Pullorum Disease

- Was once the most important disease in poultry, “Bacillary white diarrhea.”
- Regulatory programs for control were developed and administered by National Poultry Improvement Plan: Chickens, 1935, Turkeys, 1943.
- Cooperative state federal program.

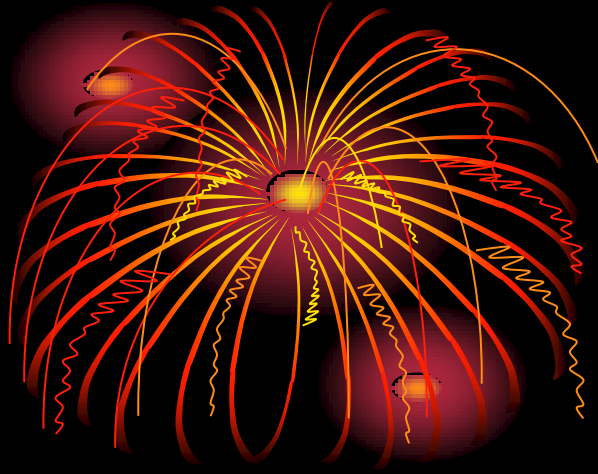
Comment

Still prevalent and important in certain countries throughout the world. Occasionally in backyard flocks in U.S. and Canada.

In 1986, an outbreak occurred in Missouri when a mail order hatchery bought eggs from backyard flocks.

Pullorum also entered commercial flocks in NC and LA in the early 1990's.

Pullorum Disease



- Controlled by test and slaughter. Eradicated in commercial poultry in USA and Canada.
- Reportable disease.

Causative Agent

- **Salmonella Pullorum**
  - **<u>Non motile</u> – Gram (-) rod**
    - **Bacteria location**
      - **Chicks and poults – internal organs, yolk sac and blood stream.**
      - **Mature birds “carriers” – ovaries, testes and gall bladder.**

Incubation Period
7 to 10 days

Course of Disease
2 to 3 weeks

Mortality
In chicks and poults less than 2 weeks old, up to 100%

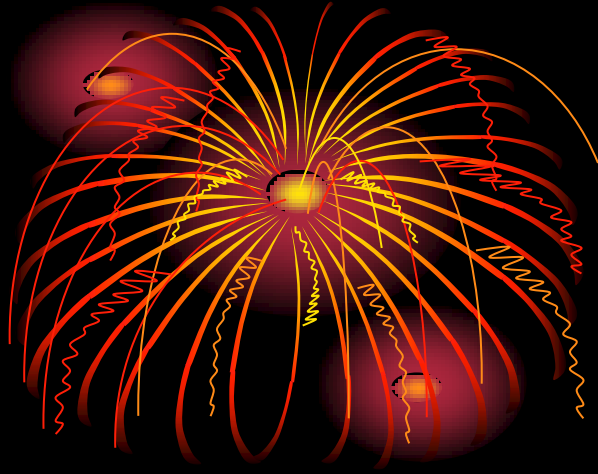
Method of Spread

- **“Carrier” layers – transovarian. This allows eradication.**
- **Infected hatchers – automated incubators allowed pooling of eggs and lateral dissemination of pullorum.**
- **“Backyard” flocks largest threat in U.S. and Canada.**

Infected Eggs

- **Dead or moribund chicks in hatcher or dead in the shell.**
- **Chick quality problems – related to breeder/hatchery contaminations.**
- **MATURE BIRDS – seldom die.**

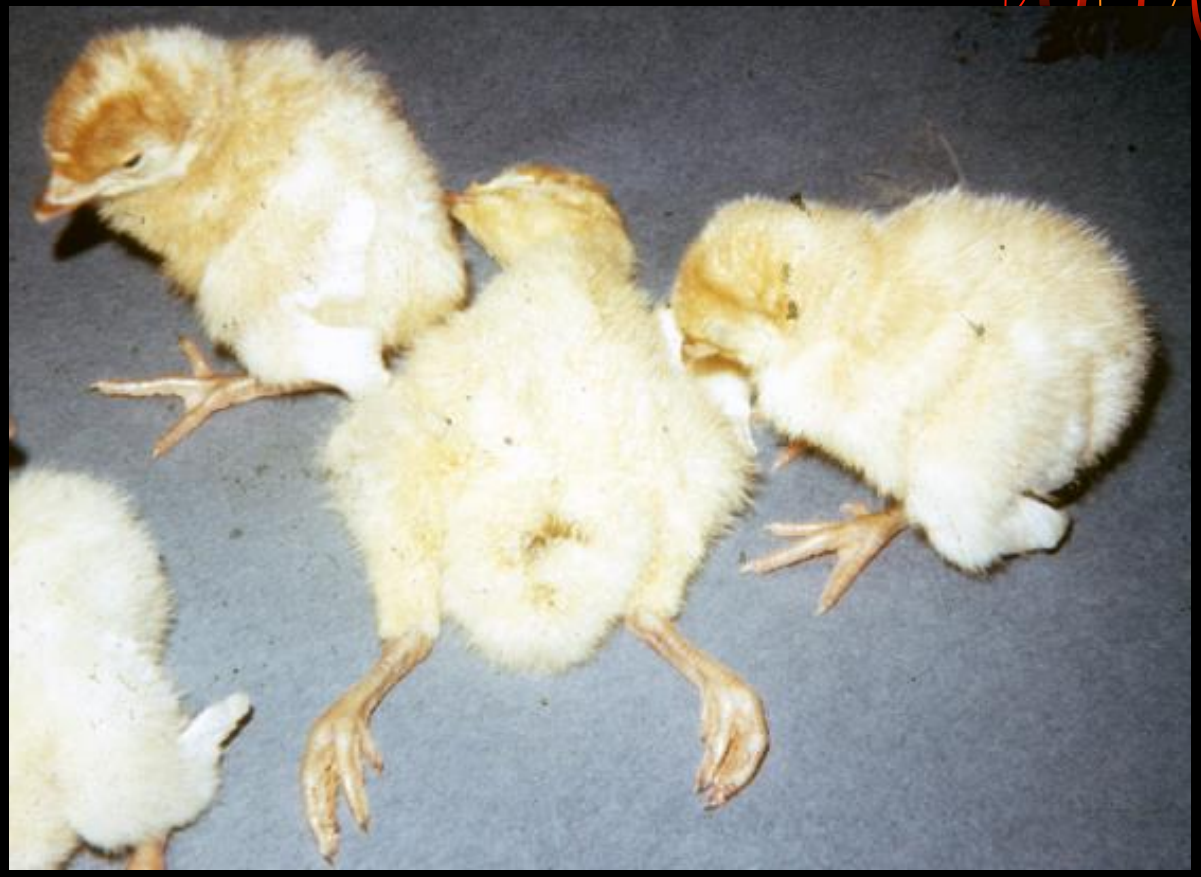
Clinical Signs



- **CHICKS AND POULTS**
  - **Some chicks may be moribund or dead soon after hatch – clinical presentation appears the same whether transovarian or hatchery transmission.**
  - **Mortality starts at 5-10 days old and peaks at 2-3 weeks of life.**

Dead in hatcher

Moribund poults

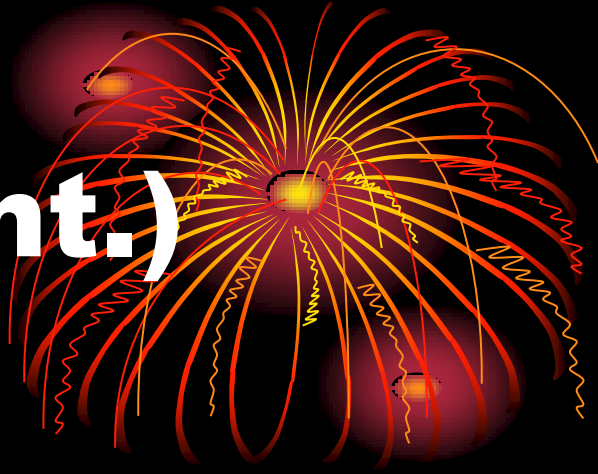


Clinical Signs (Cont.)

- Appear cold, anorexia, whitish diarrhea that causes pasted vent. Painful defecation.
  - Use caution as heat stress also causes pasty vents.

Pasty vents

Clinical Signs (Cont.)



- **ADULTS**
  - **Usually without signs**
  - **Fertility and hatchability reduced**

Postmortem Lesions

- **CHICKS AND POULTS**
  - **Peracute – lesions absent, rapid mortality.**
  - **Acute**
    - **Liver – enlarged, congested, yellow streaks with hemorrhages. Use caution with interpretation because a yellowish tinge to liver is normal in young chicks.**
    - **Omphalitis – solidified yolk. This occurs because the bacteria digests the carbohydrates in the yolk.**
      - **This produces acid which coagulates the protein.**
      - **So young birds have problems absorbing the yolk.**

Omphalitis

Omphalitis

Postmortem Lesions (Cont.)

- **White nodules in heart, liver, lungs, ceca, large intestines, and gizzard muscle.**
- **Kidneys congested and urate filled.**
- **Swollen hock and wing joints filled with exudate.**
- **Caseous cecal cores.**

Nodules in liver & heart

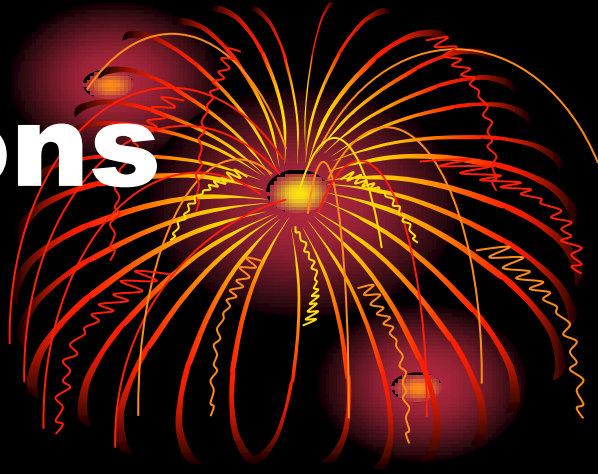
Hepatic necrotic foci

Liver foci

Cecal cores

Cecal cores

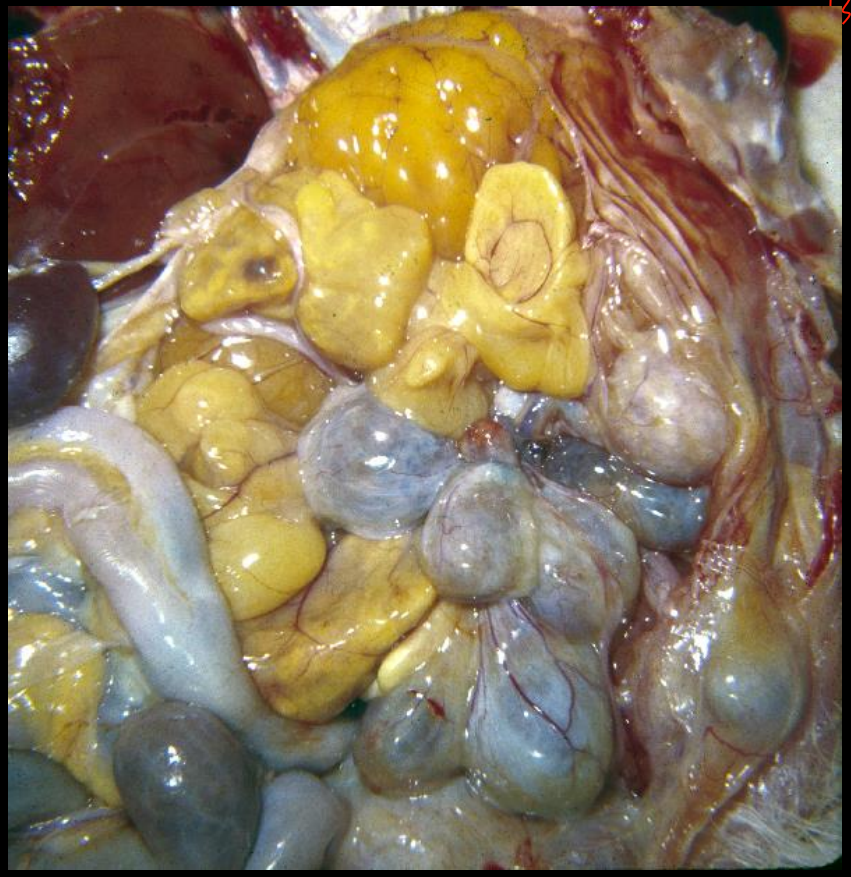
Postmortem Lesions (Cont.)



- **ADULTS**
  - **Misshapen, discolored, caseous ova.**
  - **Nodular pericarditis.**
  - **Peritonitis with internal ovulation.**
  - **Testicular abscesses.**

Misshapen ova

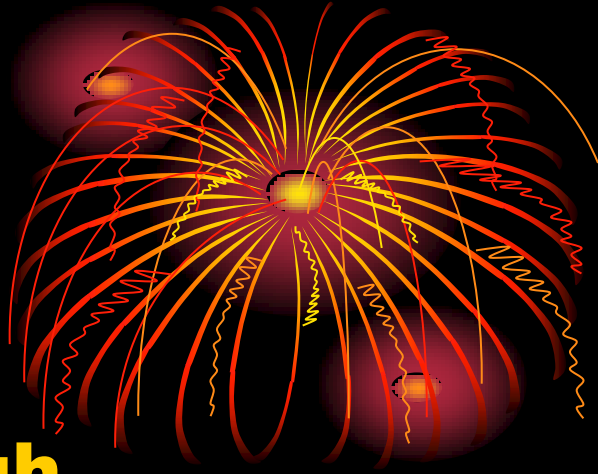
Misshapen ova



Differential Diagnosis

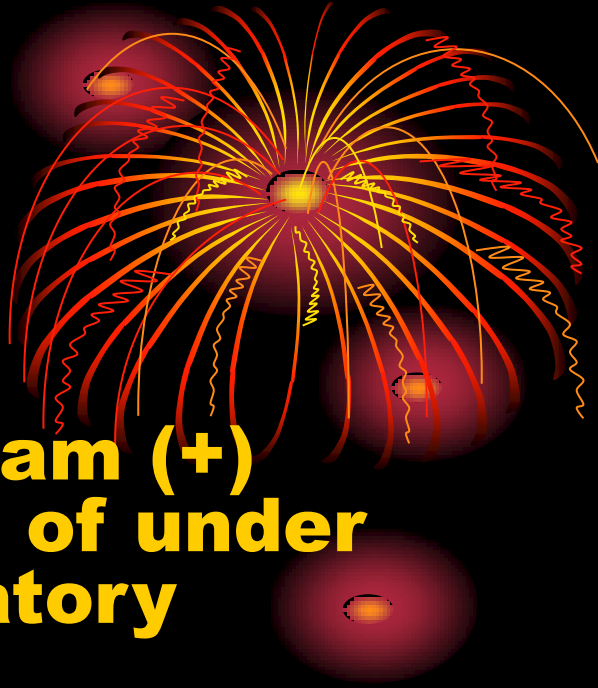
- Chilling or overheating.
- Omphalitis.
- Other Salmonellas and *E. coli*.
- In adults similar to other septicemic diseases.

Diagnosis



- **Suggestive Diagnosis – High mortality in chicks and poults during first two weeks of life plus lesions. Look for cecal cores.**
- **Positive Diagnosis – Isolation and identification of causative agent. Culture the yolk sac and gut.**
- **Agglutination Blood Test – Indicates infected breeder flocks.**

Control Program



- Voluntary regulatory program (+) reactors must be disposed of under supervision of state regulatory agency.
- Flock usually destroyed.
- Premises decontaminated as per the NPIP.
- Several cases found since 1986 originating from “mail order hatchery” in the mid-west.

Isolation & identification

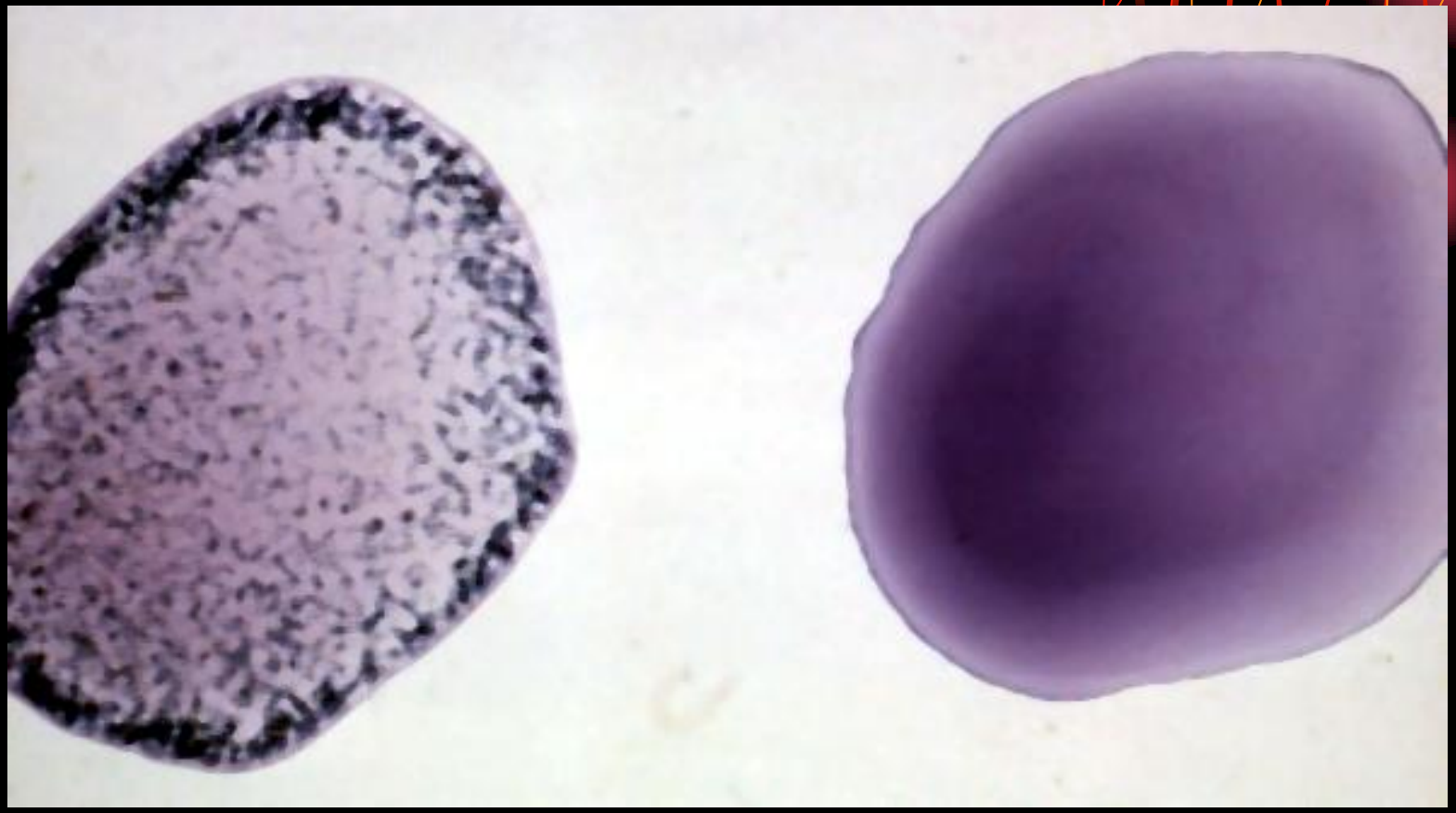
- **Similar to other Salmonellae except:**
  - **Slow to variable H2S production**
  - **Non-motile**
  - ***S. pullorum* and *S. gallinarum* and *S. enteritidis* are Group D**

Serological Testing

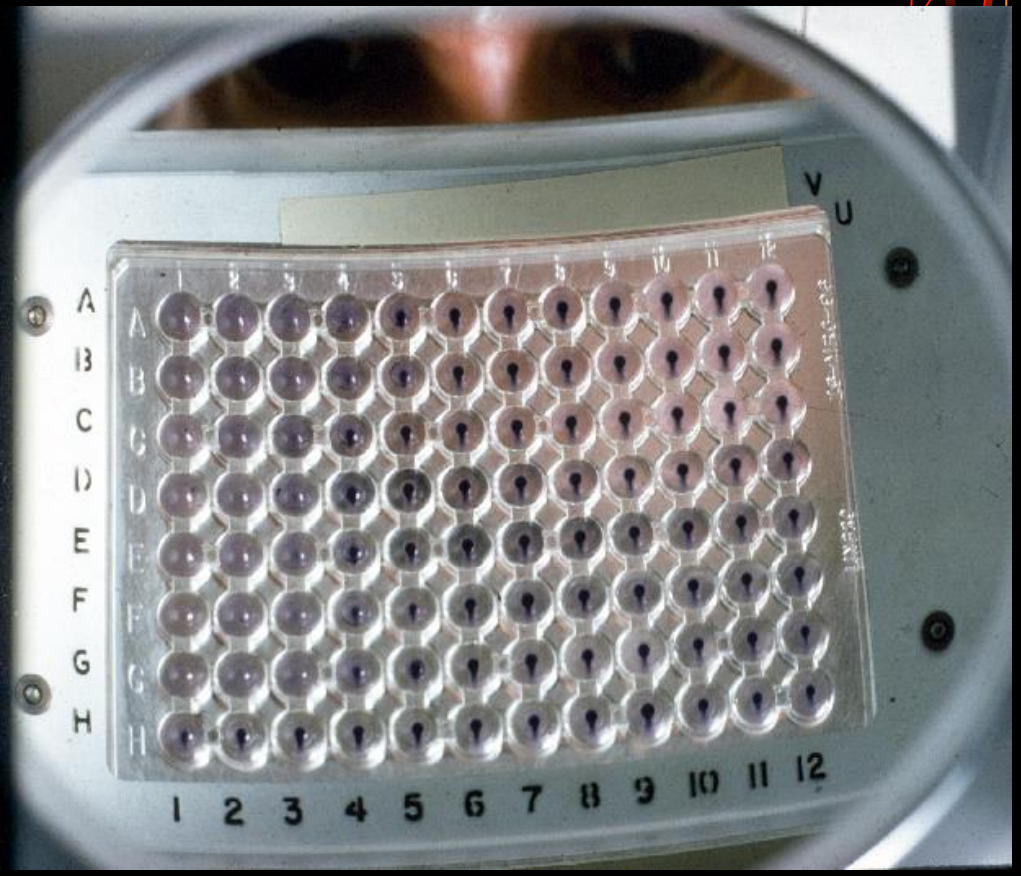
- Stained antigen whole-blood test accepted by NPIP for chickens, not turkeys.
- Tube agglutination test done after 16 weeks.
- Usually kill infected flock.

Agglutination test

Agglutination



Micro agglutination



Tube Agglutination

Control

- Establish and maintain Pullorum-free breeders.
- Serological testing – stained antigen whole blood test.
- Purchase chicks and poults from hatcheries that participate in NPIP.
- Organism in hatchery can be killed by formaldehyde fumigation.

Comments

- **Non-pullorum reactors (false +) can occur on testing. This problem is overcome by careful bacteriologic exam of suspicious reactors.**
- **The false positives are usually caused by common cross-reactive antigens possessed by other bacteria.**
- ***Salmonella enteritidis* has a similar antigen to *S. gallinarum* and *S. pullorum*.**

Treatment I

- **Birds usually destroyed in U.S. and Canada**

Treatment II

- **Drugs will not eliminate infection from a treated flock, and will perpetuate the carrier state.**

Mortality can be controlled with:

- **Sulfonamides: i.e. Sulfamerazine can't use sulfa in egg hens.**
- **Antibiotics: tetracycline, gentamycin, and spectinomycin.**
- **Nitrofurans: effective but illegal in U.S.**