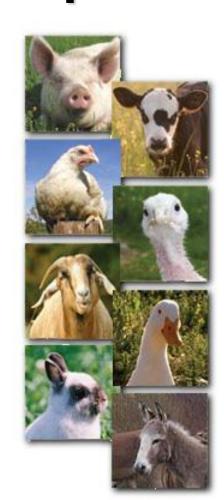
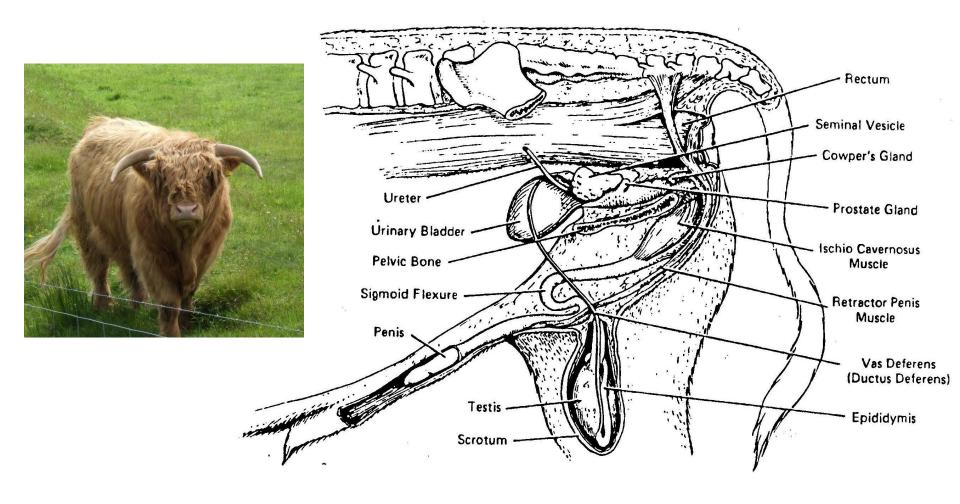
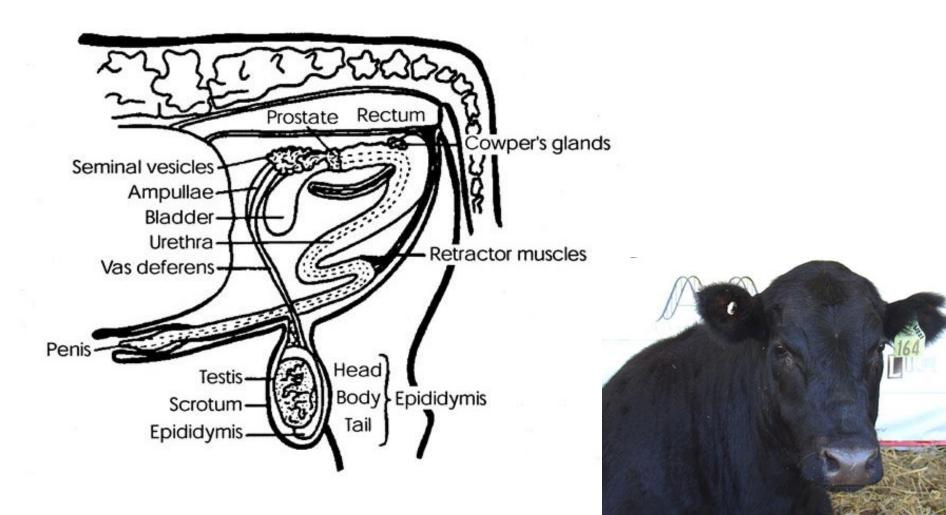
# Farm Animal: Male Reproduction



Anatomy: Reproductive Organs of Bull

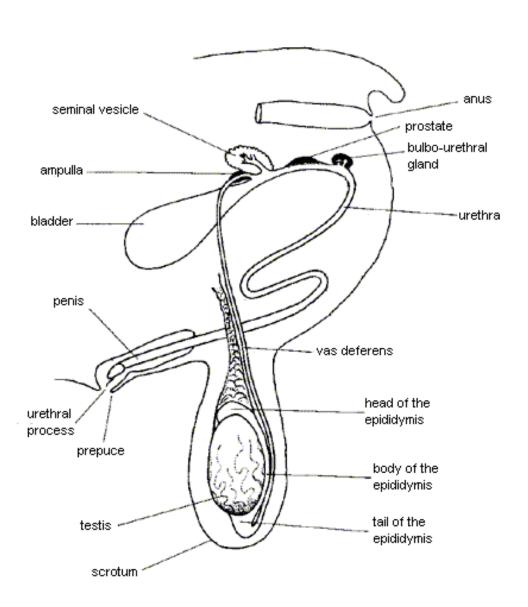


Anatomy: Reproductive Organs of Bull



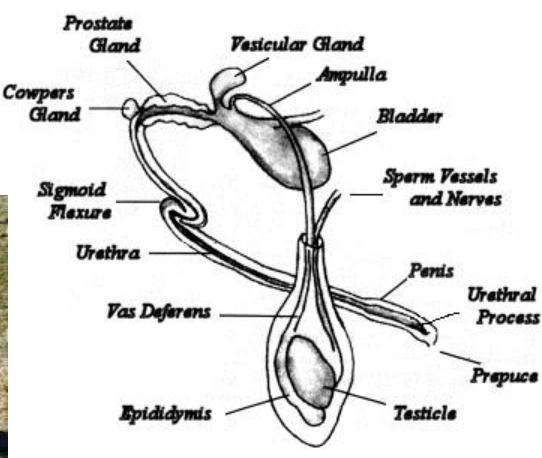
Anatomy: Reproductive Tract of Ram



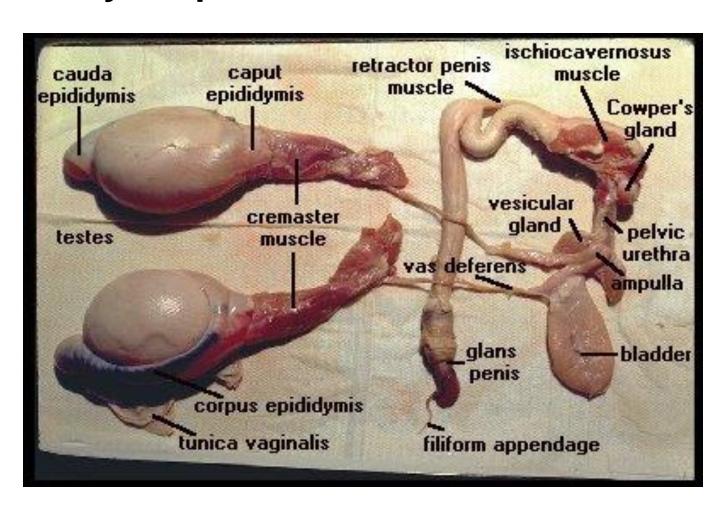


Anatomy: Reproductive Tract of Ram

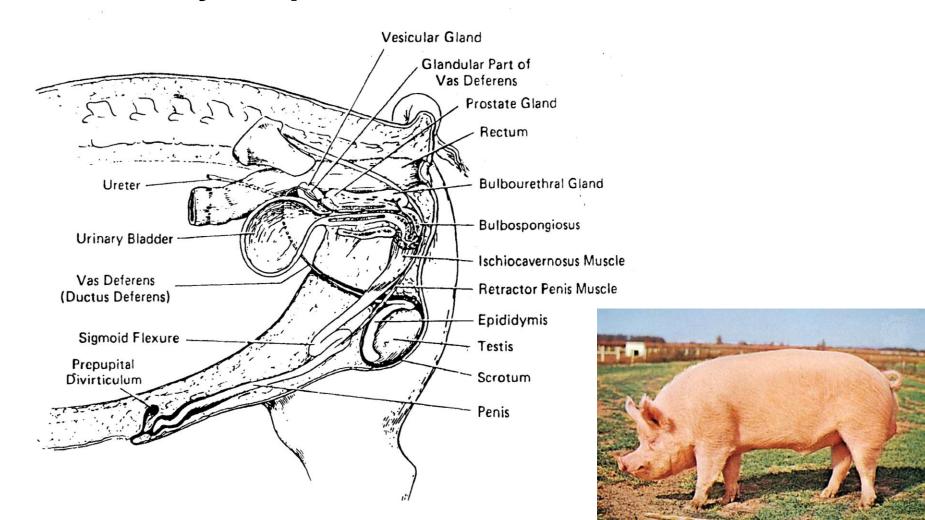




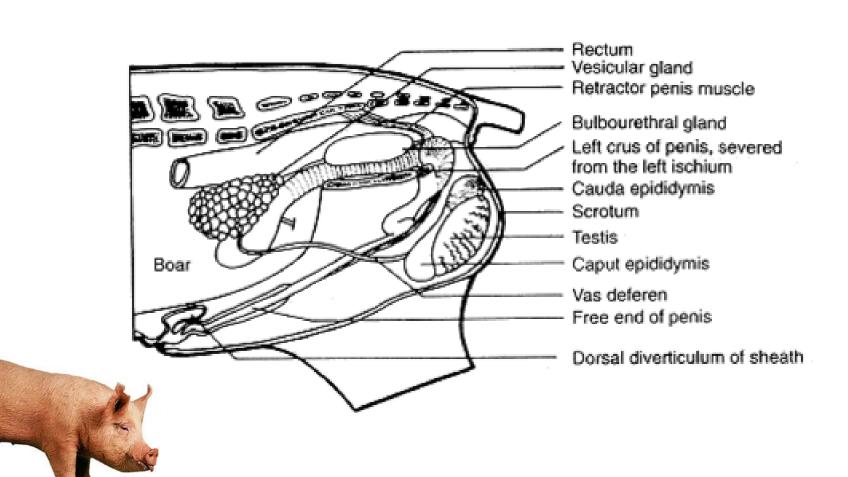
Anatomy: Reproductive Tract of Ram



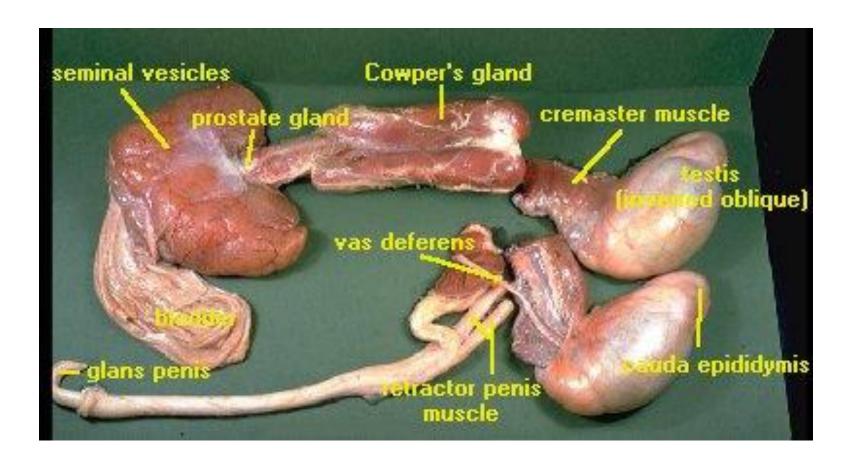
Anatomy: Reproductive Tract of Boar



Anatomy: Reproductive Tract of Boar



Anatomy: Reproductive Tract of Boar

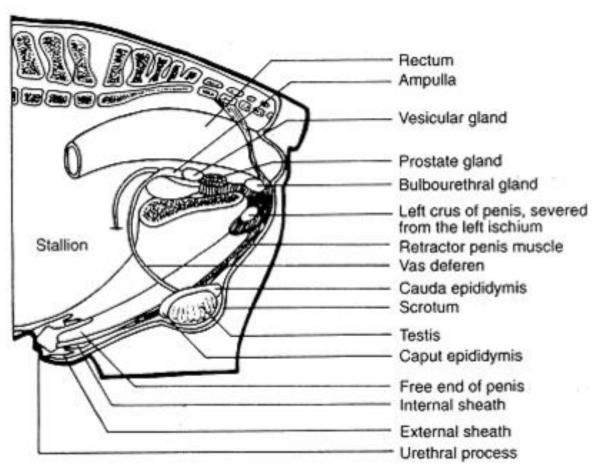


## Love those pigs!



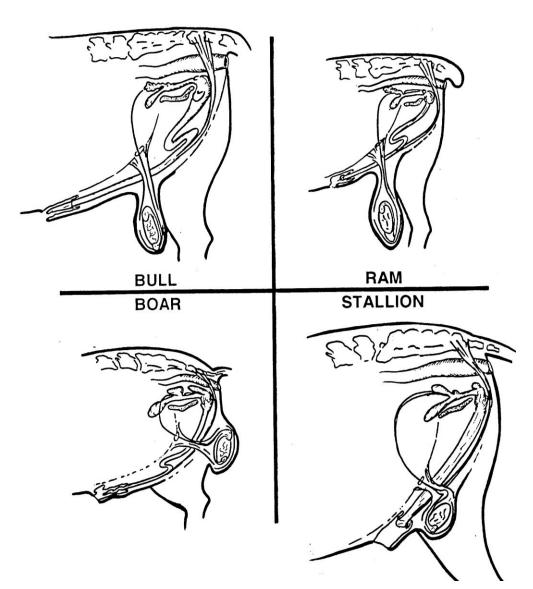
Anatomy: Reproductive Tract of Stallion



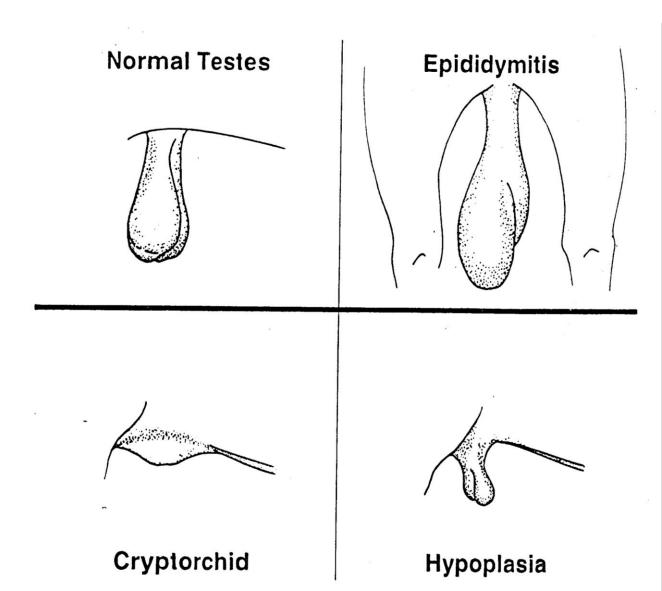




Gross Anatomy:
Male Farm Animals

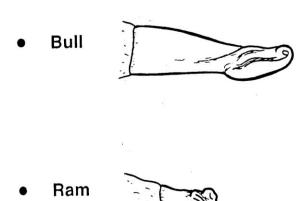


Testicular Defects:





Normal Glans Penis: Highly sensitive to find "target"

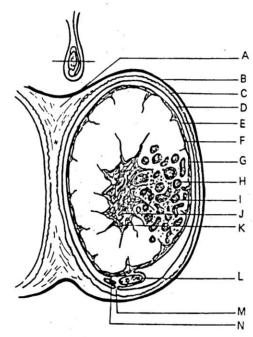




Stallion

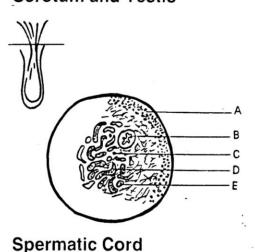


Anatomy: Scrotum;Testis & SpermaticCord



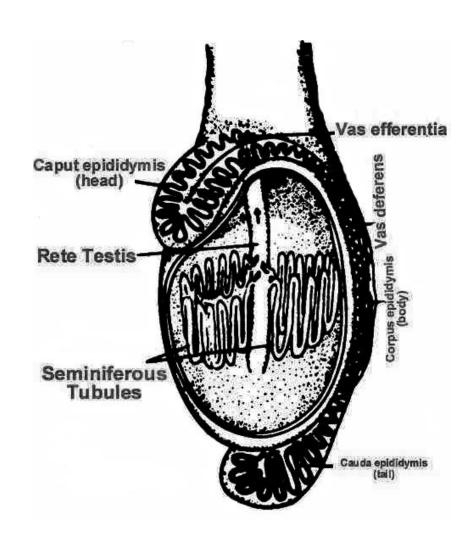
**Scrotum and Testis** 

- A. Septum
- B. Skin
- C. Dartos
- D. Tunica vaginalis (parietal)
- E. Cavity
- F. Tunica vaginalis (visceral)
- G. Tunica albuginea
- H. Semiferous tubles
- I. Interstitial cells
- J. Rete testis
- K. Mediastinum
- L. Epididymis
- M. Peritoneal fold
- N. Vas deferens



- A. Cremaster muscle
- B. Vas deferens
- C. Nerve
- D. Pampiniform plexus
- E. Lymphatic

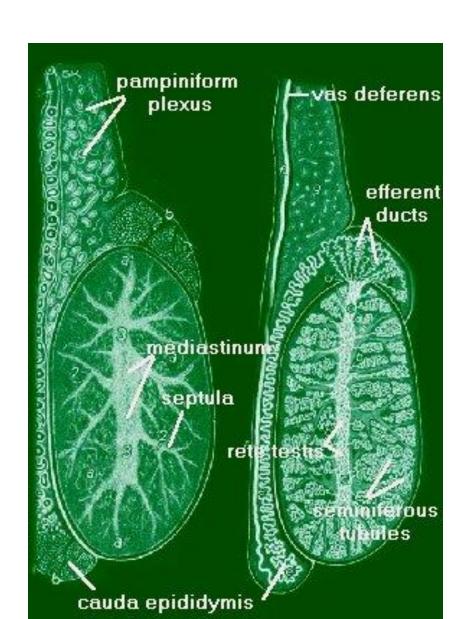
Cross-section of Testicle:



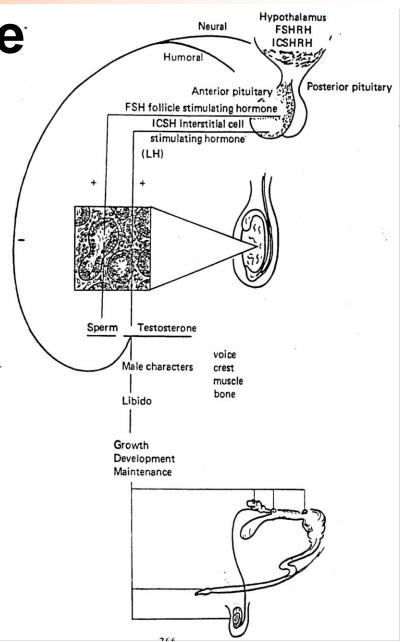
#### Anatomy: Bull Testis & Epididymis

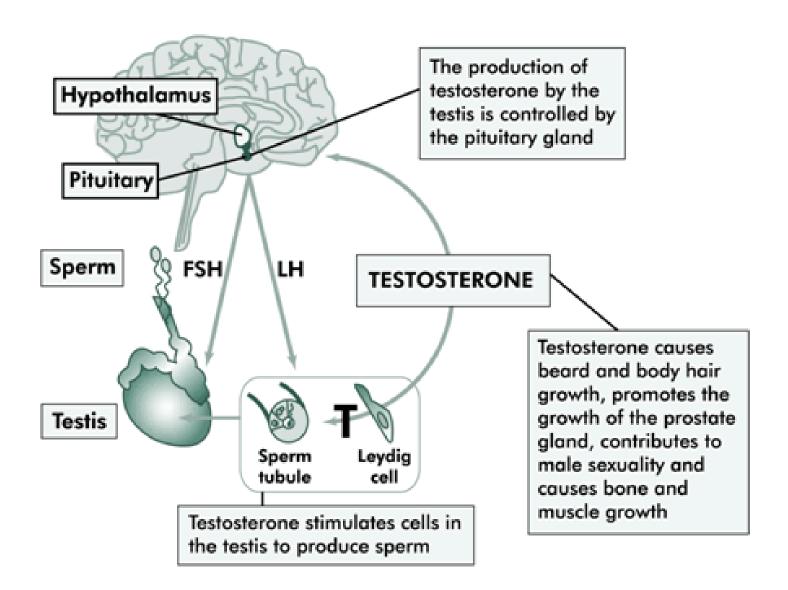




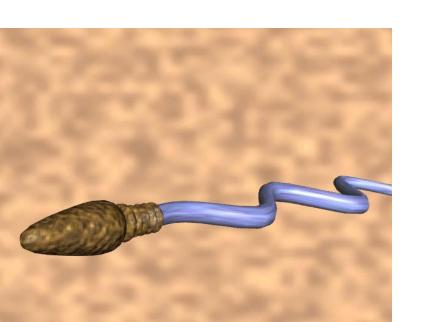


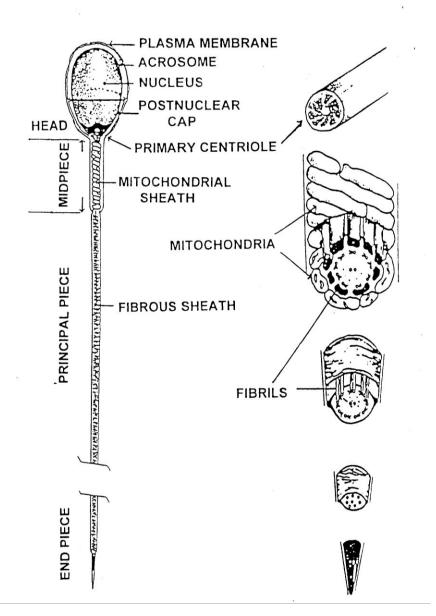
Male Hormonal Relationships:





Anatomy: Bull Sperm Cell



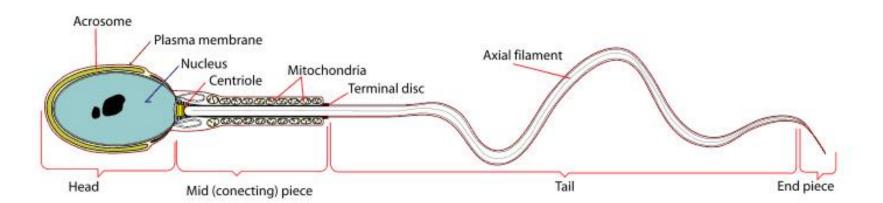




### Spermatogenesis Time

- Rams: 45-49 days
- Boar: 36-40 days
- Stallions: 55-59 days
- Bulls: 56-63 days
- Exposure to chemicals, pathogens, excess heat, electricity, etc. can cause transient or permanent sterility in the male.

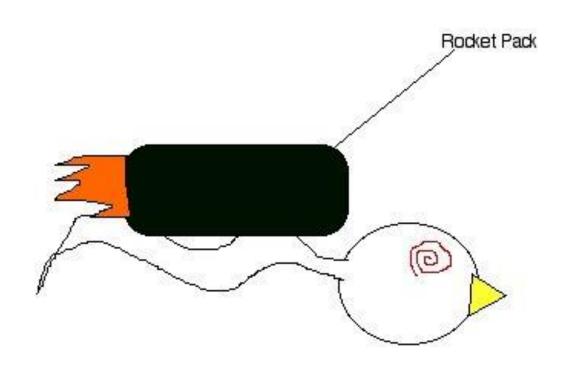
Anatomy: Sperm Cell





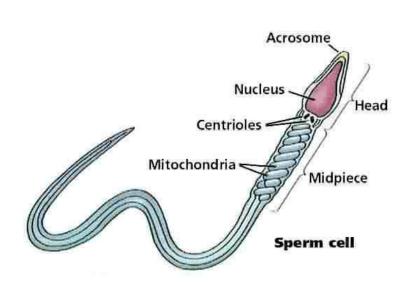


### Sperm Cell with Rocket Pack!



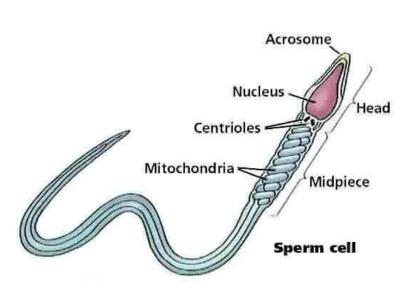
#### Primary Sperm Abnormalities:

- □ Head
  - Pyriform or pear-shaped
  - Round
  - Elongated or slender
  - Microcephalic or small
  - Macrocephalic or giant
  - Double or twin
  - Abnormal acrosome



#### Primary Sperm Abnormalities:

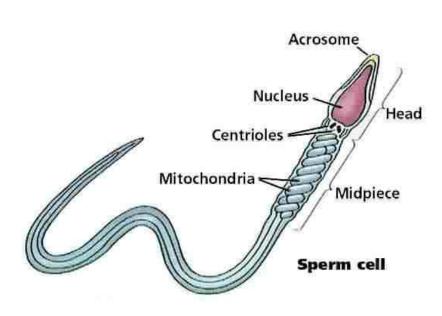
- Midpiece:
  - Bent or kinked at right angle
  - Off-center attachment or abaxial
  - Twin or double
  - Enlarged or swollen



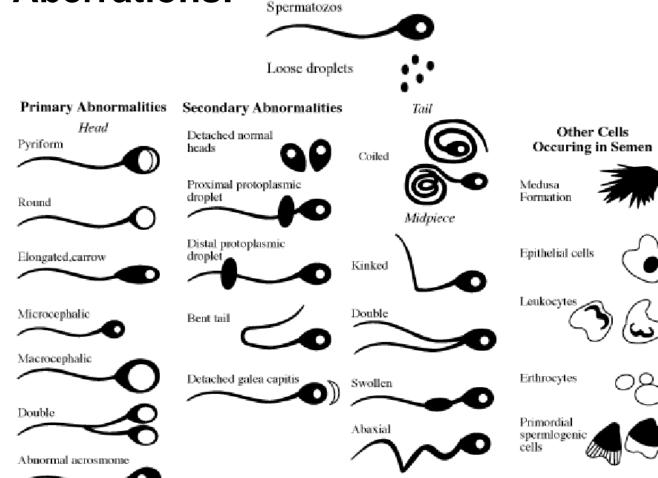


#### Primary Sperm Abnormalities:

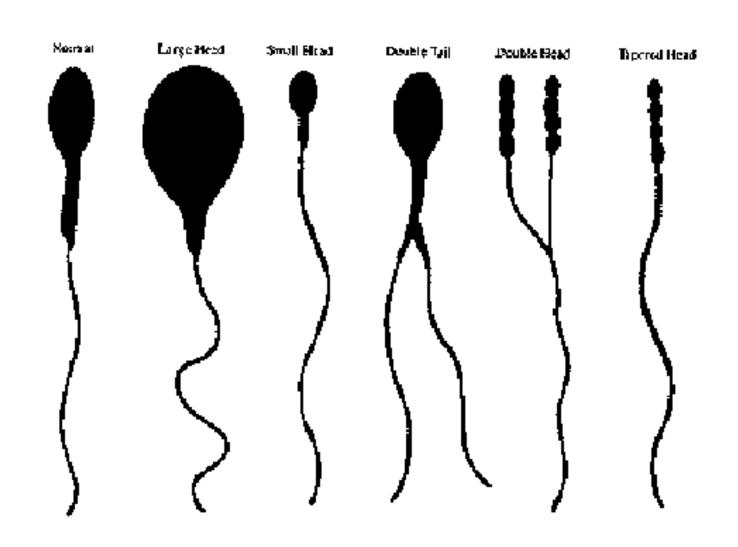
- □Tail:
  - Coiled or curled
  - Double tail
  - Bent tail

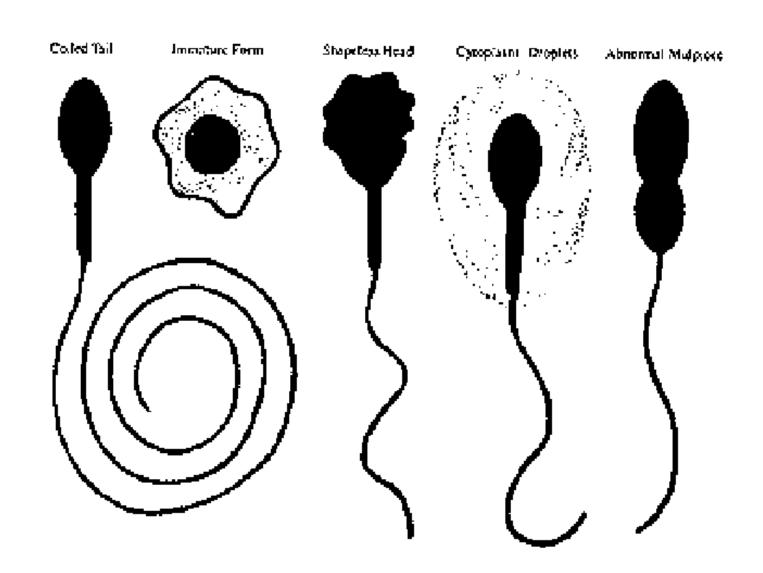


Sperm Aberrations:

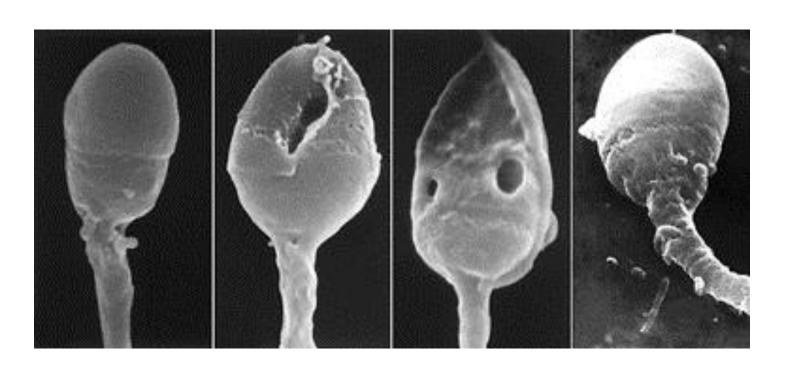


Normal

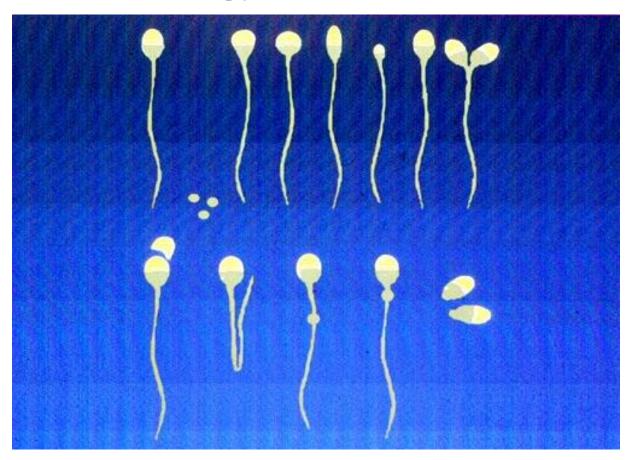




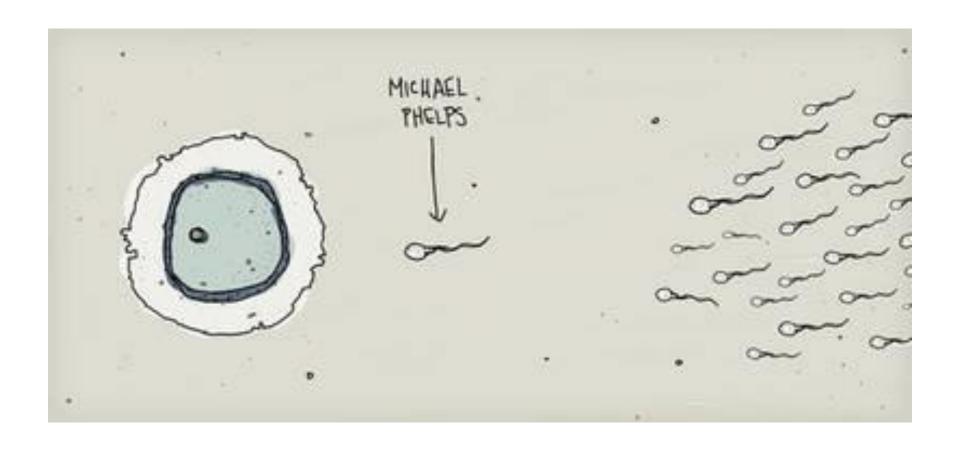
Abnormal Sperm Heads:



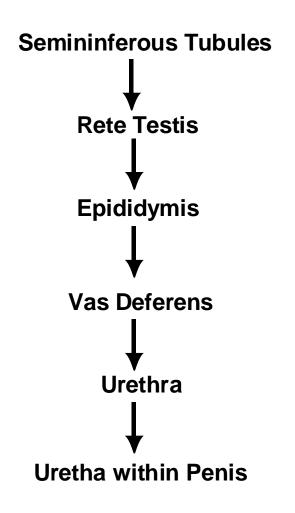
Sperm Morphology:

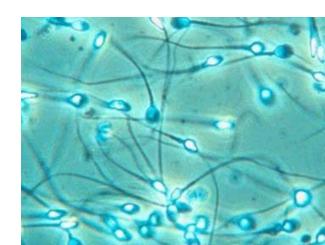


### M.P. In the beginning

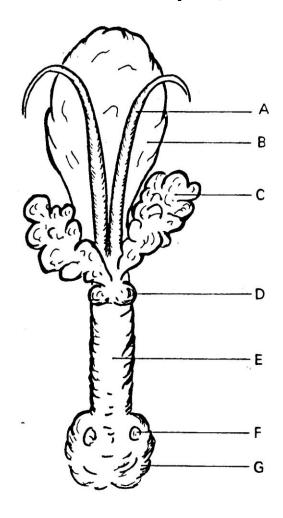


#### **PATHWAY FOR SPERM**





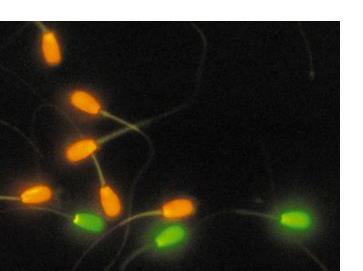
Male Accessory Glands:



- A. Ampulla
- B. Bladder
- C. Vesicular glands
- D. Prostate gland
- E. Uretha
- F. Buibourethral glands
- G. Bulbourethral muscle

#### Semen = Sperm Cells + Fluids from

- ! Ampulla (not present in swine)
- ! Seminal vesicles
- ! Prostate
- ! Cowper's gland (aka bulbourethral glands)

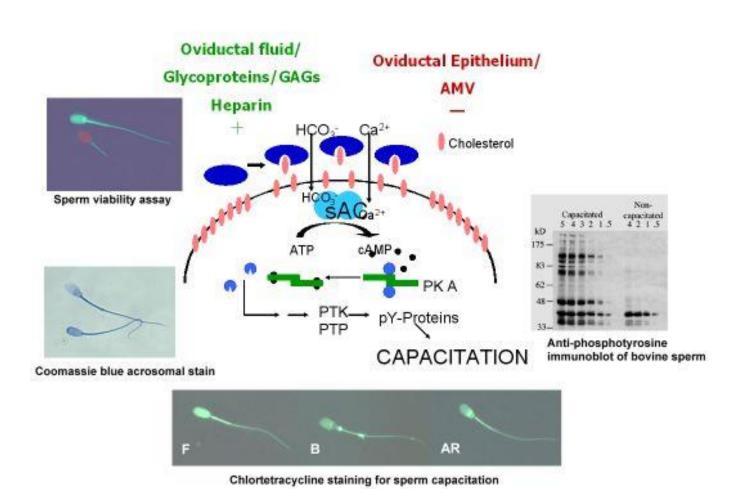


- Purposes of accessory gland fluids:
  - ☐ Add volume to the ejaculate.
  - Enhance sperm survival.
  - □ Enhance sperm movement.
  - □ Provision of nutrients for sperm.
  - □ Provision of electrolytes for sperm.
  - Lubrication for mating process.
  - Neutralization of urinary acid residues in the urethra.

- Accessory gland fluids contain:
  - Sodium chloride
  - □ Potassium chloride
  - Nitrogen
  - □ Citric acid
  - □ Fructose
  - □ Several vitamins

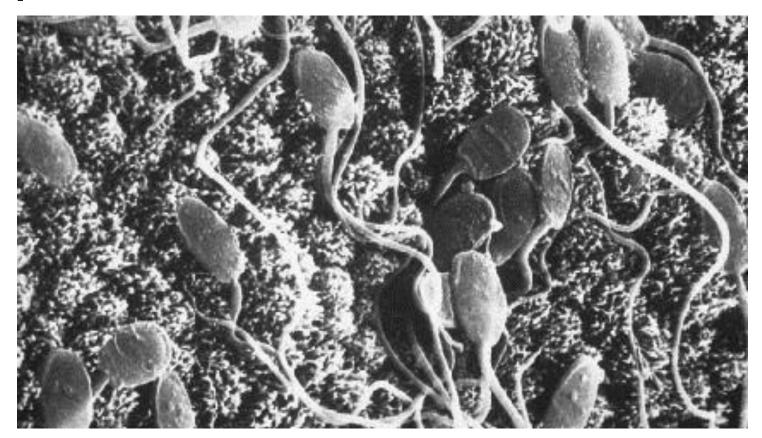


Sperm Capacitation:

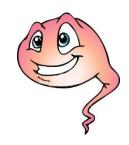


### Reproduction

Sperm Near Ovum:

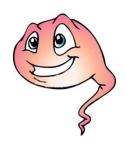






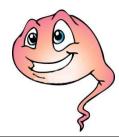
EJACULATE & SEMEN CHARACTERISTICS					
	Bull	Ram	Boar	Stallion	Man
Time lapse for ejaculation	1 sec	1 sec	5-25 min	30-60 sec	
Point of semen deposition	os cervix	os cervix	cervix	os cervix	os cervix
Ejaculate volume (ml)	5-15	0.8-1.2	150-200	40-100	2.0-6.0





EJACULATE & SEMEN CHARACTERISTICS					
	Bull	Ram	Boar	Stallion	Man
Composition of ejaculate	Single fraction	Single fraction	Fractionated: -sperm free -sperm rich -coagulum	Fractionated: -sperm free -sperm rich -mucus	Coagulated single fraction
Concentration sperm/ml x10 <sup>6</sup>	800- 1200	2000- 3000	200-300	200-500	50-150
Total sperm /ejaculate x10 <sup>9</sup>	4-18	1.6-3.6	30-60	8-50	0.1-0.9

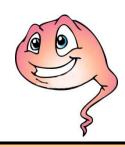




EJACULATE & SEMEN CHARACTERISTICS					
	Bull	Ram	Boar	Stallion	Man
Average % Motile*	75	95	70	70	65
Average % Normal*	95	95	90	90	60

<sup>\*</sup>This figures depend upon the overall health and freedom from disease and parasites as well as nutrition of the individual.

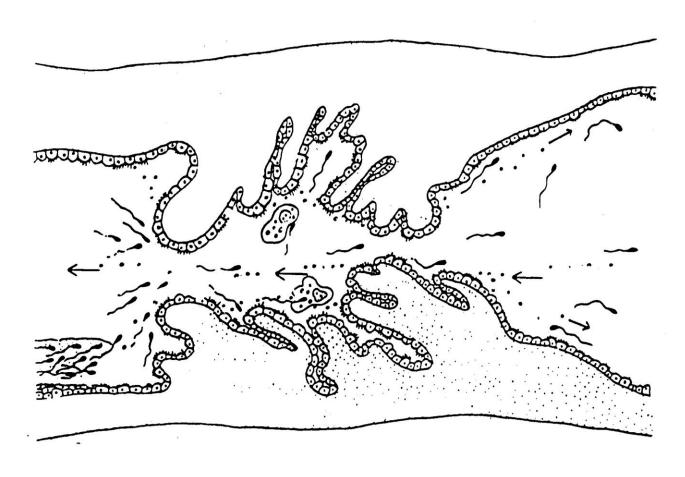




THE EJACUI	LATE AND ITS OF FERTI	TRANSPORT LIZATION	TO THE SITE
Species	Site of Deposition	Time from Ejaculation to Presence in Oviduct (min)	Number of Sperm Reaching Site of Fertilization
Cattle	Vagina	12-13	4,200-27,500
Sheep	Vagina	8	600-5,000
Swine	Cervix & Uterus	30	Few
Horses	Cervix & Uterus	-	-
Human	Vagina	30	Few

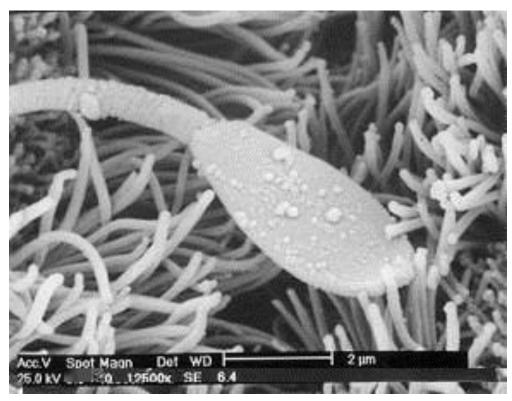
#### **Reproduction - Mating**

Sperm Moving Against the Mucous Current of the Cervix and Leucocytes Phagocytizing:

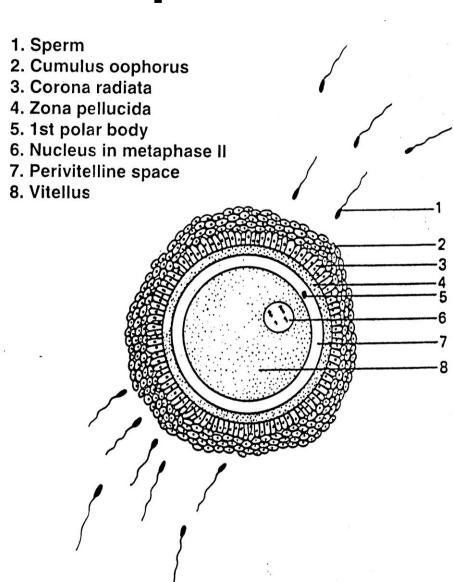


#### **Reproduction - Mating**

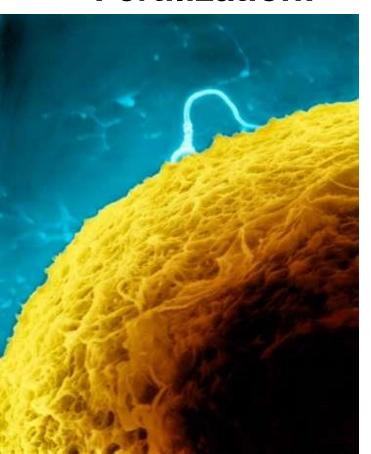
Sperm at Entrance to Oviduct @ 18 hrs. after mating.

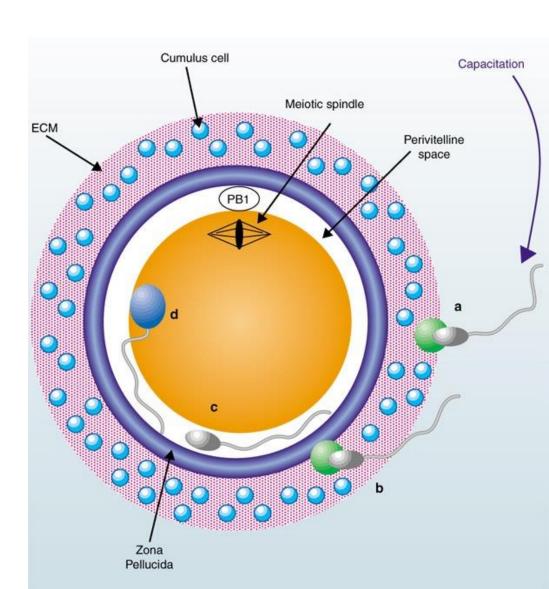


Sperm
Approaching the Egg Cell Mass:

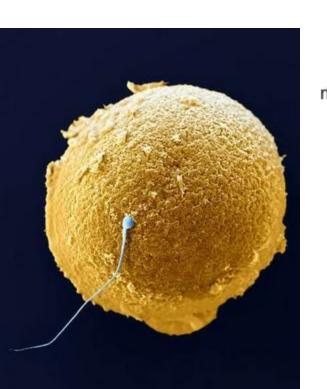


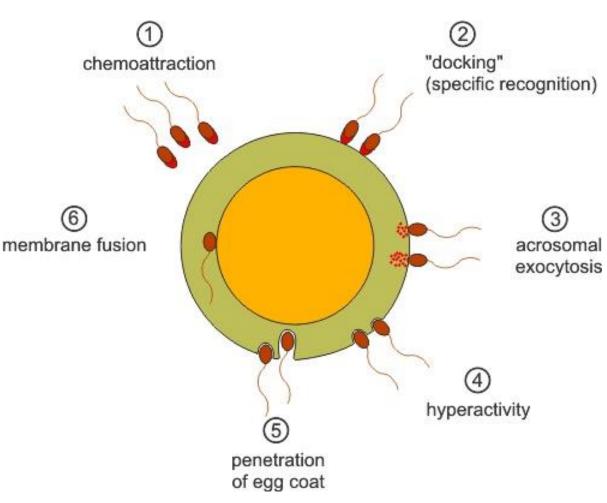
Process of Conception or Fertilization:

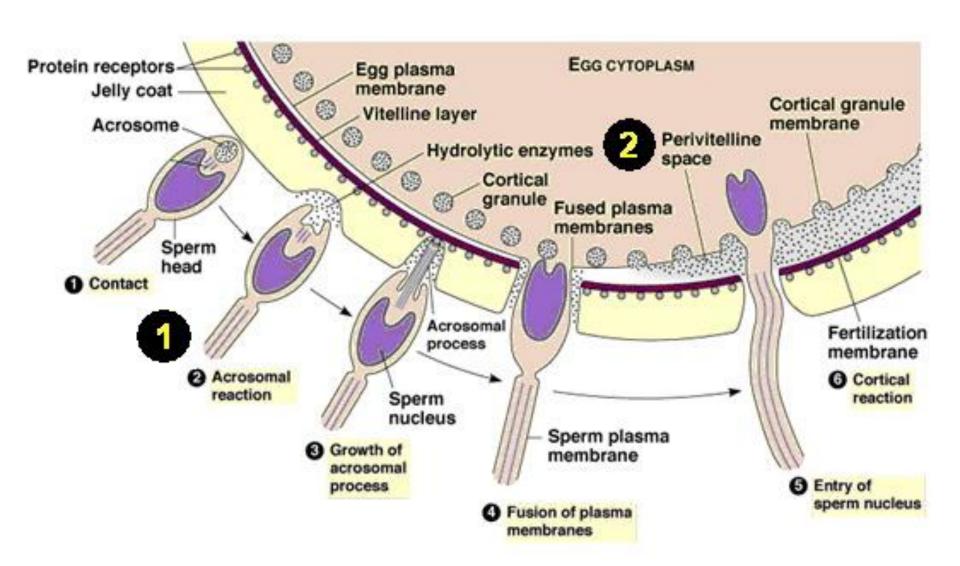




Steps to Conception:









#### Implantation:

- □ Fertilized ovum moves down the Fallopian Tube (Oviduct) to the Uterus.
- Zygote survives on Yolk and Uterine Milk (Uterine secretions until contact is made between the maternal and fetal membranes).
- □ This initial contact is called **Implantation** or **Nidation**.

- Implantation (continued):
  - □ After **Implantation**, the developing embryo to fetus obtains nourishment from it's dam.
  - □ Implantation is a gradual process:

Ewe

10-18 days

Sow

12-24 days

Cow

12-30 days

Mare

30-60 days

- Implantation (continued):
  - □ Types of Abnormal Implantations:
    - Ovarian Young seldom survive to full term.
    - **Tubal** Young occasionally survive to birth.
    - Abdominal Young do not survive to full term.

- Three (3) Primary Placental Membranes:
- Amnion innermost
- 2. Allantois middle
- 3. Chorion outermost

#### Placentation:

- Each embryo usually have their own set of membranes.
- Two individual embryos may fuse, resulting in a common blood supply.
- Twins in cattle have common membranes and a common blood supply.
  - Having common membranes and blood supply results (>90% of the time) in Freemartin condition of heifer (Freemartinism).

- Placentation (continued):
  - □ Intrauterine Migration distribution of young embryos equally in uterine horns in sow, bitch, and other litter bearing animals.

#### Placentation (continued):

- □ Early in gestation, young embryos develop membranes to provide for protection and nourishment.
- □ These membranes are called Fetal Membranes.
- □ Amnion the innermost membrane which surrounds the embryo/fetus.
  - Developing fetus is suspended in this fluid.

- Placentation (continued):
  - □ Chorion the outermost layer of Fetal Membranes that makes contact with the maternal uterine tissue.
  - □ Ruminants are Cotyledonary type of Chorionic attachment.
  - □ Contacts are made only at certain points in the uterus called Caruncles.

- Placentation (continued):
  - □ Sow and Mare have a Diffuse type of Chorionic attachment.
    - Contact is made over most of the Chorion surface with the uterus.
  - □ Outer portion of **Allantois** is fused with the **Chorion** and the inner layer with the **Amnion**.
  - The formed sac or space is filled with Allantoic Fluid that accumulates waste from the developing fetus.

- Placentation (continued):
  - □ Placenta is formed by the fusion of the Chorion and the Uterine Mucosa.

#### Function of the Placenta:

- Transmission of nutrients from dam to young.
- Transmission of wastes from young to dam.
- Protection of young from shock and adhesions by means of **Amniotic Fluid**.
- Prevention of bacteria and other large molecular substances from dam to young.
- The secretion of certain hormones; HCG (woman) and PMSG (mare), and progesterone.

#### Placental Barrier:

- Prevents large molecules such as antibodies and large amounts of fat soluble vitamins from passing in large amounts from mother to young.
- Viruses that are small enough to penetrate the Placental Barrier can cause defects in young.
  - Developing young are susceptible to viral infection because they have not produced their own antibodies.(BVDV in cattle)
- Certain other chemical substances in the dams ration penetrate the Placental Barrier and may cause congenital defects.

EMBRYOLOGICAL DEVELOPMENT IN THE CALF			
Period	Age (days)	Change	
Ovum	1	Two cell blastomere in oviduct	
	4	Zygote reaches uterus (8-16 cell stage)	
	7	Blastula	
	8	Zona pellucida breaks up	
	9	Germ cell disc	
	12	Entoderm developing	
Embryo	13	Gastrulation	

EMBRYOLOGICAL DEVELOPMENT IN THE CALF				
Period	Age (days)	Change		
Embryo	14	Mesoderm, coelom		
	21	Heart begins to beat; lungs, liver, and pancreas begin to develop from the foregut; early kidney and reproductive tract begins		
	22	Neural groove closes to form brain and spinal cord		

EMBRYOLOGIC	EMBRYOLOGICAL DEVELOPMENT IN THE CALF				
Period	Age (days)	Change			
Embryo	22	Head region recognizable, branchial arch, optic and otic vesicles			
	23	Allantois well developed			
	25	Forelimb buds appear			
	27	Hindlimb buds appear			
	30	Limb buds change to legs and toes, tail grows, eyes and nostrils become apparent			

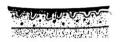
EMBRYOLOGIC	EMBRYOLOGICAL DEVELOPMENT IN THE CALF				
Period	Age (days)	Change			
Embryo	30	First placental plates appear			
	32	Pregnant horn filled to tip with membranes; Allantoic sac fills chorionic sac in pregnant horn of uterus			
	33	Fragile cotyledonary attachment			
	36	Allantoic sac extends full length of chorionic sac			

EMBRYOLOGICAL DEVELOPMENT IN THE CALF			
Period	Age (days)	Change	
Fetus	38	Attachment begins	
	70	Bones begin to ossify	
	90	Hair follicles appear	
	100	Horn pits show up	
	110	Tooth development begins	
	150	Hair around eye and muzzle region	
	230	Hair covering body	
	280	Birth	

Attachment of the Placental Membranes to the Uterus:

1. Chorioallantois	3. Endometrium
2. Placentome	4. Myometrium

Diffuse - Mare, Sow







**Cotyledonary - Cow** 







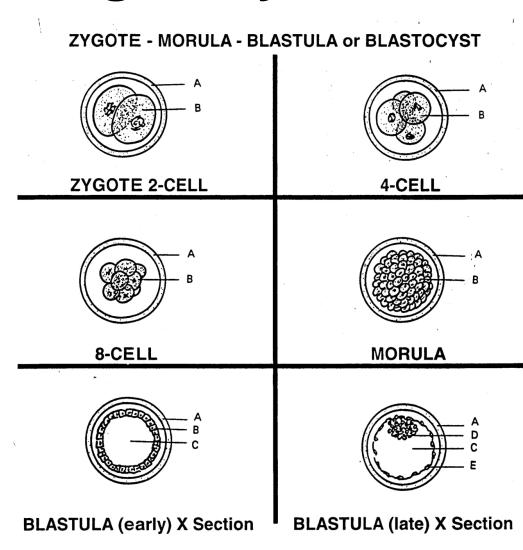
**Cotyledonary - Ewe** 







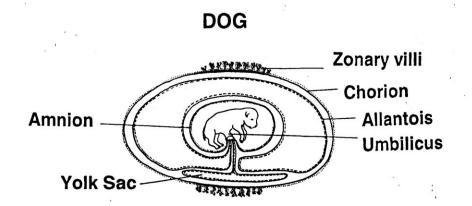
Early Embryonic Development:



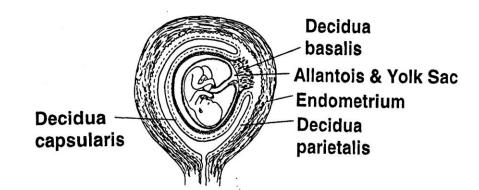
A. Zona pellucida C. Blastocoele E. Trophoblast

B. Blastomere D. Inner cell mass

Types of Fetal Membranes:



#### MAN

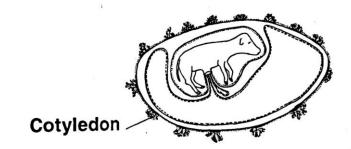


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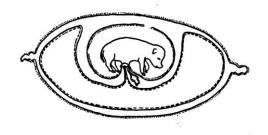
## **Reproduction - Pregnancy**

**CALF** 

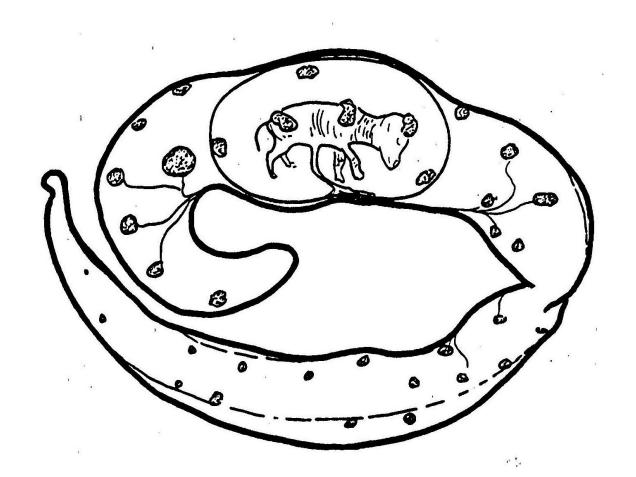
Types of Fetal Membranes:



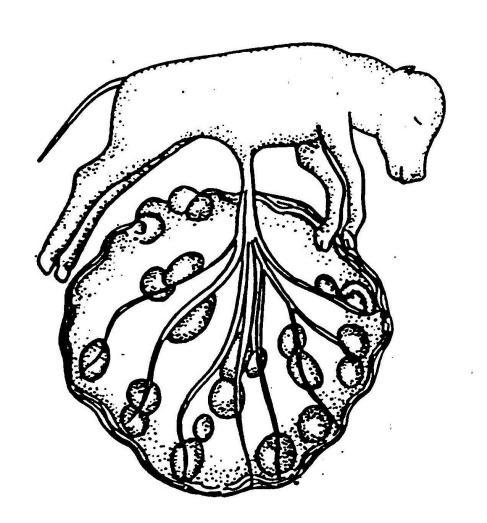
**PIG** 



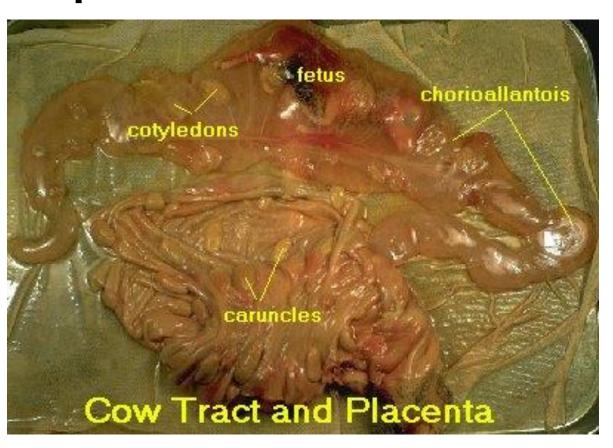
90 Day Calf Fetus:



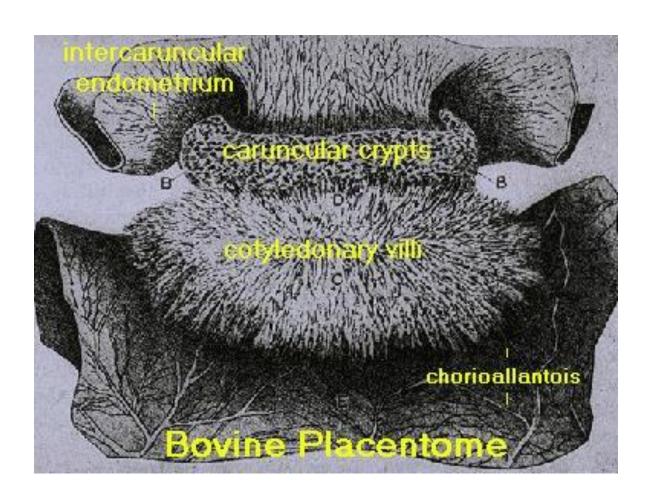
Portion of the Placenta from a 4-Month Pregnant Cow:



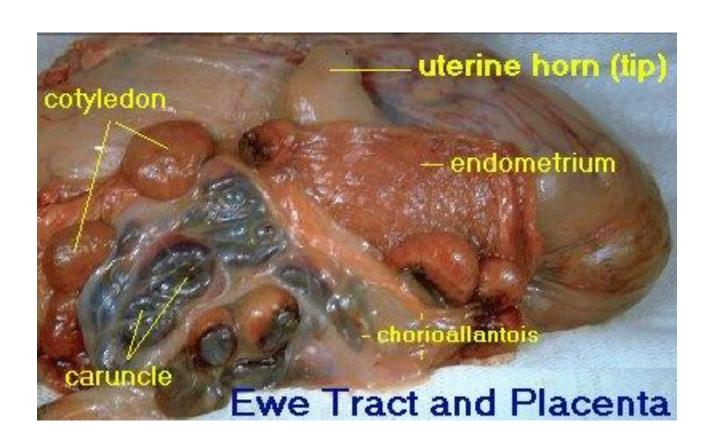
Cow Reproductive Tract and Placenta:



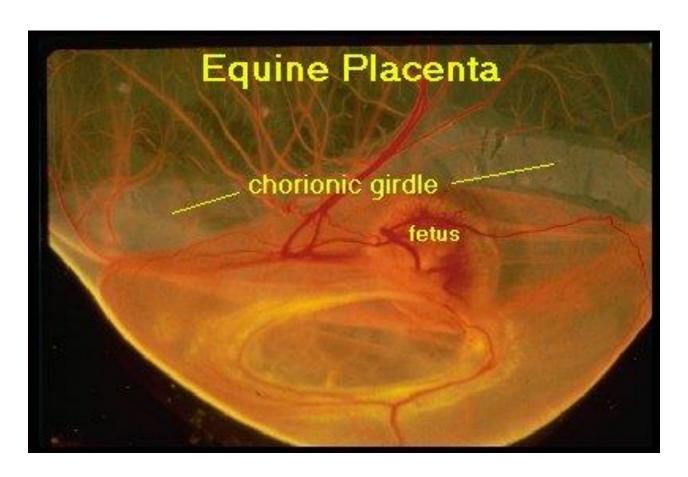
Cow Placentome:



Ewe Reproductive Tract and Placenta:

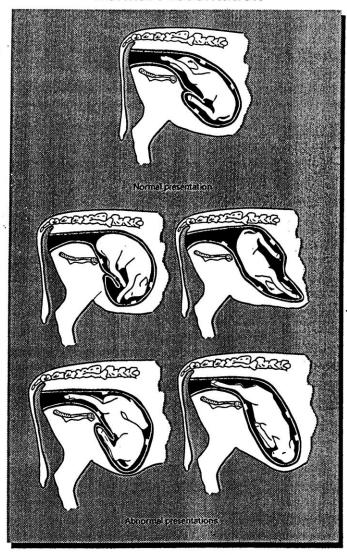


Mare Placentation:



#### Reproduction - Parturition

 Normal and Some Abnormal
 Presentations of the Calf at Parturition: **Normal Presentation** 



**Abnormal Presentations** 

## **Parturition**



#### **Reproduction - Parturition**

#### REPRODUCTIVE FUNCTION AFTER PARTURITION

	Dairy Cattle	Beef Cattle	Sheep	Swine	Horses
Parturition to Ovulation (days)	20 (10-50)	62 (35-102)	18 <sup>a</sup>	9 <sup>b</sup> (7-12)	12 (9-16)
Estrus (days)	34 (20-70)	63 (40-110)	35ª	7 <sup>b</sup> (4-9)	8 (5-12)
Uterine Involution (days)	45 (32-50)	45 (32-50)	27 (20-35)	24 (18-30)	20 (10-40)

<sup>&</sup>lt;sup>a</sup> After parturition during the breeding season. The first ovulation after parturition in sheep and dairy cattle is seldom accompanied by estrus. Ovulation and estrus may be delayed by months after parturition during seasonal anestrus in sheep and horses.

<sup>&</sup>lt;sup>b</sup> Days postweaning.



## Reproduction-Parturition

- The placenta should be expelled within a few hours after the fetus.
- Failure of expulsion=Retained Placenta or Retained
   Fetal Membranes
- The female's immune system is responsible for breaking down the connection between the chorion and the endometrium.
- Any stressors around parturition can lead to RP/RFM
- RP/RFM leads to endometritis and pyometra

# Questions?

