Guide to the recognition and treatment of disorders of Pigs

Dr John Carr
Contents of the course notes:

Introduction
Clinical examination skills

Introduction
Clinical examination skills and Recognition of disorders of the pig

Stockpersons recognition of clinical signs
Clinical examination of the individual pig: cooperative and uncooperative
Recognition of the signs of ill-health
Examination of a group of pigs
The basics of a farm visit

Disorders by clinical sign
Disorders by age of the pig

Diagnostics
Normal physiological parameters
Tests for specific diseases
Blood testing
Tonsil sample
Euthanasia of a pig
Post-mortem examination
Examination of a semen sample

Normal Behaviour

Farrowing
Nursing patterns and consequences
Post-weaning: the first five days
Lying patterns as an indicator of acute comfort
Defecation patterns as an indicator of chronic comfort
The thermoneutral zone in pigs
Handling and moving pigs
Mixing pigs
Pen design to accommodate pig behaviours
Play behaviours
Reproductive behaviours:
The signs of oestrus
Oestrus behaviour patterns
Courtship behaviour
Boar breeding or stud behaviour signs

The major disorders of the pig

The major disorders of the pig are presented by the body system which is most significantly affected from a gross clinical examination view.

Skin

Anatomy of the skin
Erysipelas
Foot and Mouth Disease
Greasy Pig disease
Herniation
Mange
Porcine Dermatitis and Nephropathy Syndrome
Swine Fevers
Tail biting and other vices
Other skin conditions
Pityriasis rosea
Pig Pox
Ringworm
Epithelium imperfecta
Dermatitis parakeratosis
Abscess
Flaking skin
Areas of skin trauma
Head
Clinical gross anatomy of the head
Progressive atrophic rhinitis
Congenital tremor
Conjunctivitis
Meningitis
Post-weaning sneezing
Other conditions:
  Middle Ear
  Aural Haematoma

Chest
Clinical anatomy of the chest
Actinobacillus pleuropneumonia
*Actinobacillus suis*
Enzootic (Mycoplasma) pneumonia
Glasser’s Disease
Mulberry Heart
Pneumonia Pasteurellosis and Streptococi
Porcine Reproductive and Respiratory Syndrome
Porcine Respiratory Coronavirus
Swine Influenza

Intestinal tract
Anatomy of the intestinal tract
Abdominal catastrophe
*Ascaris suum*
Brachyspira colitis
*Clostridium difficile*
*Clostridium perfringens*
Coccidiosis of piglets
Non-specific colitis
*Escherichia coli* general
Bowel Oedema
Pre and post-weaning diarrhoea
Pre-weaning diarrhoea treatment
Gastric ulceration
Porcine epidemic diarrhoea
Porcine proliferative enteropathy (Ileitis)
Post-weaning illthrift syndrome
Pig parasites
Rectal stricture
Rotavirus
Salmonellosis
Swine dysentery
TGE

Reproductive tract
Anatomy of the reproductive tract
Abortion in the pig
Aujeszky’s Disease (Pseudorabies)
Brucellosis
Common developmental abnormalities
Milk production and suckling problems
Analysis of returns
Leptospirosis
Parvovirus
Rectal and vaginal prolapses
Stillborn and mummmified piglets
Tumours of the pig
14-21 days post-service vulval discharges
  Also see: Erysipelas, Swine Influenza and Swine Fever(s)
Surgery of the reproductive tract
  General introduction
Castration in the piglet
Castration in the adult male
Vasectomy
Epididectomy
Ovariectomy
Caesarian section

**Urinary Tract**
Clinical anatomy of the urinary tract
Pyelonephritis and cystitis

**Lymphatic system**
Clinical anatomy of the lymphatic system
Porcine Circovirus Associated Diseases
Post-weaning Multisystemic Wasting Syndrome
Leukaemia - See Tumors of the pig in Diseases of the Reproductive tract

**Locomotor system**
Anatomy of the locomotor system:
Young lameness:
Mycoplasma arthritis
Joint ill
Trauma
Skin abrasion in the piglet and weaner
Ulceration and erosion injuries
Bursitis
Splay leg
Adult lameness:
Bush foot
Osteocondrosis desicans (OCD)
Femoral head fracture \(\sim\) epiphyseolysis
Split hips
Shoulder sores
Ulcerated granuolma
Overgrown feet
Erysipelas and adult arthritis
Broken legs
Infected joints
Conformation problem
Growing stock
Lameness in pet pigs

**Diseases reportable to the OIE and Zoonotic diseases**
Diseases notifiable to the Office International des Epizootics (OIE) - World Organisation for Animal Health
Zoonotic diseases of Pigs

Other Pathogens:
Anthrax
Enterovirus encephalomyelitis
Japanese Encephalomyelitis virus
West Nile Virus
Nipah
Parasites
Rabies
Rinderpest
Toxoplasmosis
Disease treatment and control concepts

Maintenance of healthy pigs through management

Treatment by medication
  Use of medicines on farm
  Use of vaccines through the water supply
  Feed bin management to eliminate medication residues
  Common medication problems

Treatment guidelines
  Use of antibiotics in pigs
  Use of vaccines in pigs
  Control of reproduction
  Withdrawal times
  Examples of treatment programmes
    Piglets
    Nursery
    Grow/finishing
    Adults
    Boars
  Using Statistical Process Control to help decision making

Care of the compromised pig
  Design of a hospital area
  Health alarm
  Care of the compromised grower
  Care of the compromised adult

Reduction of pathogens on a farm
  Basic biosecurity
  Managing all-in/all-out Pig Flow
  Use of Early Weaning to Reduce Pathogen Load
  Room cleaning protocols
  Partial depopulation
  Depopulation and repopulation
Structure of the pig industry

The pig provides around 40% of the meat consumption globally – 108 million tonnes. It is interesting to note that of the "intensive" industries rearing meat – poultry and aquaculture combined with pork results in over 70% of meat consumption on the planet and this does not include feedlot cattle which is certainly not extensive. Germany consumes 60kg/head of capita, Australia’s fresh pig meat consumption is only 8kg per head of capita.

Pigs are farmed throughout the world in all climates from the extreme cold of Canadian winters to the tropics of Asia.

The pig (Sus scrofa) itself has colonized the entire planet below the snow line. This global colonization now includes man’s help – Australia and New Zealand and the New World – North and South America – and includes countless numbers of small islands around the world.

The pigs on the planet – the suina


<table>
<thead>
<tr>
<th>American Peccaries</th>
<th>African Pigs and Hippos</th>
<th>Eurasian Pigs</th>
<th>Island Pigs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catagonus wagneri</td>
<td>Hylochoerus meinertzhageni</td>
<td>Sus salvanius</td>
<td>Babyrousa babyrussa</td>
</tr>
<tr>
<td>Tayassu pecari</td>
<td>Phaeochoerus aethiopicus</td>
<td>Sus scrofa</td>
<td>Sus barbatus</td>
</tr>
<tr>
<td>Pecari tajacu</td>
<td>Phaeochoerus africanus</td>
<td></td>
<td>Sus cebrifrons</td>
</tr>
<tr>
<td>Pecari maximus</td>
<td>Potamochoerus larvatus</td>
<td></td>
<td>Sus celebensis</td>
</tr>
<tr>
<td></td>
<td>Potamochoerus porcus</td>
<td></td>
<td>Sus philippensis</td>
</tr>
<tr>
<td></td>
<td>Hippopotamus amphibious</td>
<td></td>
<td>Sus verrucosus</td>
</tr>
<tr>
<td></td>
<td>Hexaorotodon liberiens</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hippos
<table>
<thead>
<tr>
<th>Animal</th>
<th>Image 1</th>
<th>Image 2</th>
<th>Image 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peccary</td>
<td><img src="image1" alt="Peccary Image" /></td>
<td><img src="image2" alt="Peccary Image" /></td>
<td><img src="image3" alt="Peccary Image" /></td>
</tr>
<tr>
<td>Warthog</td>
<td><img src="image1" alt="Warthog Image" /></td>
<td><img src="image2" alt="Warthog Image" /></td>
<td><img src="image3" alt="Warthog Image" /></td>
</tr>
<tr>
<td>Babirusa</td>
<td><img src="image1" alt="Babirusa Image" /></td>
<td><img src="image2" alt="Babirusa Image" /></td>
<td><img src="image3" alt="Babirusa Image" /></td>
</tr>
</tbody>
</table>
**The pig industry**

Worldwide the pig industry is structured on pyramidal concepts with pure bred breeding stock supplying cross bred commercial stock with hybrid vigour.

There are hundreds of pig breeds globally; however, the important breeds are limited to three – the Landrace (mother), the Large White (father) the Duroc (meat quality) – together with minor contributions from other largely male lines – Pietrain and Hampshire for example.

<table>
<thead>
<tr>
<th>Nucleus farm</th>
<th>X</th>
<th>Landrace Father</th>
<th>↓</th>
<th>Landrace Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>pure breeds</td>
<td>X</td>
<td>Large white Father</td>
<td>↓</td>
<td>Landrace Mother</td>
</tr>
<tr>
<td>Landrace</td>
<td></td>
<td>(possibly via AI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yorkshire/Large White</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duroc as example</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This is a closed herd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Multiplication farm</th>
<th>X</th>
<th>Large white Father</th>
<th>↓</th>
<th>Landrace Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>(possibly via AI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commercial farm</th>
<th>X</th>
<th>Duroc Father</th>
<th>↓</th>
<th>F1 hybrid Mother</th>
</tr>
</thead>
<tbody>
<tr>
<td>(possibly via AI)</td>
<td></td>
<td></td>
<td></td>
<td>Landrace/Large White cross</td>
</tr>
</tbody>
</table>

| Slaughter generation | | Landrace / Large White / Duroc Cross |
| male and female      | | Other breeds may be involved as well – the Hampshire for example |
Life cycle of the pig

Some basic facts:
Age at breeding varies: for a gilt 220 days; for a boar about 7 months
Oestrus cycle 18-24 days three weeks
Gestation 115 days three months, three weeks and three days
Breeding season generally none poorer in the summer and early autumn
Slaughter weight about 114 kg (250-280 lbs) at about 26 weeks of age

Pig farms have become larger in the last 20 years; however, the basics remain exactly the same. But the individual components of the system have become more specialized, thus creating multisite systems where animals are removed to the next phase of production.

The typical family farm evolves into the corporate farm:

**Traditional**
- Breeding and farrowing
- Nursery
- Grower
- Finisher

**2 site production**
- Breeding and farrowing
- Nursery
- Grower
- Finisher

**3 site production**
- Breeding and farrowing
- Nursery
- Grower
- Finisher
- 20-30kg

- Finisher

**Basic Pig Life Cycle**
Mutisite production (company or cooperation)

Breeding and farrowing

Breeding and farrowing

Breeding and farrowing

Breeding and farrowing

Assuming pigs are moved into the grow/finish house at 30 kg at 10 weeks of age and are sold at 100 kg at 24 weeks of age then 14 grow/finish sites are needed.

The most complex system today is the parity segregated farm where gilts are farmed on a separate unit and only move to the breeding unit at first pregnancy diagnosis of parity 1 sows.

All-in/All-out

The principle of health management on a pig farm relies on the simple principle of all-in/all-out which albeit is simple to understand appears extremely difficult to put into practice.

<table>
<thead>
<tr>
<th>All-in/All-out in principle</th>
<th>Why do pigs fail to achieve their genetic potential?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous flow</td>
<td>Example of stress factors</td>
</tr>
<tr>
<td>All-in/all-out by room</td>
<td>Disease</td>
</tr>
<tr>
<td>All-in/all-out by building</td>
<td>Poor feed and water</td>
</tr>
<tr>
<td>All-in/all-out by site</td>
<td>Poor air quality</td>
</tr>
<tr>
<td>Production advantage</td>
<td>Poor stocking rate</td>
</tr>
<tr>
<td>Hygiene improvement/ increasing disease control</td>
<td>Poor quality floors</td>
</tr>
<tr>
<td></td>
<td>Poor stockmanship</td>
</tr>
</tbody>
</table>

100% of genetic potential
Some farms only realise 45% of their potentials
The commercial pig industry

There are about 940 million pigs worldwide:
Asia 550 million, Europe 300 million, America 140 million and Africa 3 million.

In Asia – our major market:

<table>
<thead>
<tr>
<th>Country</th>
<th>Millions of pigs</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>460</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>22</td>
</tr>
<tr>
<td>India</td>
<td>17</td>
</tr>
<tr>
<td>Philippines</td>
<td>12</td>
</tr>
<tr>
<td>Korea South</td>
<td>9</td>
</tr>
<tr>
<td>Taiwan</td>
<td>7</td>
</tr>
<tr>
<td>Thailand</td>
<td>7</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6</td>
</tr>
<tr>
<td>Myanmar</td>
<td>4</td>
</tr>
<tr>
<td>Korea North</td>
<td>3</td>
</tr>
<tr>
<td>Australia</td>
<td>3</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0.4</td>
</tr>
</tbody>
</table>

There are around 270,000 sows farmed in Australia giving a total of around 3 million pigs on the ground (growing pigs have around a 6 month lifespan). Other countries production is greater – Iowa in Central USA finishes 25 million pigs a year with 2% of Australian landmass.

There are however, 20 million pigs in Australia – one pig per person on the continent. Feral pigs are a serious threat to the Australian wildlife.

Where are the commercial pigs in Australia?

<table>
<thead>
<tr>
<th>State</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>30</td>
</tr>
<tr>
<td>Queensland</td>
<td>21</td>
</tr>
<tr>
<td>Victoria</td>
<td>19</td>
</tr>
<tr>
<td>South Australia</td>
<td>17</td>
</tr>
<tr>
<td>Western Australia</td>
<td>12</td>
</tr>
</tbody>
</table>
Western Australia
Based on the WAPPA submission to the Productivity Commission Safeguards Inquiry into the Importation of pig meat 2007

Western Australia has the natural resources and geographic location to be a long term supplier of quality fresh pork to the Australian and Asian markets. The WA industry has grown the export market for pork from 65 tonnes in 1997 to an average of 12,000 tonnes in 2007. Currently approximately 25% of annual production from WA is exported mainly to Singapore. Maintaining and growing this export market for fresh chilled product is crucial to the future of the WA industry.

Western Australia is also a reliable supplier of grains (wheat and barley) for the animal feed industry. Total grain production in WA averages in excess of 8 million tonnes per year, and with the grain growing regions covering a wide range of climatic zones the risk of crop failure due to drought is relatively low. Grain prices in WA are on average lower than those in the Eastern States where lack of supply due to drought is a major concern. Recent increases in grain prices on the world market associated with the advancement of other uses of corn (*Maize zea*), namely the impact of ethanol production, has had a direct impact on the profitability of producers in WA.

The temperate climate in the southern part of WA is ideally suited to pig production, and with adequate supplies of water in these areas either from natural aquifers or state managed distribution systems there are good opportunities for the industry.

The pork industry contributes $105 million annually in gross value (farm gate) to the WA economy, while continuing to provide direct and indirect employment for an estimated 2,500 people from production to retail. Sales of pork products at retail are estimated to be worth $525 million with wages estimated at $120 million annually.

**Change in the WA sow herd since 1992**
The composition of the sow herd and the number of producers in WA has changed significantly in the last fifteen years (Figure 2). In 1992 there was an estimated 38,900 sows with 789 producers; this has declined to approximately 160 producers with 30,000 sows. There are still a number of small producers with less than 10 sows, but their contribution to overall production is negligible.
Pig Production in WA
The number of pigs slaughtered in 2003/04 was 674,419, up 24% on the 542,585 head in 2000/01. The volume increase in tonnage was similarly up by 23% from 36,782 tonnes of carcass to 45,190 tonnes.

Since June 2004 the decline in slaughter numbers are down 106,357 since 03/04 with the decline in production since the same period being down 6,289 tonnes. Note in WA, the carcase weight calculation is unusual as it does not include the head resulting in a net dead weight of 70 kg.

Production and slaughter numbers (Source APL/ABS)

Slaughter numbers through the PPC/Linley Valley abattoir on a weekly basis have declined with the current weekly slaughtering of about 9,500 animals.

Despite trend increases in per capita consumption of pork products and population growth, an industry analysis conducted in 2004 projected a fall in production of 3% over the next three years. Projected import volumes would result in increased import market share. The import share of the domestic processed market increased from 40% to over 50%.

Pig Cycle
The ability to mass produce a product 20 x a year results in a perpetual cycle of over and under production.
Thus creating a cycle of profit and loss which pigs as a cash crop are classic examples. When the price of pig meat is high this results in an increase in producers entering the market. Their product hits the market a year later resulting in an over production thus the price falls forcing producers out for the market. The cycle in pigs take 5-7 years from one peak to another.

This variance is slightly dependent on external factors i.e. corn price, disease outbreaks in major competitive markets etc. The cycle has continued for over 100 years.
The rate of change of the pig price on a global scale over the last few years:

The major pork cuts

Note these changes throughout the world.