

# *Large Offspring Effects in Cattle*

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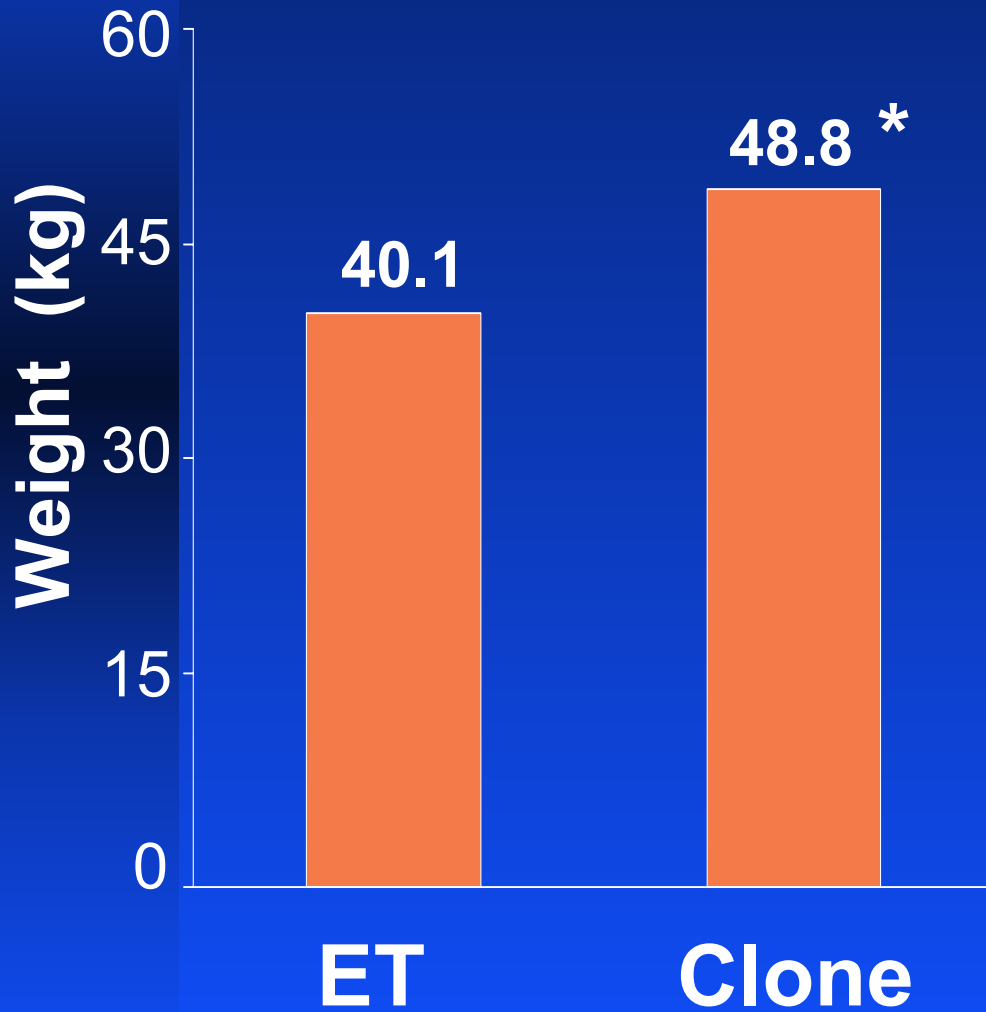
**Cloned**



**In Vitro Cultured**

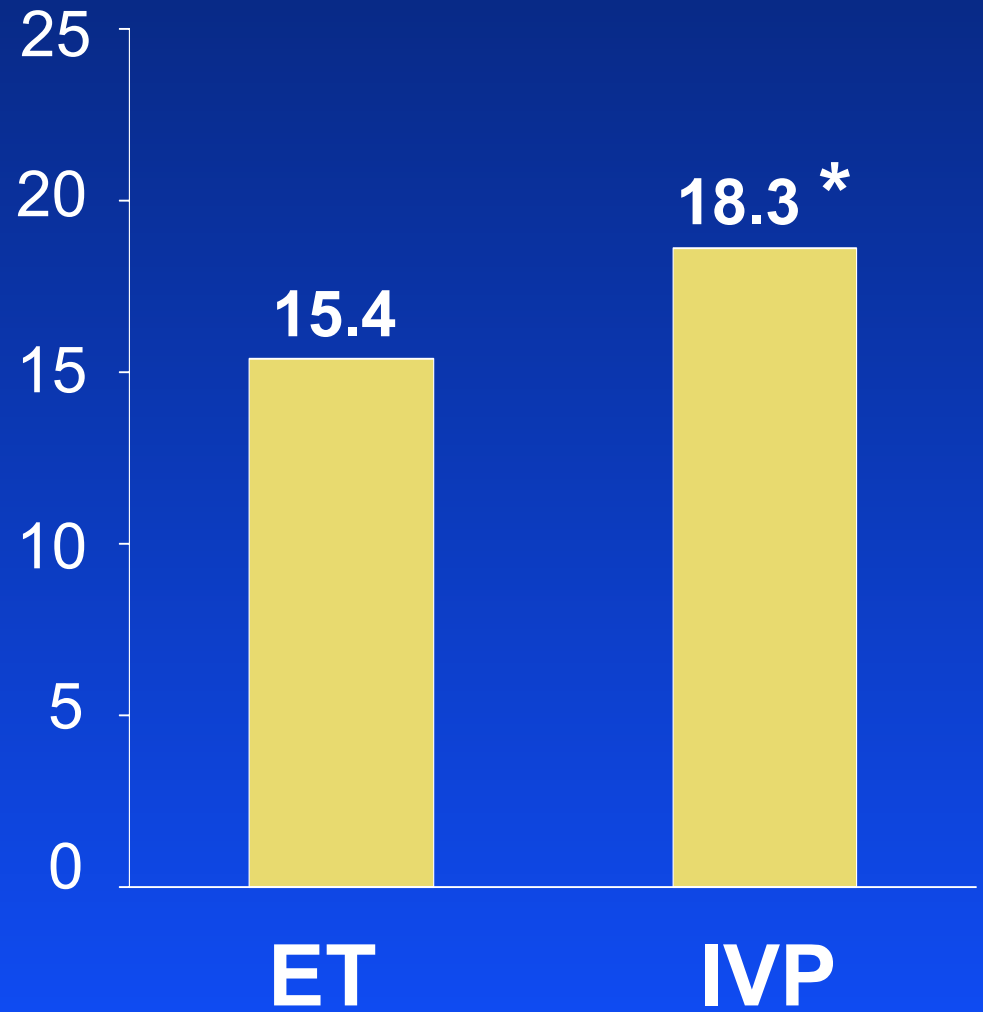
## Calves at Birth

Wilson et al., 1995



## Fetuses at 7 Months

Farin & Farin, 1995



# *In Vitro Embryo Production*

## *Calf*

- ↑ birth weight
- ↑ congenital defects
- ↑ neonatal mortality
- Altered energy metabolism  
and growth

## *Placenta*

- ↑ hydrallantois
- Altered development
- Edema

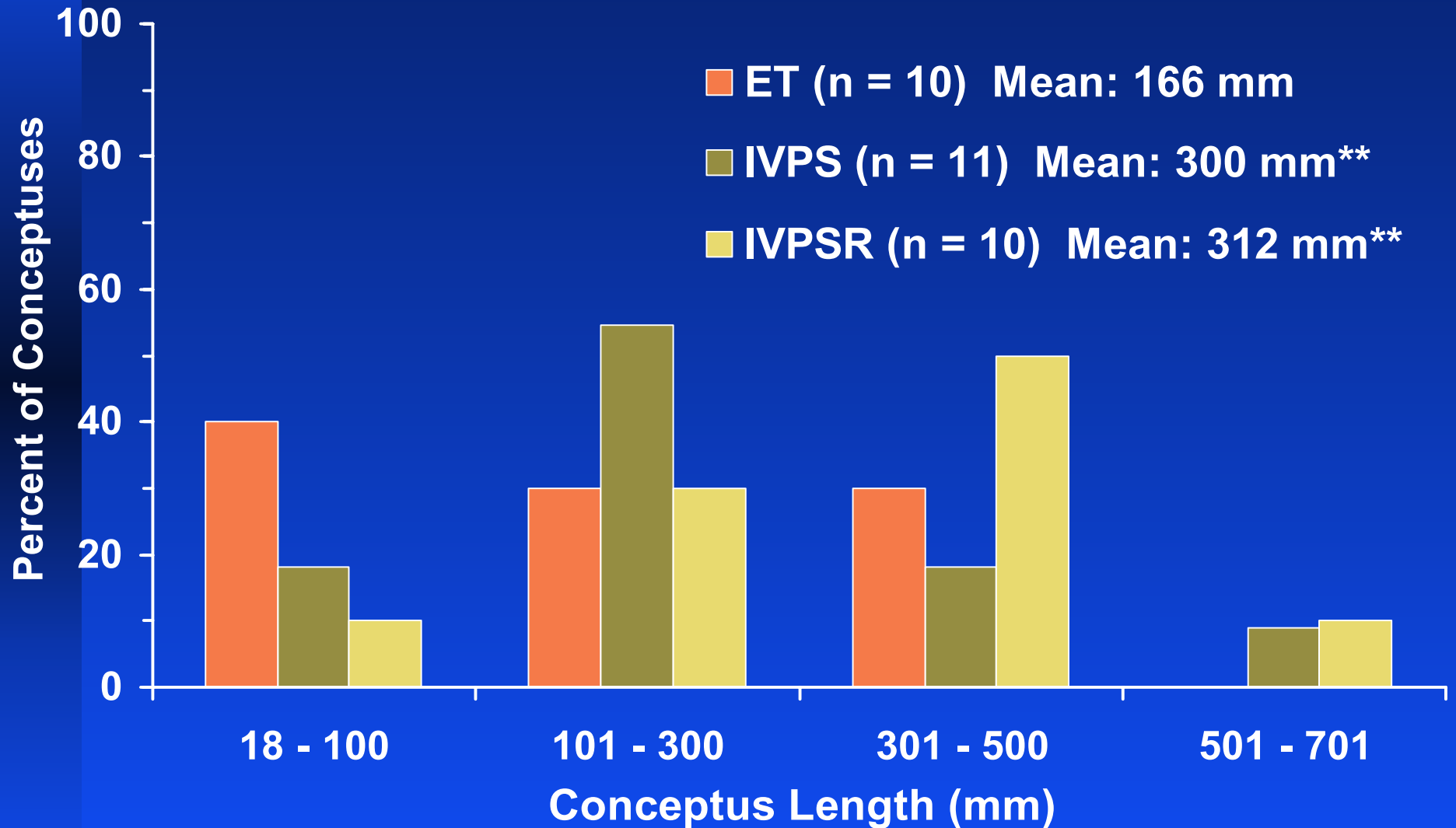
## *Fetus*

- ↑ body weight
- Altered development  
(e.g. muscle fibers)
- Changes imprinted genes  
(e.g. IGF-II)
- ↑ stillbirths

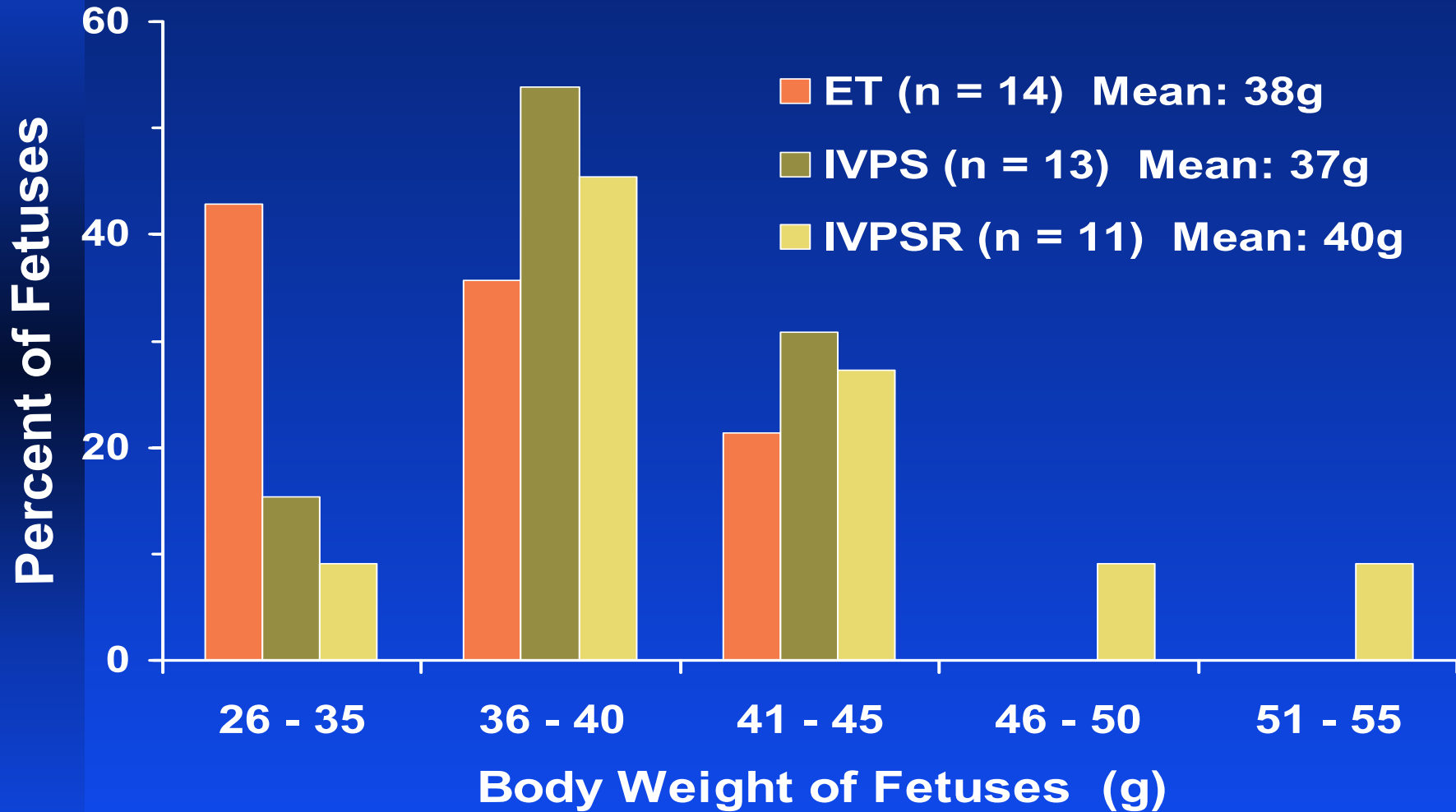
## *Recipient*

- ↑ abortion
- ↑ gestation length
- ↑ dystocia / C-sections

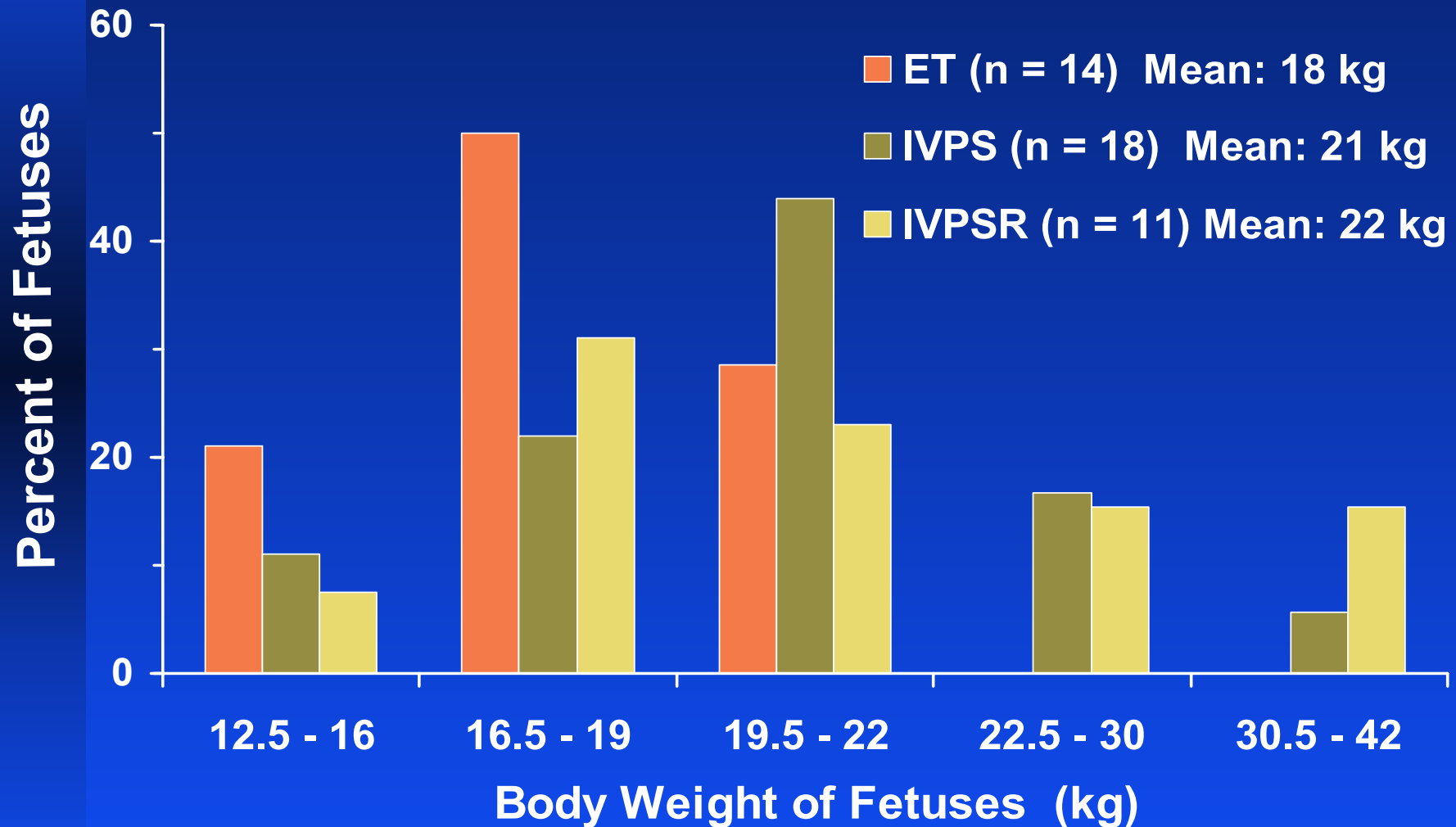
# Conceptus Lengths at Day 17 of Gestation



# *Fetal Weights at Day 70 of Gestation*



# *Fetal Weights at Day 222 of Gestation*

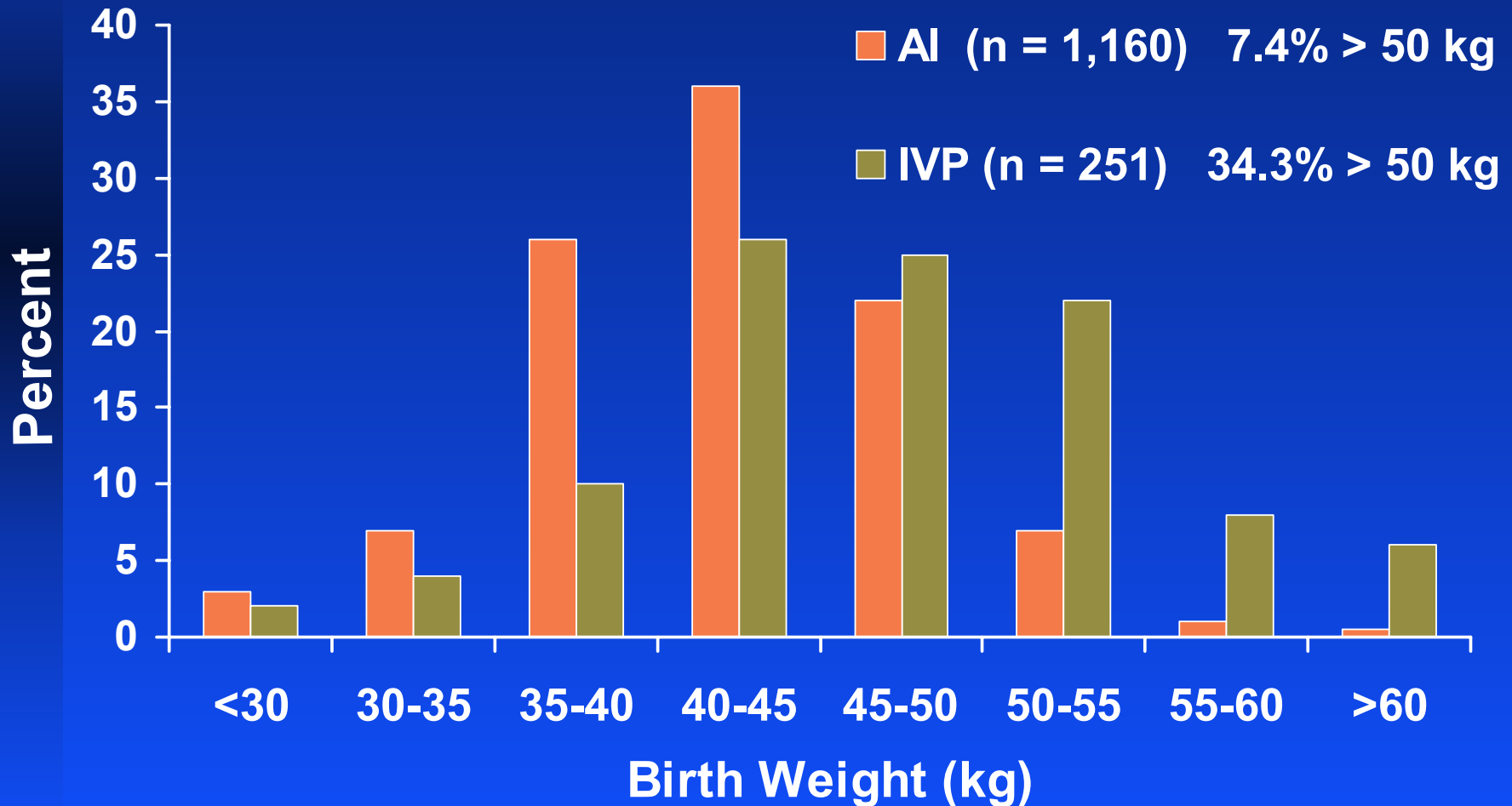


# *Fetuses from IVP Embryos - Day 222*

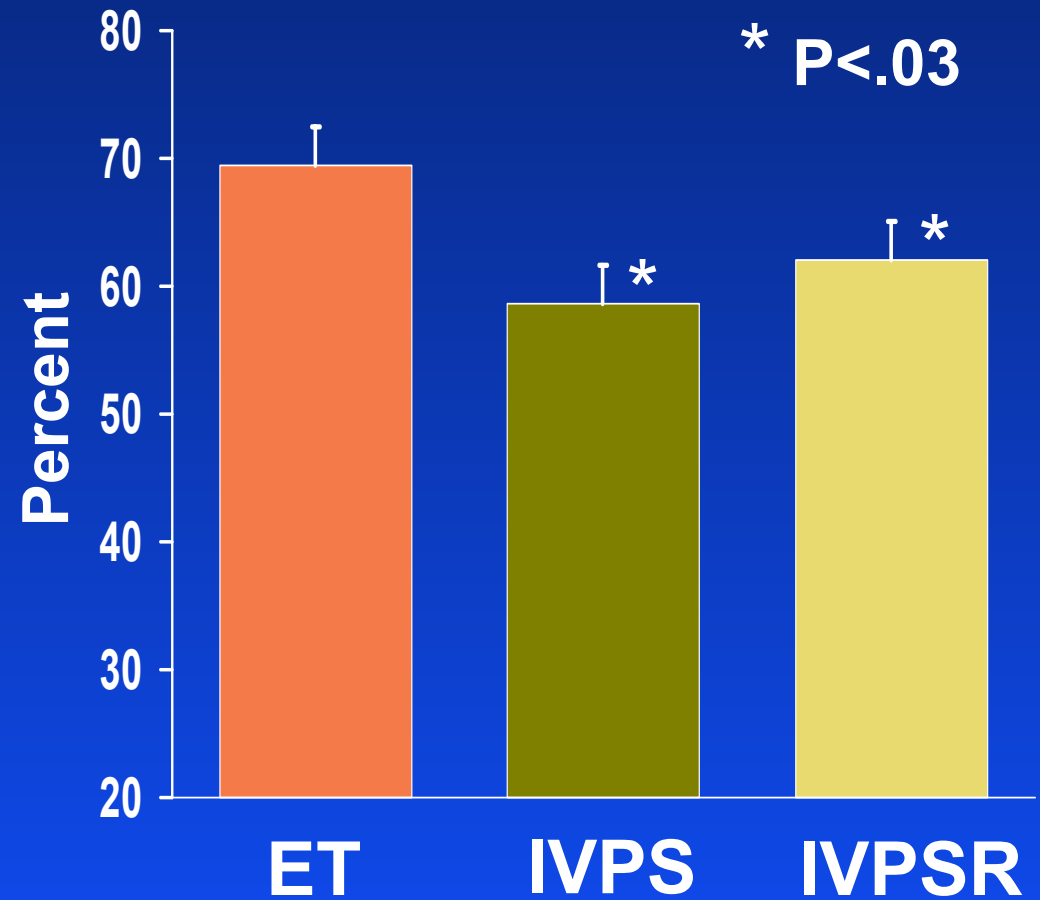


# Calf Birth Weight

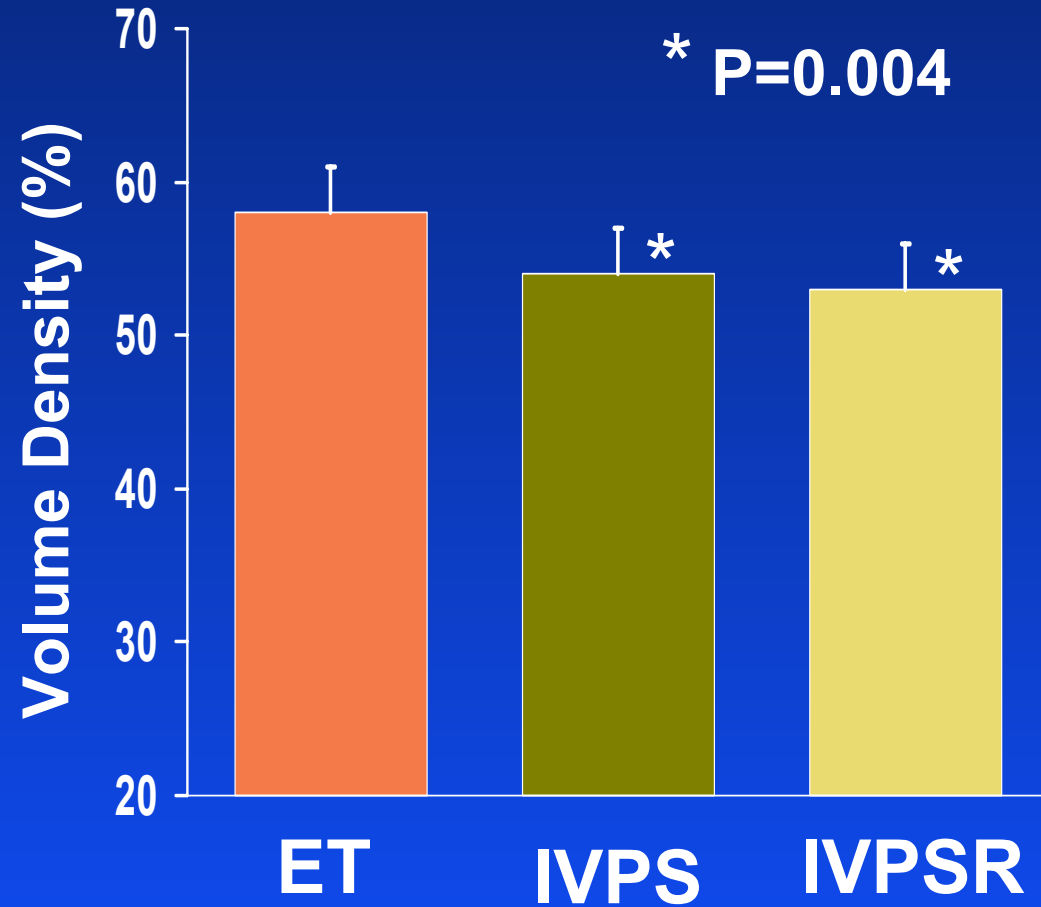
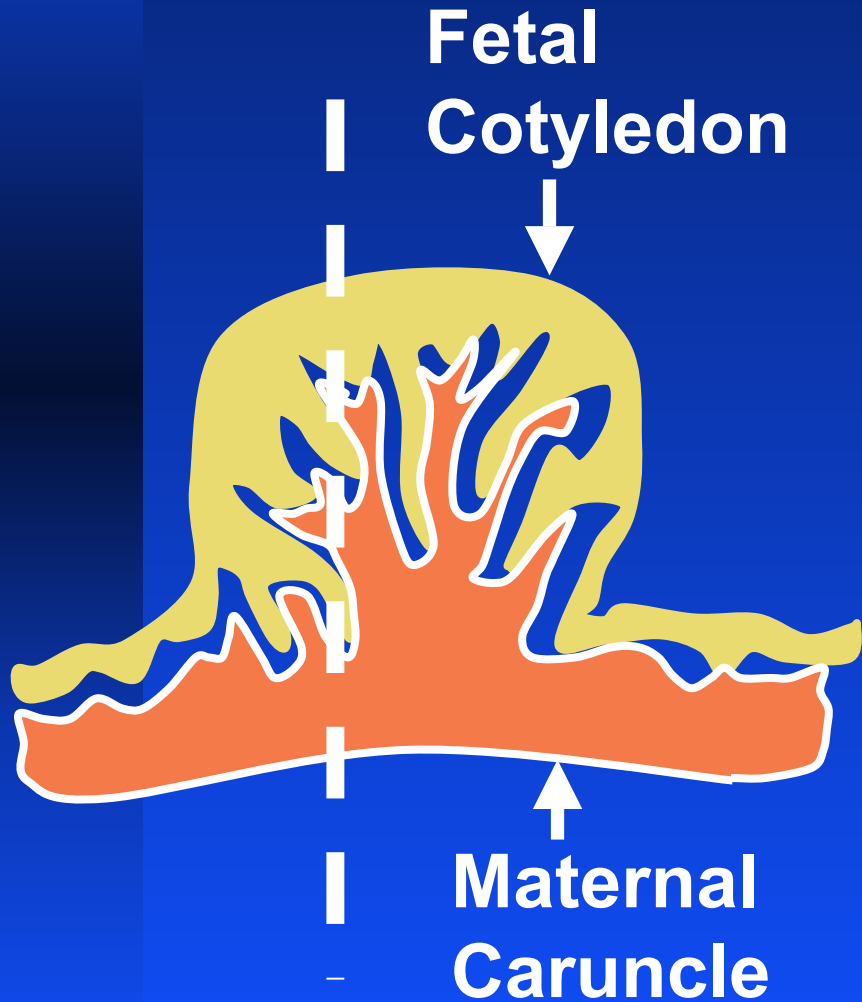
Modified from Kruip and den Daas, 1997



# Caruncular Surface Area Day 222

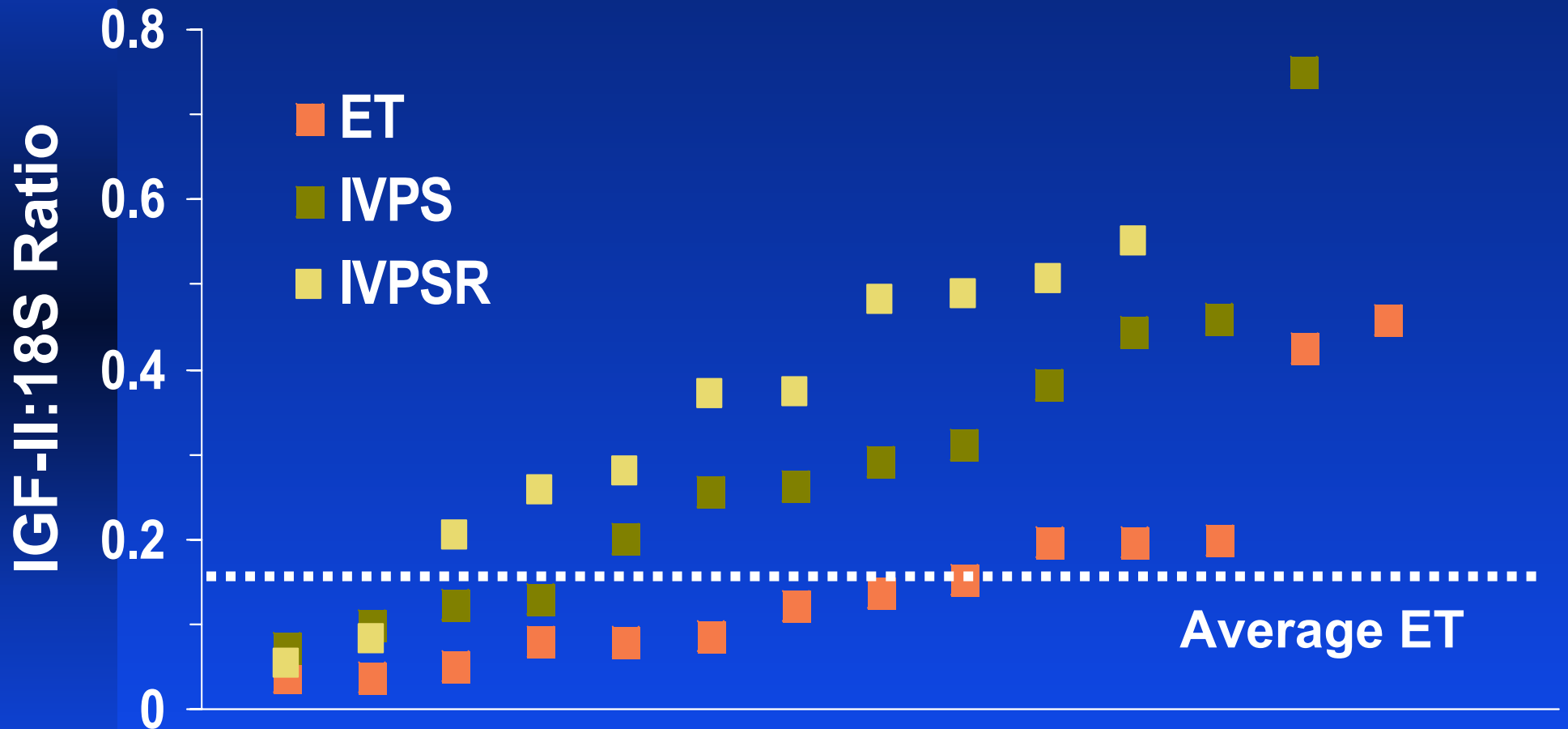


# Villous Volume Density Day 222



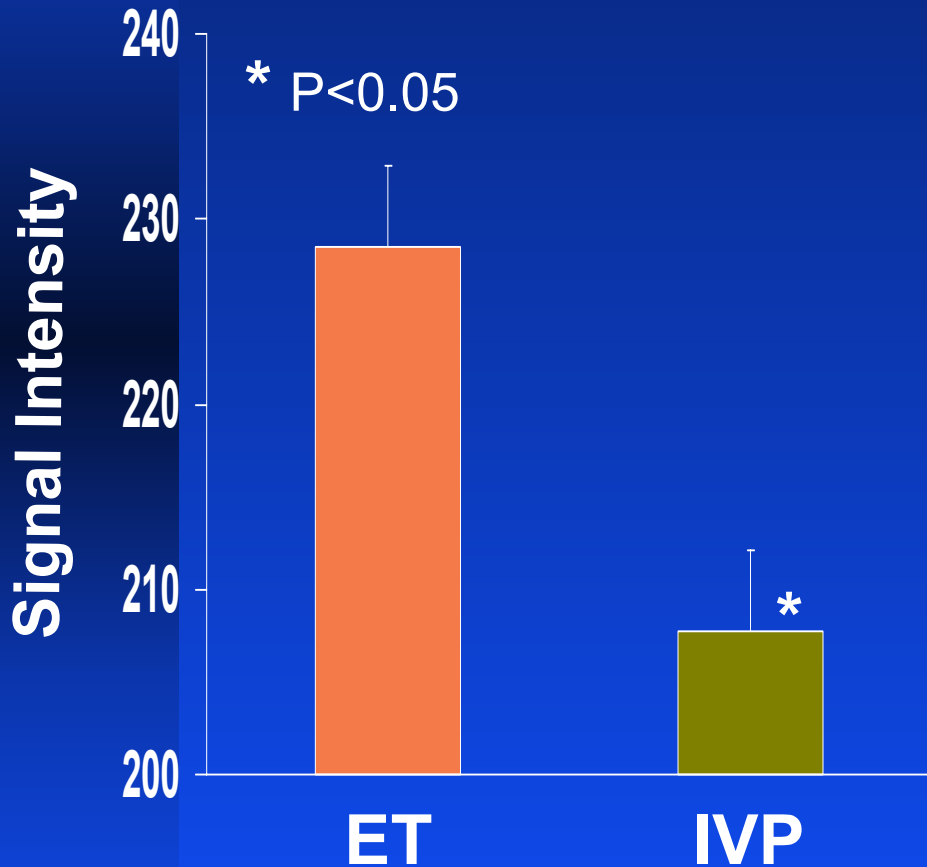
Farin et al., 2000; Therio 53:474

# IGF-II mRNA in Fetal Liver - Day 70

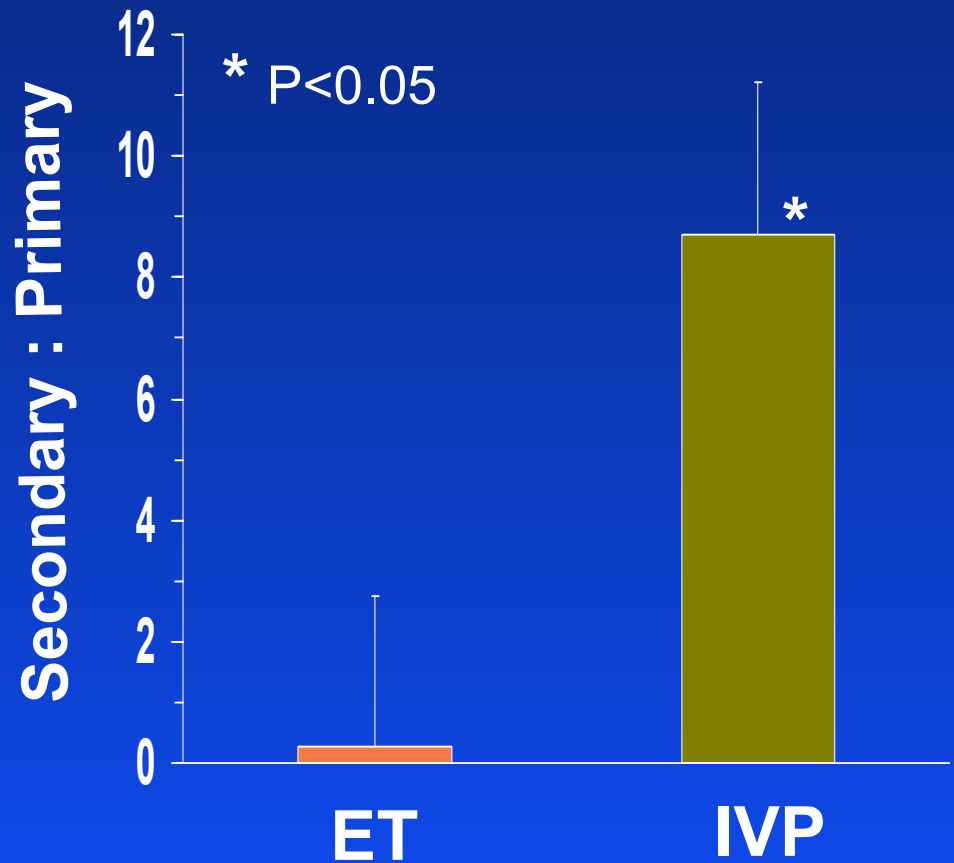


# Muscle Fibers of Fetuses - Day 222

## Myostatin mRNA



## Muscle Fiber Number



# ***Summary and Implications - Large Offspring Effects in Cattle***

- ❖ **Increased fetal and calf weight**
- ❖ **Altered development of organs and placenta**
- ❖ **Effects may occur throughout pregnancy and neonatal life**
- ❖ **Changes in imprinted genes (IGF-II)**
- ❖ **Changes in genes regulating muscle development (Myostatin)**