

**Effects of in-utero exposure to  
environmental chemicals  
via maternal pasture ingestion on  
fetal development**

**What are EDCs and where do they come from?**

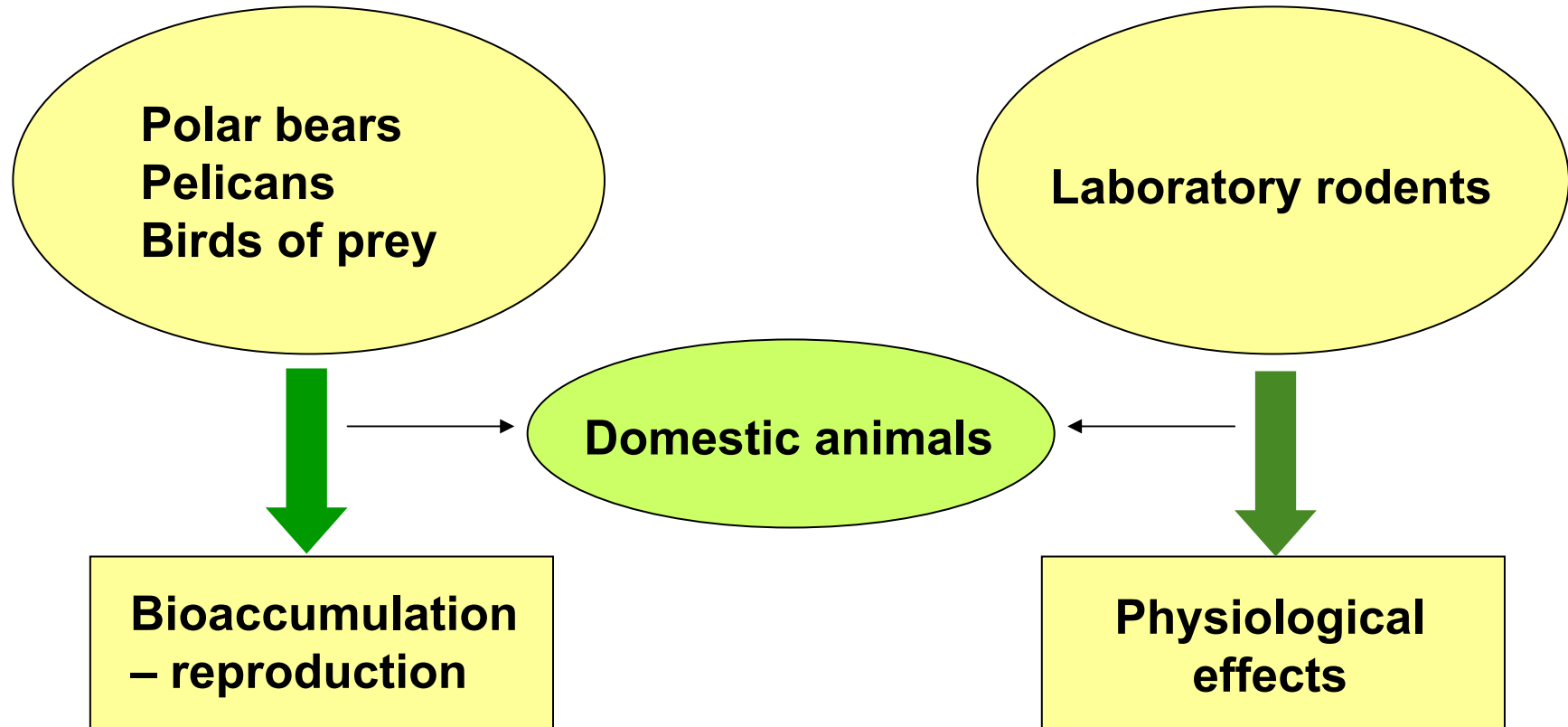
# Sources

- Alkyl phenols - Detergents; paints; cosmetics**
- PCBs - Adhesives; electrical transformers**
- Phthalates - Plastics**
- PBDE - Flame retardants**
- Bisphenol A - Food cans; dental**
- PAHs - Incomplete combustion**
- Dioxins - Incinerators**
- Organochlorine pesticides**

# Disruption effects

- **Reproductive function**
- **Immune function**
- **Thyroid function**
- **Sexual differentiation of brain**
- **Cognitive/ motor function**
- **Carcinogenic**

# Sources of Information



# **Not problem in farm animals?**

- **Effects with HIGH EDC levels**
  - **environmental levels are LOW**
- **Problem chemicals are banned**
- **Some EDC degraded in the gut**
- **Low affinity for estrogen receptor**

## **But.....**

- **Prolonged / low = short / high**
- **Banned but still in environment**
- **New EDC (e.g.PBDE) also present**
  
- **Other factors must be considered ....**

# Properties of EDC

- **Persistent**
- **Lipophilic**
- **Biologically available**
- **Sensitive stages of development**
- **Effects of mixtures**
- **Differences with species and strain**
- **Potential transgenerational effects**

# Exposure of farm animals to EDC

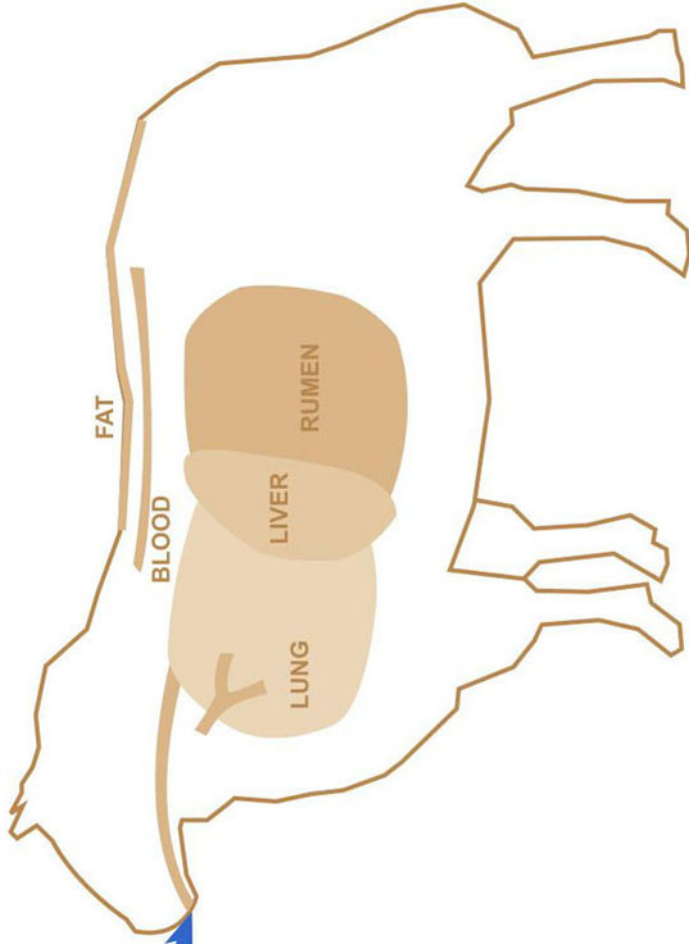
- **Feed – herbage not very important**
  - **soil – potentially important**
- **Water – important if contaminated**
- **Air – importance uncertain**

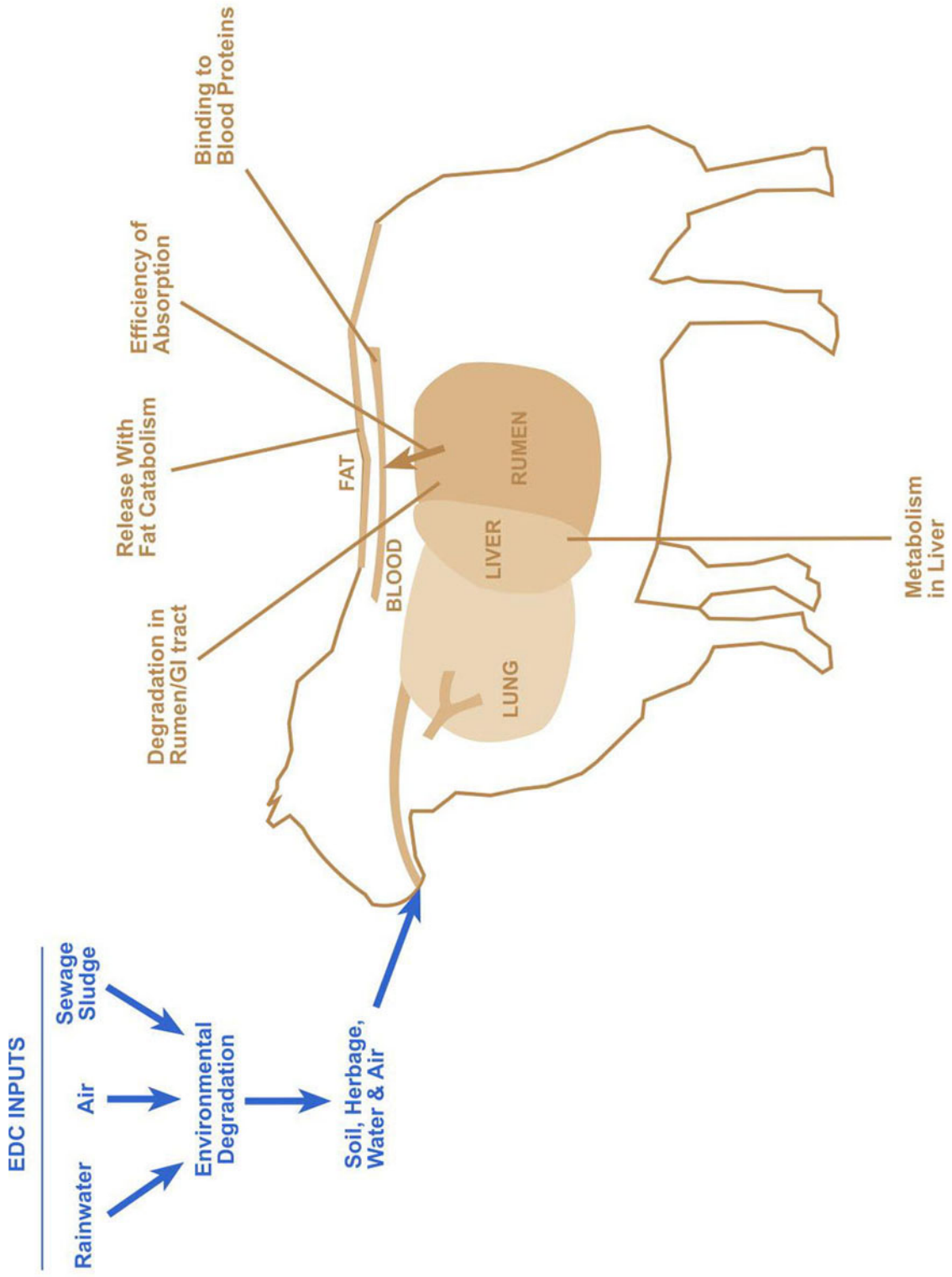
**EDC INPUTS**

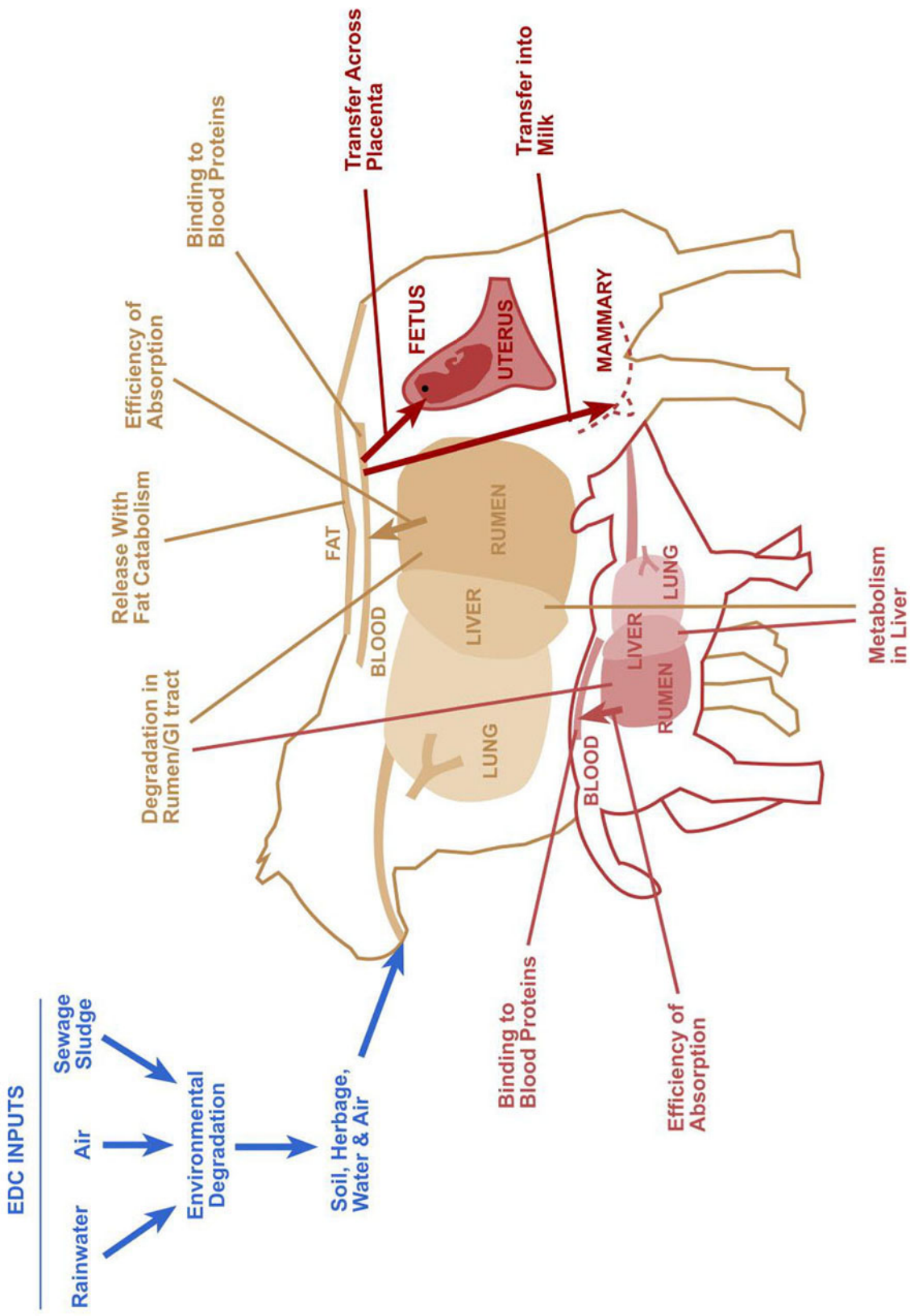
Rainwater      Air      Sewage Sludge

Environmental Degradation

Soil, Herbage, Water & Air







# Potential effects of EDC exposure

**Sludge to pasture**

**Lab studies**

**Multiple EDC**

**Single EDC**

**Environmental**

**Pharmacologic**

**Long term**

**Short term**

# Preliminary results

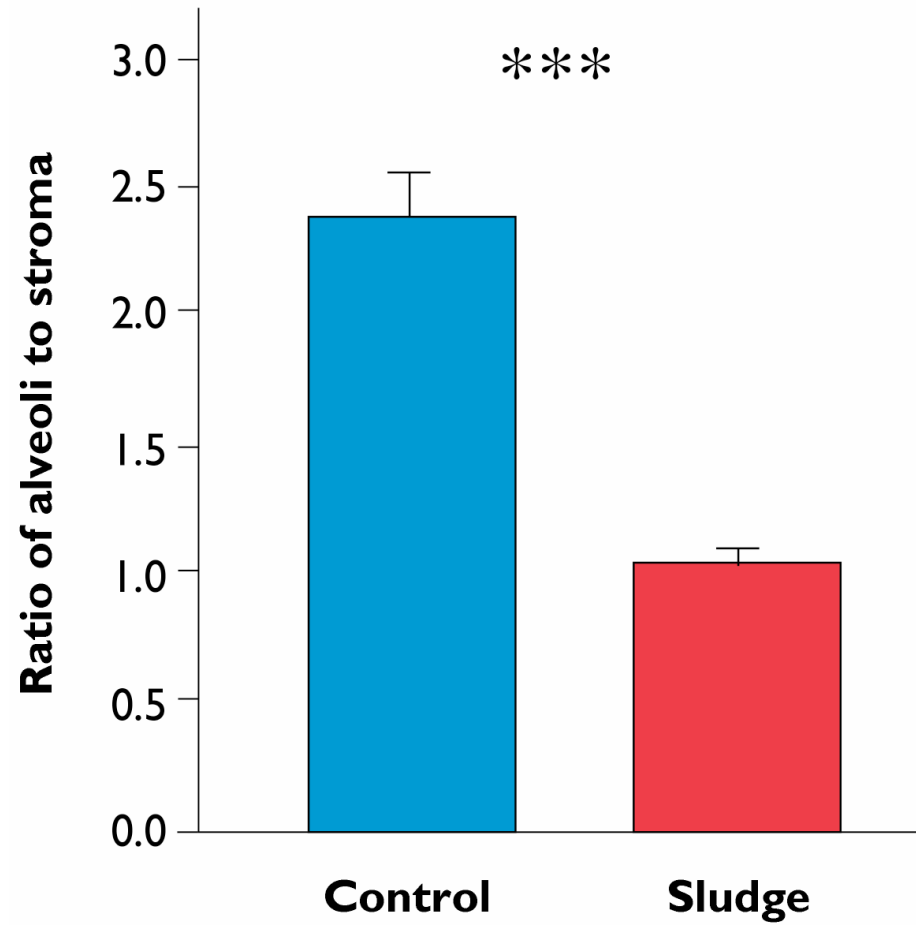
## Pituitary function reduced

**% LH $\beta$  immunopositive pituitary cells**

	<b>n</b>	<b>%</b>	<b>s.e.</b>	<b>Sig.</b>
<b>Sludge exposed</b>	<b>11</b>	<b>15.4</b>	<b>1.2</b>	
<b>Control</b>	<b>15</b>	<b>18.4</b>	<b>0.9</b>	<b>P&lt;0.05</b>

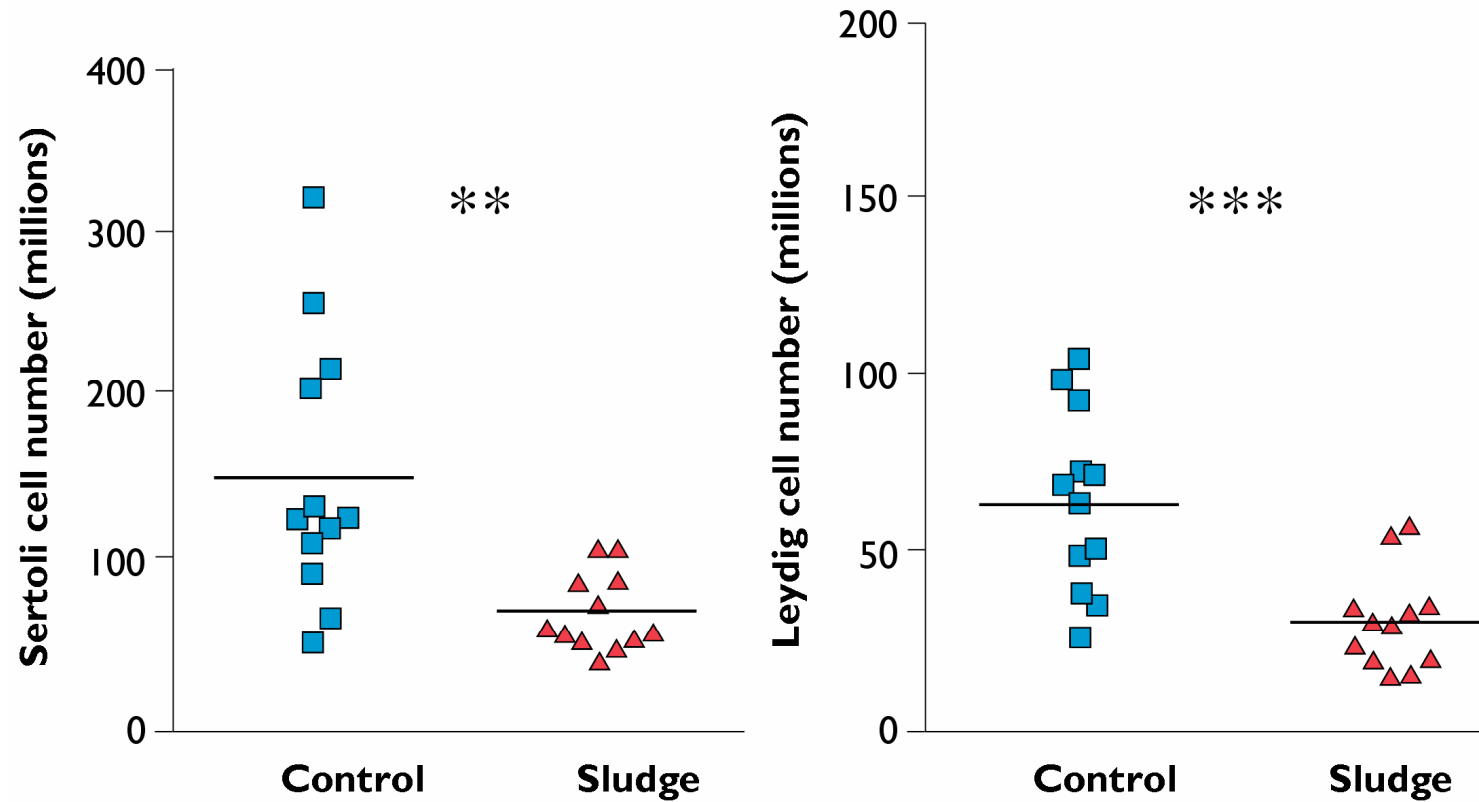
# Preliminary results

## Maternal mammary



# Preliminary results

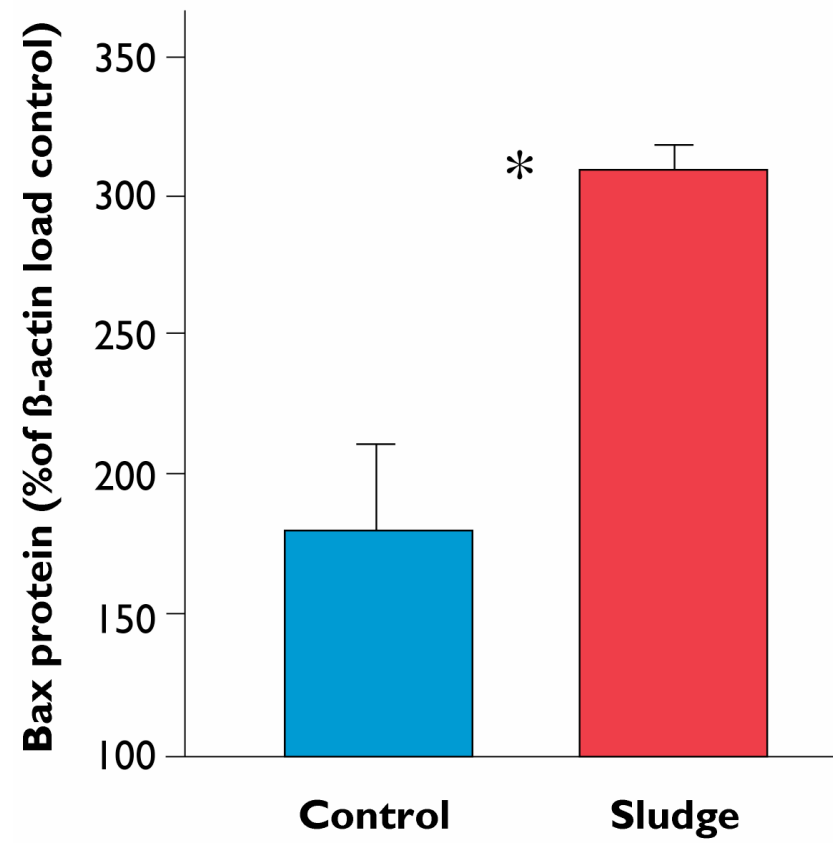
## Fetal testis



Paul et al. (2005) *Environmental Health Perspectives*. In press.

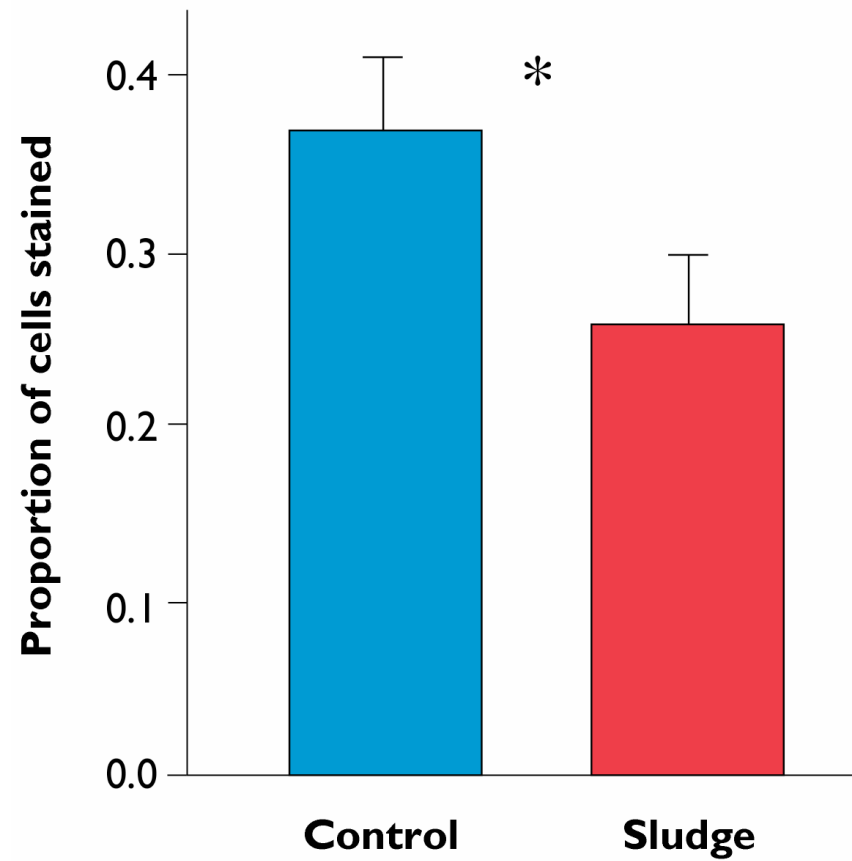
# Preliminary results

## Fetal ovary



# Preliminary results

Index of T lymphocyte activity  
in fetal cervical lymph node



# Conclusions and implications

- **EDC exposure is unavoidable**
- **Effects are subtle but there are many**

## Participants

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