Part 1 - Basic Principles

Introduction

When compared to large commercial pig keeping operations, the small pig population presents different health challenges. The smaller population can exist as part of a mixed animal small holding, as a part-time venture, as a hobby farm or, in some cases, as a high value rare breed or pedigree population. Increasingly, pet pigs have also become more common.

Smaller herds may not suffer the same major disease issues seen in the larger commercial sector, but there is greater focus on the individual pig. All pigs are susceptible to the same range of diseases and disease conditions in the individual take on a higher level of importance to the owner.

As with all species, vaccination forms an important part of the overall health management of the pig, which is often overlooked in small populations.

What is vaccination?

When animals are exposed to infection, provided they recover, they will develop an immunity which will protect them against future repeated challenge to that infectious organism - be it bacterial, viral or other types of microbes.

The aim of vaccination is to mimic the challenge by exposing the animal to a controlled dose of an adapted form of the specific organism prior to the risk of full challenge, thus stimulating natural immunity without causing disease. In some cases this may be effectively life-long but others may require booster doses (much like the use of vaccines in human beings). Whilst immunity generated by vaccines is protective against the specific disease contained in them, it is never 100% effective and can be overridden by high disease challenge and circumstances which suppress immunity including stress.

Vaccines are initially prepared from field strains of infectious agents known to cause disease in pigs. The organism may be included in the vaccine in a live form - altered to render it harmless to the pig - or be inactivated chemically. Some vaccines either include or are only formed of the toxin (poison) typically produced by harmful strains of the organism. The precise nature of the vaccine will determine the strength and duration of immunity that will ensue and the dose regime required to be effective.

However, certain features are common to all vaccines:

- They are specific to the organism or organism included e.g. E. coli vaccines only provide protection against that organism; they are not protective against other causes of diarrhoea.
- They do not treat the disease concerned, they do not prevent infection but they help prevent future disease.
- They take time to work - typically a few weeks and thus must be administered in a timely fashion.

Within the pig population vaccines can be targeted in a number of ways:

- To provide protection against disease in the animal to which the vaccine is given (E.g. Enzootic Pneumonia vaccine).
- To provide protection to the unborn litter of a breeding animal (e.g. Porcine Parvovirus vaccine).
- To stimulate immunity in the dam that is passed on to piglets (via colostrum) to protect them only when they are young (e.g. E. coli vaccines).
- A combination of effects (e.g. Erysipelas vaccines).

In the majority of cases in pigs, vaccine is administered by individual injection although there are an increasing range of other vaccines becoming available, which now include a live oral vaccine against ileitis (Lawsonia infection). Note immunity generated by vaccines or natural infection in the sow is not passed to the developing litter directly; transfer only occurs after birth via colostrum.

Clinical Disease Conditions

1. Porcine Parvovirus (PPV)

PPV is a viral disease, which only affects the pregnant animal by damaging the unborn litter. The sow or gilt will not be ill herself. As such, it can produce:

- Returns to service - typically at more than three weeks post service (due to embryonic deaths)
- Small litters (including those less than four pigs - again due to embryonic deaths)
- Progressive Mummification - due to foetal death - such that variable sized mummies are produced reflecting different ages at death
- Stillborn pigs - due to late foetal death or slow farrowings where high numbers of mummified pigs are present
- Delayed farrowing - especially with small litters

NB. PPV does not cause abortions but is the most common cause of SMEDI syndrome.
2. Porcine Reproductive Respiratory Syndrome (PRRS/Blue Ear)
A viral disease that can infect and affect all ages of pigs. In young piglets the principle signs are scour, weakness and high mortality, with many pigs born weak and underdeveloped. Haemorrhages and swelling around the eyes are occasionally seen.
In growing pigs, respiratory disease is the principle sign but PRRS virus depresses lung immunity and therefore often occurs in conjunction with other respiratory agents and acts as a trigger for complex disease. It is a major component of Porcine Respiratory Disease Complex. Rarely, Blue Ears will be seen.

In adults, the virus can have both a direct effect on the sow or boar producing depression, inappetance, vomiting, skin discolouration (especially of the extremities), agalactia etc. However, it also has significant effects on breeding with abortions, premature farrowings, failure to farrow (not-in-pig sows), stillbirths and late mummification.

3. Porcine Circovirus Associated Disease (PCVAD)
This viral disease primarily affecting growing pigs although the age affected is highly variable - as young as 5-6 weeks up to 20 weeks, but in all cases mortality rates are high.

Various manifestations are seen:

**a. Post weaning Multisystemic Wasting Disease (PMWS)**
One of the initial presenting signs in which rapid extreme loss of condition in pigs typically 7-12 wks of age is accompanied by enlarged superficial lymph nodes (esp. superficial inguinal LN). Profuse watery scour and respiratory distress may accompany the condition. Mortality rates are high.

**b. Porcine Dermatitis Nephropathy Syndrome (PDNS).**
Often occurring later than PMWS and as an immune mediated condition, may be viewed as a ‘recovery disease’, sudden onset haemorrhage of the skin is the most noticeable feature. Due to protein loss from nephritis, oedema (fluid swelling) of the legs is common. Again mortality is high in affected pigs.
4. **Mycoplasma hyopneumoniae**

This organism is the cause of Enzootic Pneumonia (SEP) of pigs - a widespread condition producing respiratory disease in growers. It is a component of the Porcine Respiratory Disease Complex (PRDC) and tends to be more of a problem in larger populations.

Coughing and laboured breathing are the principle signs with slowed and uneven growth typical manifestations. Death is rare in uncomplicated cases but secondary infection with other agents can cause significant mortality.

SEP is routinely monitored in slaughter pigs.

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**Fig 5: PDNS skin haemorrhage**

c. Non-specific PCVAD

Usually a respiratory or enteric based disease often complicated with bacteria. It can present as an acute systemic disease with high temperature, depression and anorexia, coughing and severe dyspnoea, along with scour that can range from profuse and watery to mild looseness. Discolouration of extremities is seen as in septicaemias and the superimposition of secondary infections (such as Streptococci and Pasturella,) will distort and exacerbate signs in individuals. Mortality is generally less extreme than with PMWS and PDNS but can still be significant.

**Fig 6: Outbreak of acute PCVAD**

d. Peracute PCVAD

Causing sudden death due to massive accumulation of fluid in lungs

e. PCV2

Is also capable of causing reproductive failure in naive adults - presenting variably as returns to service, abortion, mummification and stillbirths. However, experience in the UK suggests that this presentation is not common.

**Fig 7: Lung consolidation in the cadiac lobe typical of Enzootic Pneumonia**

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5. **E. coli Enteritis**

Whilst E. coli infections can affect young piglets from birth up to around eight weeks of age it is the newborn piglet that is especially vulnerable and is relevant to prevention by vaccination of the sow or gilt.

Diarrhoea (scour) in the first three days of life is severe and watery and causes rapid dehydration and death. Death is often worse in litters from gilts but potentially any litter can be affected. Hygiene in the farrowing area is critically important.
Fig 8: Typical neonatal E coli diarrhoea

6. Clostridial enteritis
Often occurring in conjunction with E. coli and particularly a problem in sows farrowing on soil that is contaminated. Clostridial challenge may be higher where pigs are kept with sheep but this is not essential for disease risk to exist.

Piglets can scour from a few hours of age up to one week, although depending on the strain involved, haemorrhage can occur into the gut such that the piglets die before they have a chance to show diarrhoea. Any scour in baby piglets with obvious bloody content would suggest Clostridial involvement.

Fig 9: Haemorrhagic intestine seen with Cl perfringens infection

7. Erysipelas
Erysipelas is a bacterial disease to which all pigs are particularly vulnerable, with the causative organism widely found in the environment and carried in the gut of many species of wild animals including rodents and birds. Disease can also occur in sheep and turkeys and occasionally spread to man causing 'Erysipeloid'.

In adults, it can present with high temperature (42°C or more), depression and lethargy sometimes with characteristics 'diamonds' on the back and sides. Pregnant animals can return to service or abort. Affected boars are sterile for up to eight weeks.

In growing pigs the disease can vary in severity from peracute - causing sudden death due to septicemia - to acute illness (as in sows) with diamond lesions on the skin. Mild cases may show skin lesions without illness.

Fig 10: Diamond lesions on the back of growing pigs are typical of Erysipelas
In the longer term affected pigs may be crippled with arthritis, have necrosis of the skin or be found dead due to lesions growing on the heart valves (endocarditis).

Fig 11: Skin sloughing following Erysipelas infection
8. Atrophic Rhinitis
Infection of young piglets (below eight weeks of age) with Pasteurella multocida type D can damage the nasal tissues of the growing pig, producing distortion of the snout and loss of the filter effect of the nose. Growth is severely impeded and secondary bacterial disease of the lower airways is common.
High levels of sneezing will occur in affected pigs and severely affected animals will have nosebleeds (epistaxis).

Fig 13: Snout distortion typical of progressive atrophic rhinitis.

Vaccines available
Table 1 (below) provides a list of vaccines currently available for disease control in pigs (2016) with a note of their relevance to the smaller pig producer.

In addition to vaccines available for prevention of disease, a product was made available in 2009 that is used to immunologically castrate male pigs, temporarily, close to slaughter weight. It is potentially useful to the smaller specialist niche market producer who is not constrained by the embargo in any form of castration imposed by Quality Assurance Standards appropriate to large commercial farms.

This vaccine removes the need to castrate piglets for meat production, particularly in unusual breeds, for private butcher sales and farmers' markets. Two doses are required in growing pigs with the second dose given six weeks prior to slaughter.

It is also possible to produce bespoke or autogenous herd vaccines where commercial vaccines either do not exist or prove ineffective. These can be costly and are a long-term commitment. Arrangements can be made through the veterinary surgeon.

Note: specific NADIS bulletins are available describing most of the disease conditions mentioned herein and are available from /livestock/pigs.aspx

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