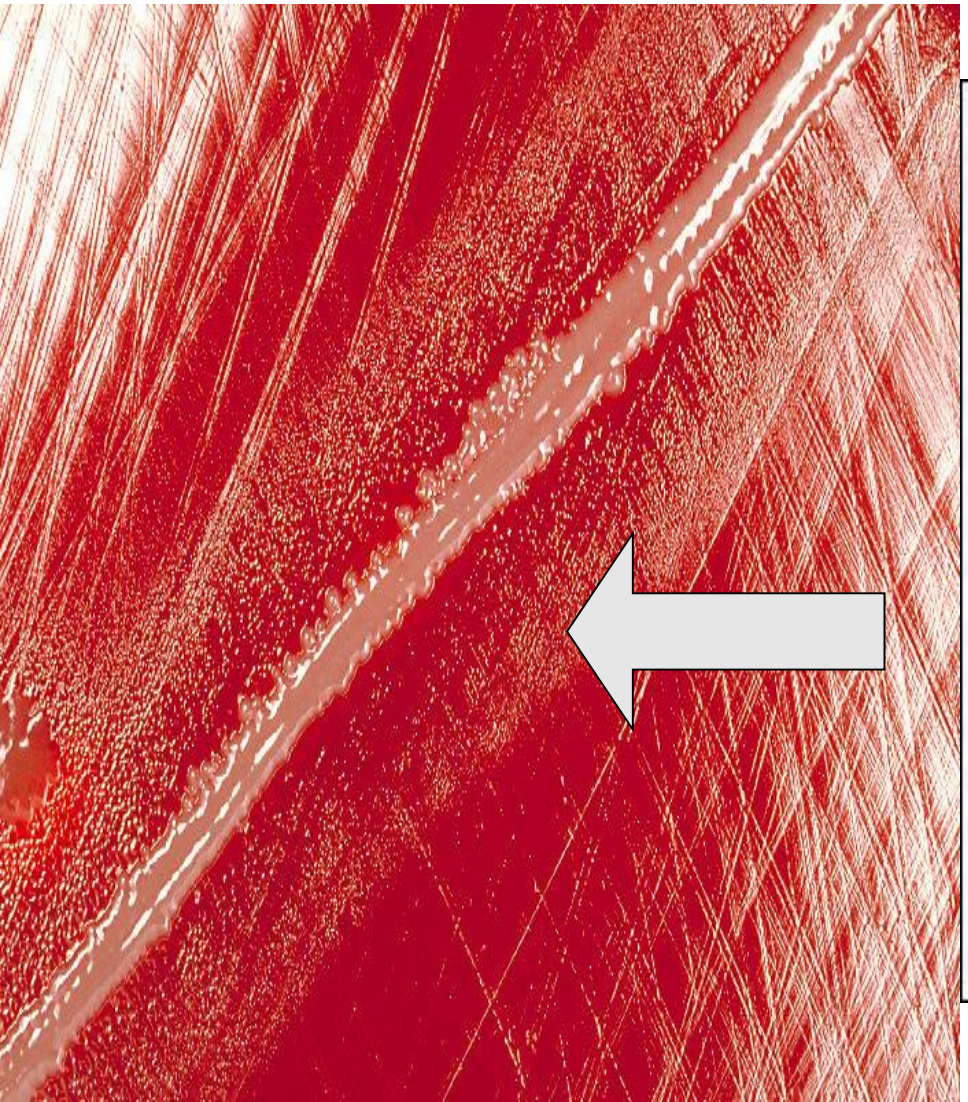
Glasser's disease control – what are the options

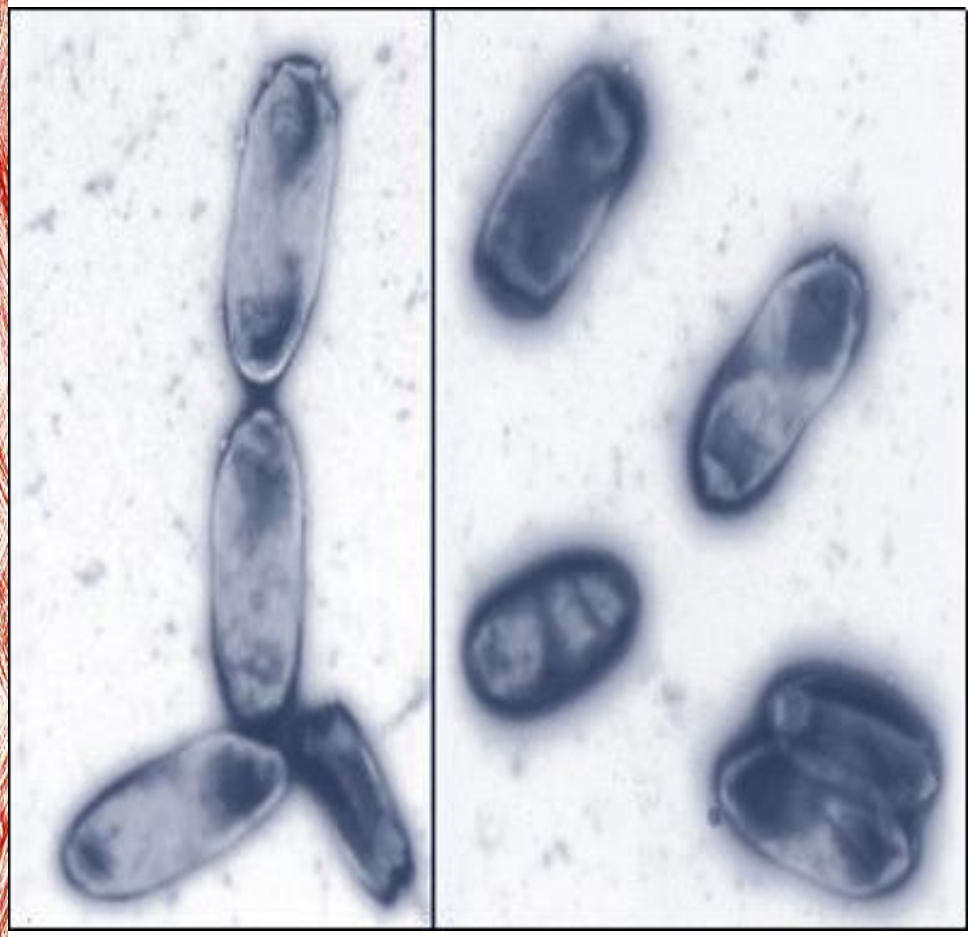
Steven McOrist

Consultant pig veterinarian

smcorist@scolexia.com.au

Haemophilus parasuis = HPS





Dynamic genome

- *Haemophilus parasuis* is ***highly variable*** regarding genotypes and phenotypes
  - Implications on vaccine development
- Normal pigs infected with HPS in tonsils and naso-pharynx
  - Farm systems can have a stable flora of HPS serotypes
- Homologous x heterologous protection
  - ***Homologous*** protection (serovar-specific) is usually ***satisfactory***
  - ***Heterologous*** protection (across serotypes) is ***partial or absent***

Many HPS serovars present in PH

Serovar	Number of isolates*	% of total
1	9	6.4
2	12	8.5
3	11	7.8
4	14	10
5-12	46	32.6
6	2	1.4
7	4	2.8
9	2	1.4
10	1	0.7
11	1	0.7
13	18	12.8
14	11	7.8
15	1	0.7
NT	9	6.3

* Data
9 Ace
Global labs,
Clark, PH

Serotype x genotype of HPS strains

- Serotype
  - ***15 different HPS serovars recognised***
  - High percentage of non-typable isolates
    - 20 - 40 % using the agar gel precipitation test
    - 10 % using genotype specific PCR
    - Serotypes 1-5, 8, 10, 13-15 considered virulent
- Genotype
  - ***e.g. 42 different genotypes*** among 140 field isolates

Piglets infected with HPS from the sow – problems start soon after weaning

What is happening ?

- Maternal to piglet transmission of HPS
- Endemic herds - piglets become sub-clinically infected when still protected by maternal Ab and then stimulate their own immune response
- If maternal immunity is not present or wears off before pigs become infected, they may develop severe disease
- If mix weaner piglets from different sources with different strains they may develop severe disease

Poor milk intake or and/or mix weaners – no relevant HPS immunity

Glasser's Disease – clinical signs

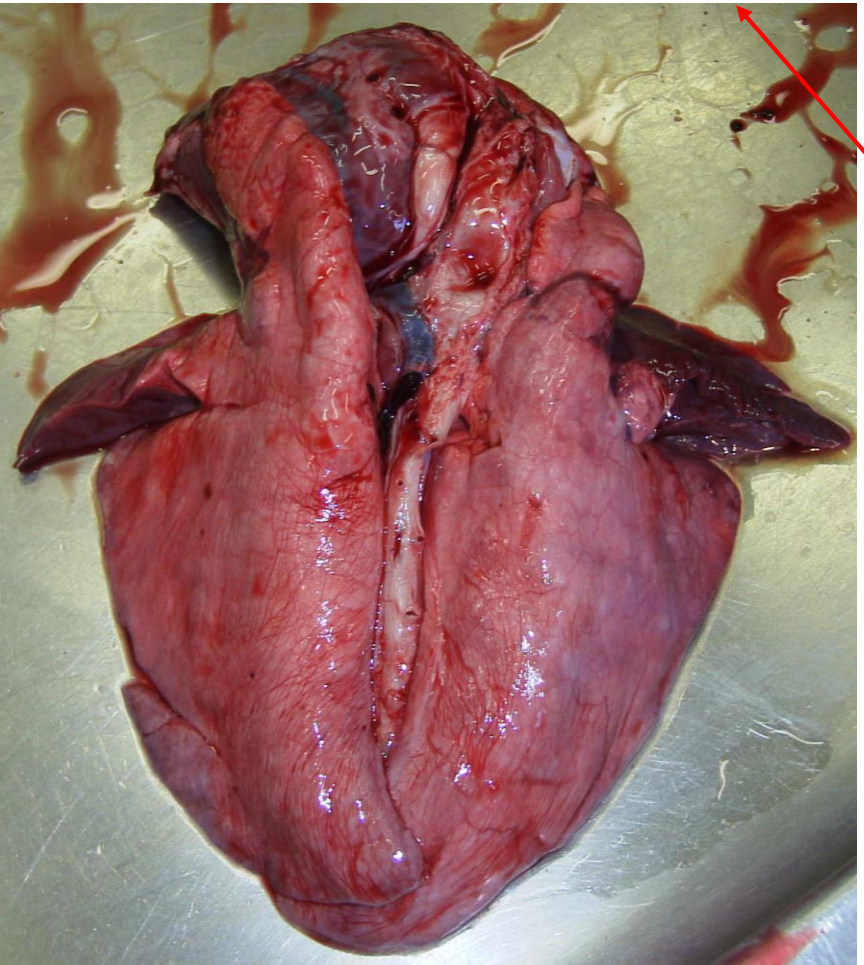
In endemic herds infection in weaners usually result in poor doing pigs which in spite of treatment continue to fade away until culled

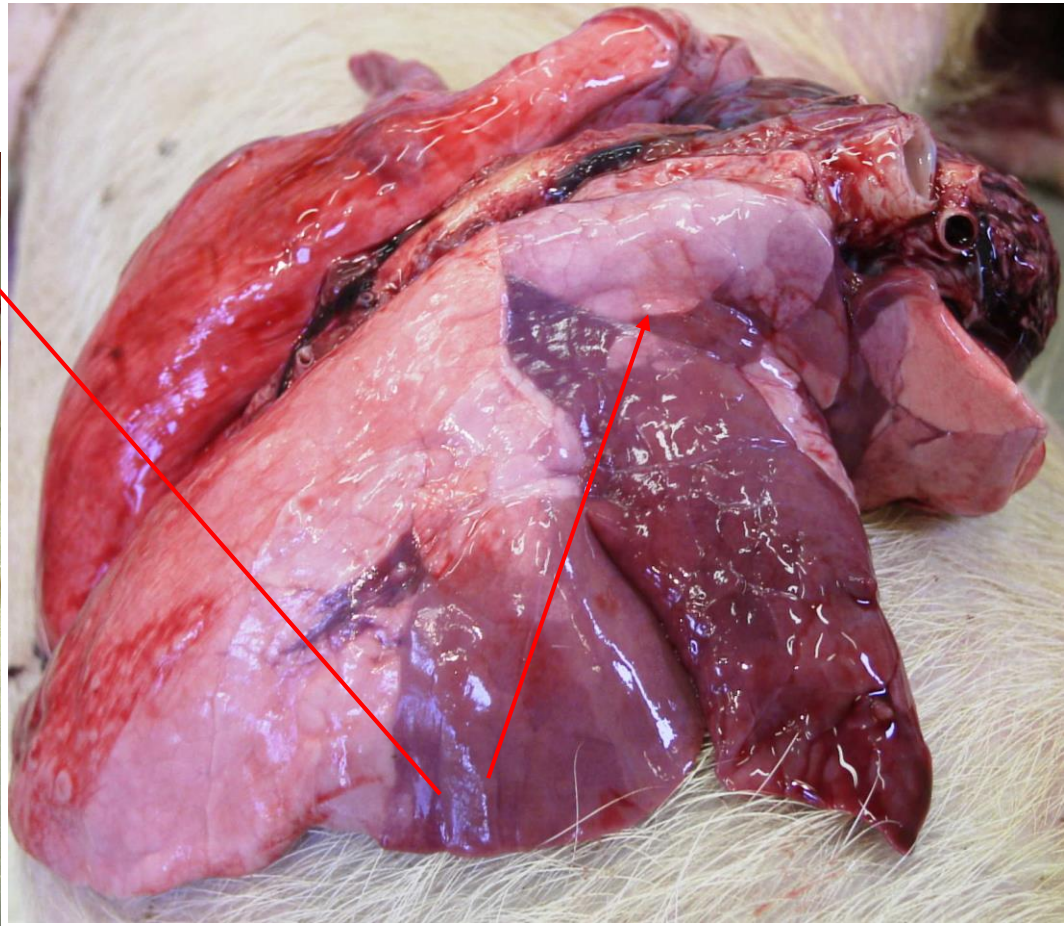
Cough, dyspnoea , weight loss, lameness, ridgy backbone and rough hair coat are the primary clinical signs

Impact is greater with concurrent PRRS infections, but not a major interaction

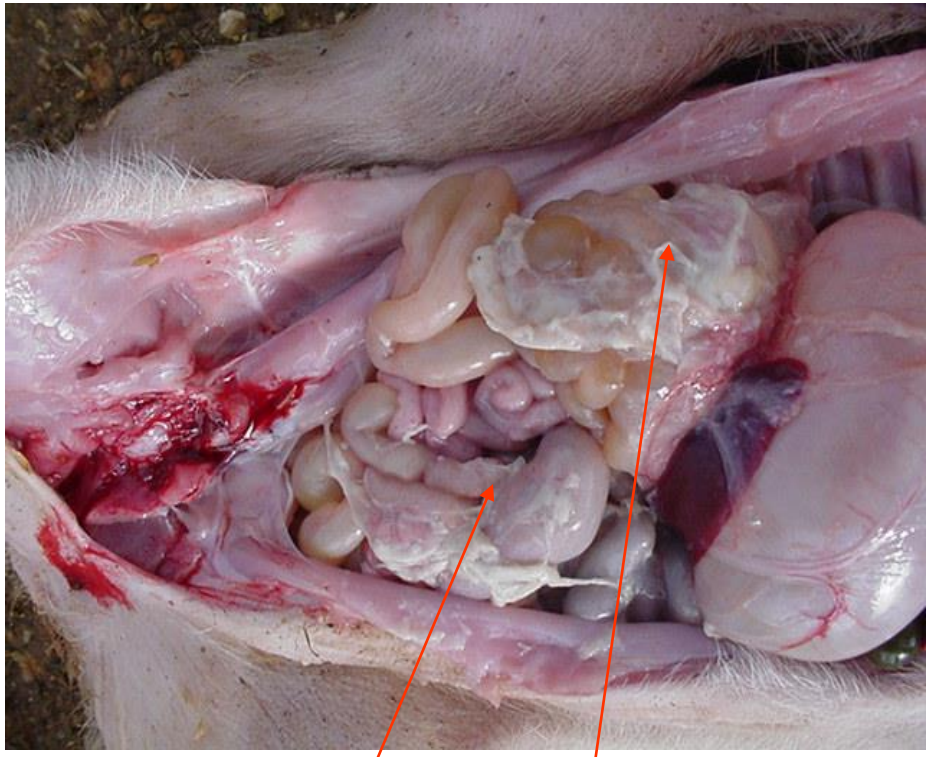
Glasser's is typically observed in weaners from 7 days post weaning - excessive numbers of poor doing pigs, which in spite of treatment continue to fade away

Early cases - Early HPS lesions are often bronchopneumonia - both of these lungs yielded pure culture *Haemophilus parasuis*

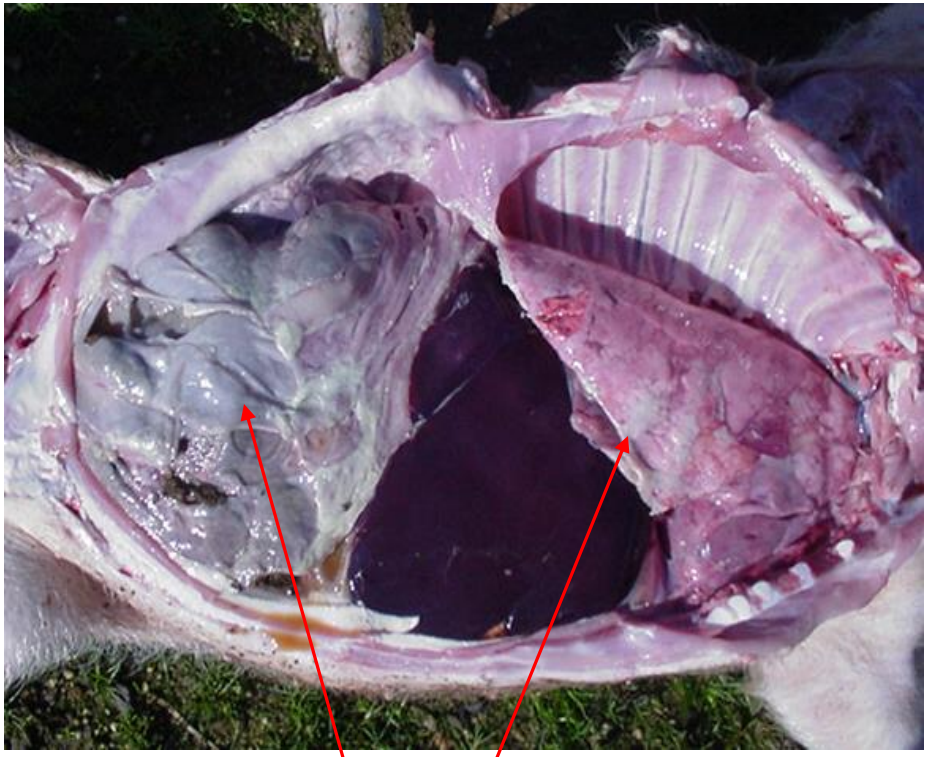




Invasion of the blood stream, and the subsequent replication at multiple serosal surfaces, produces the typical fibrinosuppurative polyserositis, polyarthritis (and sometimes meningitis) seen in pigs 14-21 days post weaning



Fibrinous peritonitis



Severe peritionitis and bronchopneumonia

Summary of Glasser's outbreak in large farm system

	Year 1	Year 2
Weaner deaths (% of pop)	0.69	0.99
Weaner ADG (kg/day)	0.348	0.319
Weight at 8 week-old (kg)	19.29	18.15
No. of weaners per week	7,250	6,570

Glasser's Disease – samples to send to the lab

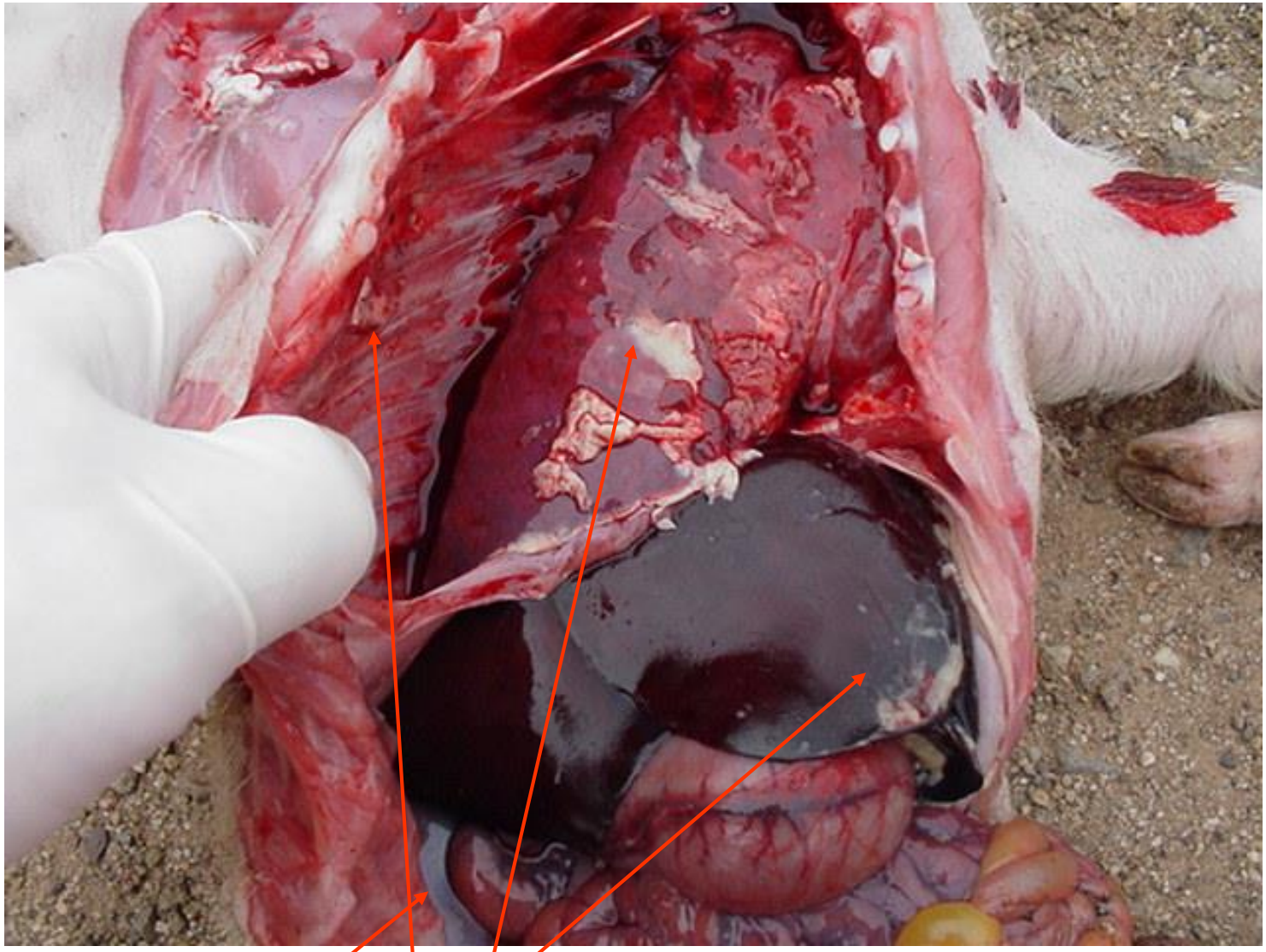
Sample very recently dead animals

Collect samples on both Amies transport media (for culture) and on dry swabs (for PCR)

Sample pigs that have not yet been specifically medicated for the disease

Sample bronchopneumonia lesions

Also sample areas of the pericardial, pleural or peritoneal cavity or joints that may show excess fluid or fibrinous exudates



Best sites to swab are serosal surfaces (even if no lesions are present) or exudates, CSF and heart blood

Actions

- **Redirect labour into weaner areas**
- **Improve medications in water feed and/or water**
- **Consider Glasser's vaccines**
  - **Sub-unit**
  - **Modified live**
  - **Commercial killed**
  - **Autogenous killed**

Actions

Improve medications in feed and/or water

- Isolates often fully susceptible to amoxicillin, penicillin, tylosin and tiamulin
- 50% resistant to tetracyclines
- 35% resistant to lincomycin
- **Improve amoxicillin doses and delivery**

Advantages

- No need to understand strains on the farm
- Works across different serotypes even mixed strains
- Can work even with poor maternal antibody levels

Vaccination for Glasser's disease – various options

Search for virulence factors in HPS

Search for virulence factors

- Gene expression under *in vitro* conditions ***mimicking*** the ***in vivo*** environment.
- ***Differential display reverse transcription*** -polymerase chain reaction
- ***Microarray*** analysis methods

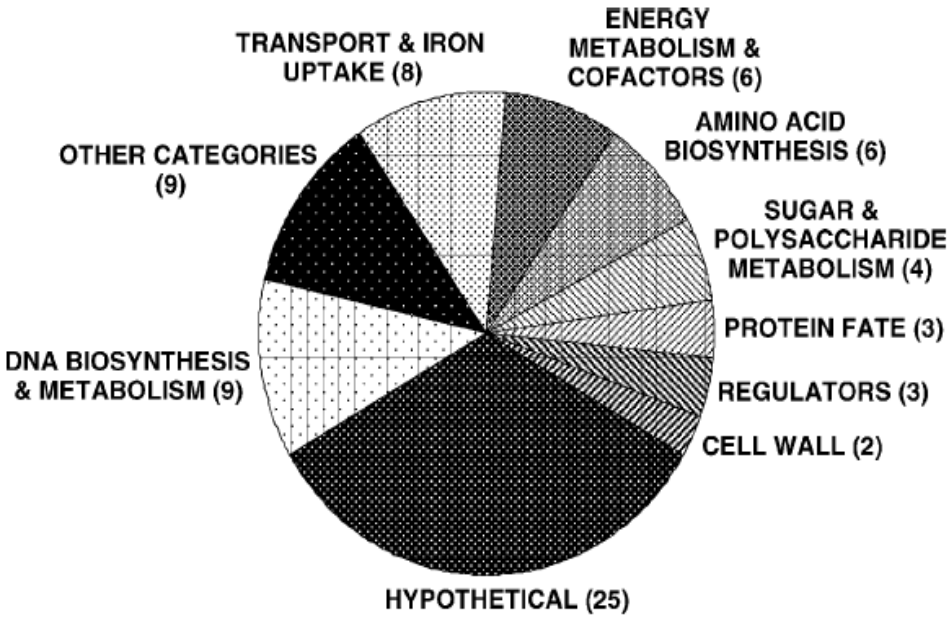


Fig. 1. Functional classification of 75 *H. parasuis* regulated genes.

No sub-unit vaccine likely soon

Modified live vaccines available in USA

Modified Live HPS vaccine products

- One dose to young piglets – intranasal
- ***Infection*** with modified live vaccine can generate ***protective*** immunity
- Evidence of protection across serotypes 4 and 5
- ***Colonization*** of 5-day-old pigs with low doses of live, virulent *H. parasuis* ***reduced mortality by 50%.***

Killed Glasser's vaccines – commercial

Serovars 1,6

- Classify dominant strains on target farm
- Strains can be stable in farm systems
- Commercial vaccines should be tried first – but cross protection present ?
- Vaccination of breeders is usually adequate
- Nursery pigs can also be vaccinated – age of infection ?

Killed Glasser's vaccines - commercial

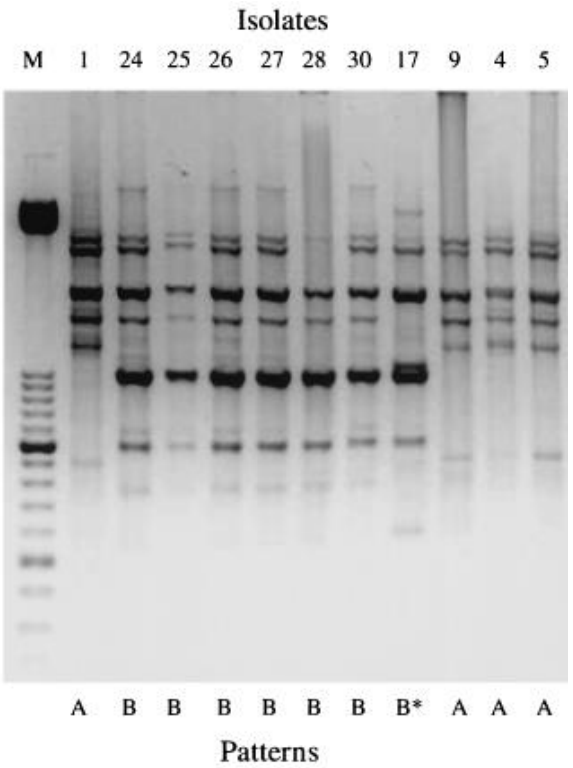
Strain Z-1517

Advantages

- Can be used immediately
- Established product
- Match the dominant strains on target farm
- Vaccination of breeders is usually adequate
- Can also vaccinate weaners

Killed Glasser's disease vaccines - Autogenous vaccines

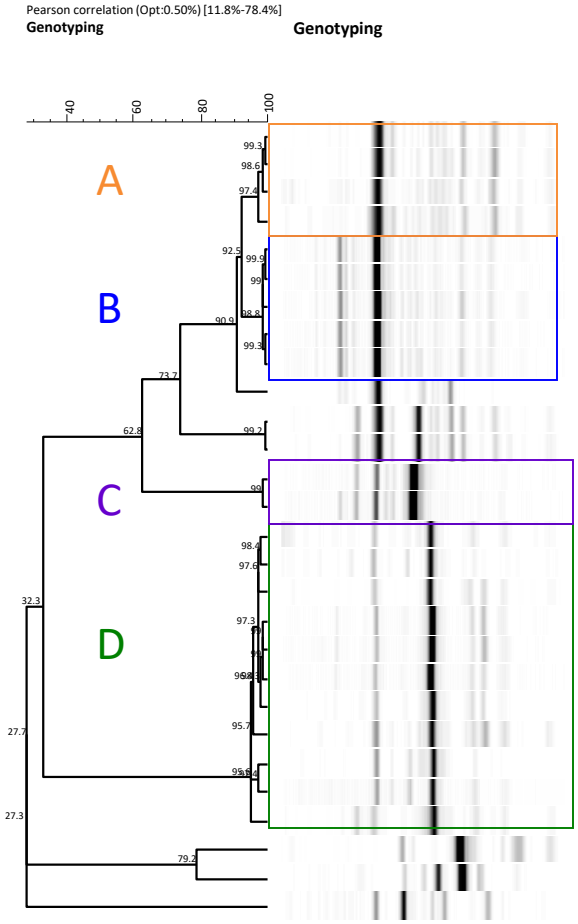
- Targeted to each farm
- Culture HPS from farm and prepare specific strains in vaccine formulation
- Need to know main strains causing farm problem – adds time and cost to vaccine
- Definite match to farm serotype - homogenous protection



Farm-selected Glasser's vaccination

- Dominant strains selected from isolates from swabs cultured and serotyped (by PCR)
- Breeder vaccine prepared and used in late pregnancy ⇒ increased maternal antibody to weaners
- Vaccination of weaners also possible
- Increased weaner protection prior to development of self-immunity

Selection of vaccine strains



D05-01	09/01/2005	Lung	Pleuritis	serotype 4
D05-02	09/09/2005	Lung	Pneumonia	NA
D05-03	05/12/2005	Lung	Broncopneumonia/ pleuritis	NA
D05-04	10/26/2005	Lung	Pneumonia/ pleuritis	NA
D06-05	12/28/2006	Pericardium	Pericarditis	NA
D07-06	02/16/2007	Lung	Pneumonia and pleuritis	NA
D07-07	03/22/2007	Lung	Broncopneumonia and pleuritis	NA
D06-08	12/27/2006	Pericardium	Pericarditis	NA
D07-09	03/08/2007	Peritoneum	Polyserositis	NA
D05-10	01/19/2005	Lung	Broncopneumonia/ pleuritis	NA
D05-11	08/10/2005	Lung	Bronchopneumonia	NA
D05-12	10/10/2005	Brain	Meningitis	serotype 5
D06-13	11/07/2006	Heart	Chronic epicarditis	NA
D07-14	03/13/2007	Lung	Broncopneumonia	NA
D05-15	02/09/2005	Lung	Pleuritis	serotype 4
D05-16	06/01/2005	Lung	Pleuritis	NA
D05-17	02/04/2005	Lung	No lesions	NA
D06-18	06/22/2006	Lung	Pericarditis	NA
D06-19	11/28/2006	Pericardium	Pericarditis	NA
D07-20	03/09/2007	Pleura	Pleuritis	NA
D05-21	08/11/2005	Lung	Bronchopneumonia	NA
D05-22	08/02/2005	Lung	Pneumonia/ pleuritis	NA
D05-23	02/04/2005	Lung	No lesions	NA
D07-24	02/09/2007	Pleura	Polyserositis	NA
D05-25	10/26/2005	Lung	Bronchopneumonia	NA
D05-26	07/28/2005	Lung	Bronchopneumonia	NA
D05-27	02/10/2005	Lung	No lesions	NA
D05-28	05/20/2005	Lung	Pleuritis	NA

Many HPS serovars present in PH

Serovar	Number of isolates*	% of total
1	9	6.4
2	12	8.5
3	11	7.8
4	14	10
5-12	46	32.6
6	2	1.4
7	4	2.8
9	2	1.4
10	1	0.7
11	1	0.7
13	18	12.8
14	11	7.8
15	1	0.7
NT	9	6.3

* Data
9 Ace
Global labs,
Clark, PH

HPS vaccine reactions

- Occur in commercial and autogenous killed vaccines
- Due to LPS in outer wall of HPS bacteria
- Acute anaphylaxis reaction – endotoxic shock

- Proper vaccine storage and transport is required to minimise release of LPS

Glasser's vaccination outcomes

- Positive vaccine outcomes on farm
- Reduced number of cases requiring treatments
- Improved weight gains and reduced losses back to previous levels
- Reduced amounts of weaner antibiotics

Weaners and fattening pigs to market

Glasser's control

- **Numerous** strains around – little cross protection
- Medication needs to be applied properly
- Vaccination of breeders can be protective for weaner progeny
- Dominant strains need to be identified for vaccination (commercial or autogenous) to be fully evaluated on each farm