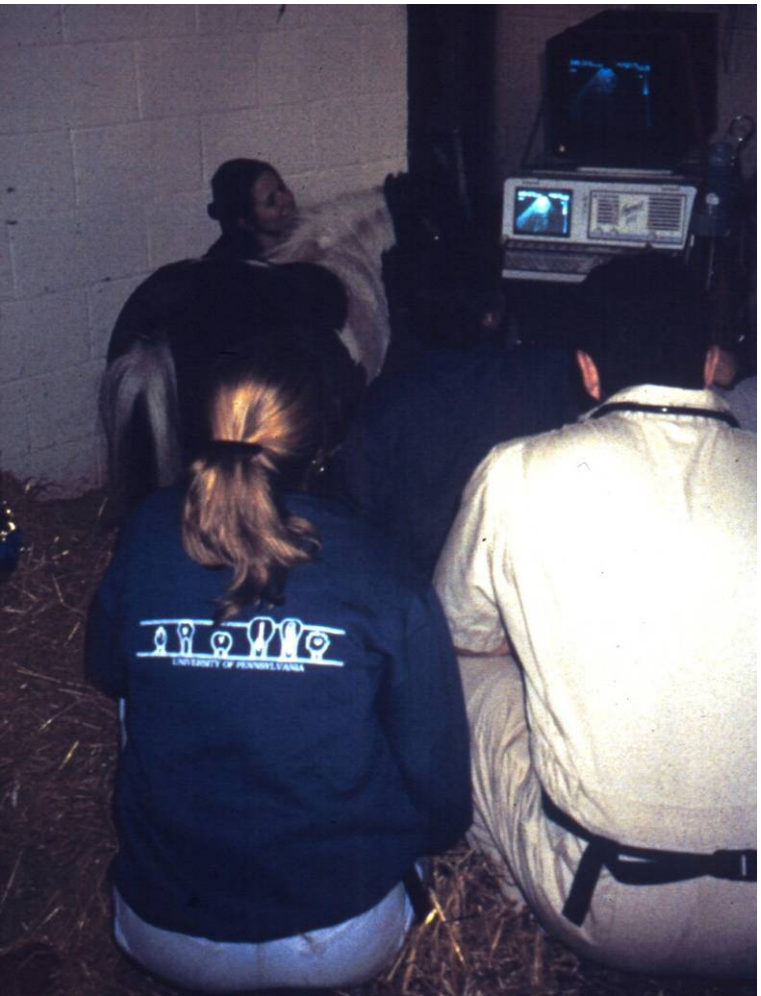
Early Udder Development
Precocious Lactation

Most reliable sign of fetal distress

Fetal Monitoring Biophysical Profile

- A collection of ultrasound derived observations
- Correlate with fetal health or fetal distress
- In man fetus with abnormal profiles
  - Clearly in trouble
- In man fetus with normal profiles
  - Usually normal
  - May have life threatening hypoxemia, other problems
- Not sensitive enough for all problems

Fetal Monitoring
Equine Biophysical Profile



Fetal heart rate

Fetal aortic diameter

Maximum fetal fluid depths

Utero-placental contact

Utero-placental thickness

Fetal activity

Fetal Monitoring
Equine Biophysical Profile

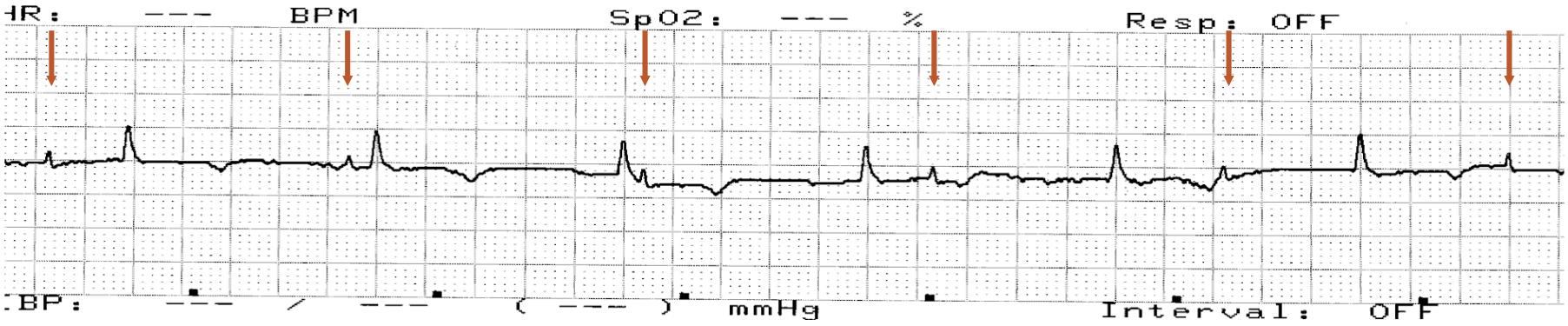
Not sensitive

- Fetus with normal profiles may be suffering from life threatening problems

- Not specific
  - Occasionally extreme values in normal fetuses


Fetal Heart
Rate Response

Fetal heart rate measurements
Fetal ECG



Fetal Resuscitation
If Fetus Clearly in Distress

Consider early induction, early delivery

- Oxytocin induction
- C-section

These should be considered high risk **nare**

No way back