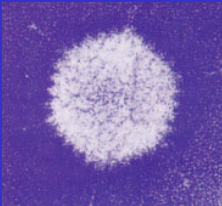


Arbortifacients (infectious)

Viral agents (current listing for cattle)

- Akabane
- pestivirus
- blue tongue
- parainfluenza

- Rift Valley fever
- malignant catarrhal fever
- infectious bovine rhinotracheitis




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Arbortifacients (infectious)

Bacterial agents (current listing for cattle)

- brucellosis (*Brucella*)
- listeriosis (*Listeria*)
- vibriosis (*Campylobacter*)
- leptospirosis (*Leptospira*)
- *Salmonella, Chlamydia, Staphylococcus, Haemophilus, Yersinia, Corynebacterium, Nocardia, Aeromonas, Mycoplasma, Fusobacterium, Ureaplasma, Bacillus, Escherichia, Pseudomonas, Pasturella, Streptococcus*




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Arbortifacients (infectious)

Mycotic agents (current listing for cattle)

- *Candida*
- *Aspergillus*
- *Rhizopus*
- *Absidia*
- *Mucor*




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Arbortifacients (infectious)

Protozoal agents (current listing for cattle)

- *Trypanosoma*
- *Trichomonas*
- *Sarcocystis*
- *Neospora (Toxoplasma/Hammondia??)*



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Congenital infections

TORCH

Toxoplasma/Treponema

Other (varicella-zoster/*Listeria/Mycobacterium*)

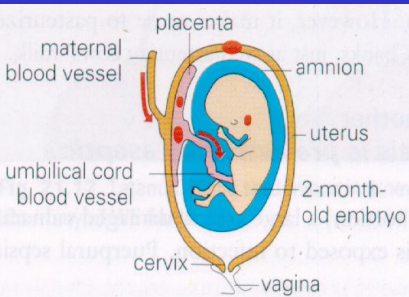
Rubella (German measles)

Cytomegalovirus/*Chlamydia*

Herpes-simplex/Hepatitis-B/HIV

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Pre-natal (*in utero*) infection



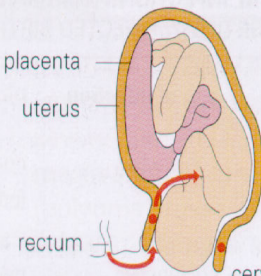
maternal blood vessel → placenta → umbilical cord blood vessel → 2-month-old embryo

maternal → placental → fetal infection

e.g. rubella, CMV, HIV

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Peri-natal (birth) infection

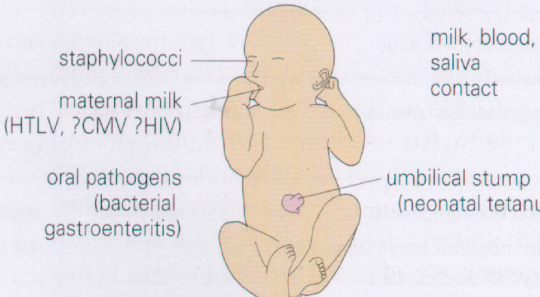


maternal blood; passage down infected birth canal
e.g. gonococcal, chlamydial conjunctivitis; group B hemolytic streptococci; *Escherichia coli*

placenta
uterus
rectum
cervix

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Post-natal infection



staphylococci
maternal milk (HTLV, ?CMV ?HIV)
oral pathogens (bacterial gastroenteritis)

milk, blood, saliva contact
umbilical stump (neonatal tetanus)

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Exemplar - rubella

- distinct from rubeola (common measles) which is caused by RNA paramyxovirus and is characterized by Koplik spots & rubeola (rash)

Rubella = German measles

- caused by RNA togavirus
- mild maternal disease but profound congenital syndrome as foetus very susceptible in first trimester (period of organogenesis)

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Congenital rubella

Developmental abnormalities

| | |
|---------|---|
| brain | small brain size, mental retardation |
| eye | cataract, microphthalmia, blindness |
| ear | hearing defect, deafness |
| heart | patent ductus arteriosus, patent interventricular septum |
| liver | hepatomegaly, thrombocytopenia |
| spleen | splenomegaly, anaemia |
| general | low birth weight, failure to thrive, increased infant mortality |

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Rubella

- rash
- cataract
- vegetative state (institutionalization)




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Rubella

Vaccination program

- huge success
- MMR (combined measles, mumps, rubella)
- live attenuated virus
- nonetheless, virus still present (third world, non-compliance, anti-vaccination groups)

Insist on antenatal screening

- identify infected individuals
- identify those at-risk

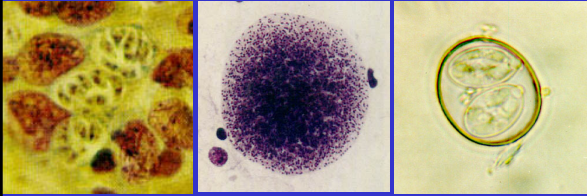
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Exemplar - *Toxoplasma*

- sporozoan (spore-forming) parasite
- apicomplexan (obligate intracellular dev.)
- single species *T. gondii* infects most mammals
 - tachyzoites (schizonts/meronts) in macrophages
 - bradyzoites (tissue cysts) in muscle/brain
- high prevalence (25-75% seroprevalence)
- life cycle only discovered in 1970's

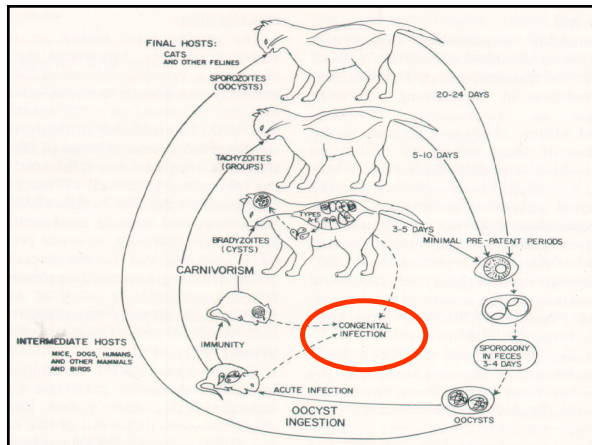
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Toxoplasma gondii




| | | |
|---------------------------------------|-----------------------------|------------------------|
| schizonts tachyzoites | tissue cysts bradyzoites | oocysts sporozoites |
| intermediate host most vertebrates | | definitive host cat |

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Complications



DISEASE
 infected during pregnancy
 1st trimester - abortion
 2nd trimester - stillbirth
 3rd trimester - congenital abnormalities

TREATMENT
 pyrimethamine
 + sulfadiazine
 + clindamycin

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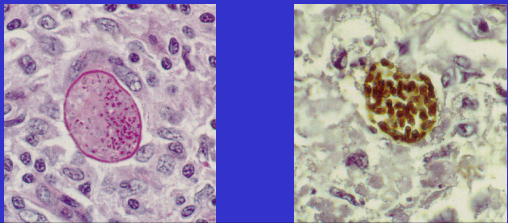
Exception to the rule!

- Toxoplasmosis does not occur in cattle
- refractory to disease for reasons unknown
- however, protozoal abortion still occurs
- due to new sporozoan named *Neospora*
- first described as agent of paralysis in dogs
- then cause of foetal abortion and neonatal mortality in cattle, goats, sheep, horses, deer

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Differential diagnosis

- Structurally similar (although *Neospora* zoites have more rhoptries and thicker cyst walls)
- Serologically distinct (no antiserum cross reactivity)



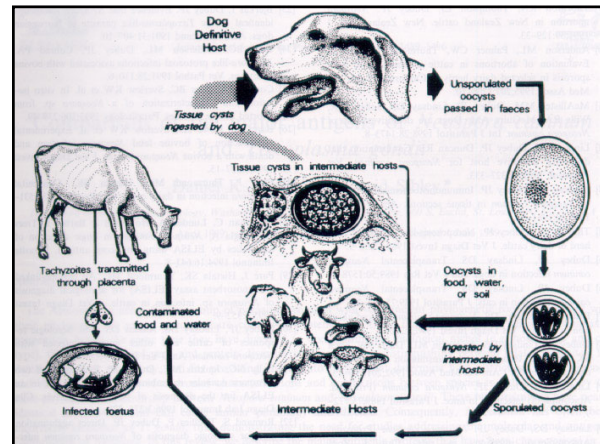
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Differential diagnosis

- Molecular characterization reveals protein and DNA differences (at variable levels)
- Different definitive hosts
 - *Toxoplasma* → cat
 - *Neospora* → dog



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Neospora serology

- cows with chronic infections may not be protected from *Neospora* abortion
- clinical disease elicits strong antibody response but it is transient (does not persist)
- cows may experience repeated abortions
- many herds have high rates of vertical transmission (calves born to seropositive cows have a high probability of infection)
- some herds have high rates of horizontal transmission (presumably from pasture contamination by dogs)

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Summary

Reproductive performance significantly impacted by infectious agents

Extremely sensitive, emotive, private issues (infertility, miscarriage, congenital infections, gross disfigurement, mental retardation, institutionalization, cost to society)

Control possible

- routine screening programs
- vaccination strategies (prophylaxis)
- timely diagnosis and treatment (therapy)
- prevention (through health education)

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Reproductive problems

Pre-implantation

- gamete production - male infertility
 - female infertility
- no fertilization - tube blockage
- no implantation - hostile uterus

Post-implantation

- foetal death
 - abortion/miscarriage
 - resorption/mummification
 - stillbirth
- live birth
 - congenital abnormalities
 - silent infection

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