Diarrhoea (scour) is one of the most common ailments affecting the young piglet before weaning. It can vary from mild to severe, brief or persistent, creamy to watery, trivial to fatal. Scour is a clinical sign representing the result of a wide range of insults to the piglet gut - causes are often complex with a mixture of infectious agents, environmental insults, and nutritional and managemental influences.

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The Piglets' Gut Function

The gastrointestinal system comprises mouth, oesophagus (gullet), stomach and intestine. Each component has specific functions but it is when the intestine is malfunctioning that scour occurs. Food, mostly mothers' milk in the young piglet, is pre-digested in the stomach before arriving in the small intestine (SI) for chemical breakdown (digestion) and absorption. It then passes into the large intestine (LI) whose main function is reabsorption of water, before the waste material is voided as faeces.

Scour can result from any of the following malfunctions:
1. Failure of pre-digestion in the stomach
2. Failure of digestion/absorption in the small intestine allowing undigested food material to pass into the large intestine where bacteria can thrive
3. Outpouring of excess fluid into the small intestine as a result of toxins
4. Failure to reabsorb fluid in the large intestine

Table 1 provides a brief summary of the types of insult, which can lead to each of these malfunctions.

It can thus be seen that scour results from a range of often interacting factors and it is always necessary to identify and correct the various insults to achieve prevention and control.

We will discuss some of the major infectious agents later but it is necessary to expand on the more basic principles first.

**Table 1. Causes of gut malfunction**

**Piglet Protection**

The piglet is born vulnerable to the individual challenges it will meet. Immunity does not pass across the placenta to the piglet unlike the situation in human babies. Nature’s way of protecting it against infection is for the sow to provide immunity through the colostrum (pre-milk, bitlings) which contains protective antibodies which can be absorbed by the piglet for the first twelve hours of life (hence the need for a good early suck) and can bathe the gut without being absorbed for many days beyond that. (Colostrum is also a vital source of essential nutrition in the post-natal period.)

**Chilling**

The body has an inbuilt protective mechanism whereby when the body temperature drops, the blood supply is cut off or reduced to non-life essential organs - preserving blood supply to vital structures such as brain and heart. The gut will be part of this shutdown mechanism and its normal ability to push through food (peristalsis) and absorb nutrients will be compromised. This has the effect of essentially allowing undigested material to pass down into the large intestine where bacteria that may normally live in balance in the gut will overgrow on a rich supply of food. Malfunction and scour are obvious results.

**Hygiene**

Following birth (and indeed in a few cases during passage through the birth canal) the piglet picks up microbial agents that colonise the gut. Many of these are harmless and form part of the normal and essential gut flora that the pig requires as it matures.

Environmental hygiene will determine the quantity of such uptake (this includes both contamination of the udder as well as the accommodation) and it is essential that whatever is consumed is maintained in balance. This beneficial colonisation depends upon the range of contaminants (harmful versus harmless), the levels of protection provided from colostrum, the quantities of microbes consumed and a normal functioning gut preventing overgrowth. Routine administration of antibiotics at birth can cause considerable and long lasting disturbance to the development of normal gut microbial population (microbiome)

In commercial, particularly indoor systems, maximum hygiene is essential, with "all in, all out" procedures, washing, disinfection and drying - preferably with detergents as part of the washing process - standard practices. This is not necessarily always the case in the smaller system where long-term occupation of pens etc. allows a balanced flora to develop in the environment, which provides the new-born piglet with the correct balance and challenge of beneficial microbes that compete with the pathogens. One of the worst actions that can be taken in such a set up is to attempt to clean but not do it thoroughly - the result being contamination remains with a disturbed balance. There can be no half measures:

- If cleaning, disinfecting and drying are done as policy it must be done to the highest standards
- If scour (and other piglet ailments) are not evident and cleaning and disinfection are not normally done, leave well alone.
- However, once scour occurs in the system thorough cleaning with degreasing, disinfection and drying are needed. Disinfectants must be left sufficient contact time to work but concentrated disinfectants can scald pigs and should not be left on the floor surface.

**Gorging**
Modern sows - even some of the more traditional breeds - can produce far more milk than piglets need early in life. Strong piglets can gorge on this supply leading to overload. It is always more likely to happen to the biggest front teat pigs.

Also, as piglets grow, supply grows and again gorging can result, leading to what is often termed "milk scour" at fourteen days plus. (This must be distinguished from coccidiosis.)

**Specific Infections**
(NB - for Clostridial Scour see workshop 5, Part 1)

**E. Coli**
E.coli bacteria are normally found in the gut of pigs (and most other mammals). The excretion rate of E coli from the sow increases as she approaches farrowing and the three major sources of infection for the young piglet are:

- The sow
- Other infected and particularly scouring piglets in the same or other litters
- The environment

Most strains of E coli are harmless. However, there are strains that are extremely harmful to the piglet - most of which are classified as Haemolytic E coli (due to their growth characteristics in the laboratory). Each strain is identified by number and in a few cases by name (e.g. Abbottstown).

The balance between the degree of exposure of the piglet at birth and the immunity conferred upon the piglet by the transfer of colostrum from mother will determine whether or not disease is seen.

The effect of these harmful strains of bacteria is to stick to the wall of the intestine and to produce a toxin (poison), which alters its function such that there is an outpouring of fluid into the gut, producing scour.

**Clinical Signs**
Neonatal E coli infection presents as a profuse watery scour within three days of age, with severe and rapid dehydration. Death can occur rapidly - in some littersmate before scour is actually evident. It will often, though not always, occur in whole litters and appear to spread from litter to litter within a house. Scour due to E. coli can occur later in the sucking period, often in conjunction with other agents (e.g. Rotavirus, Coccidiosis).

**Treatment**
Individual cases may be treated with an appropriate oral antibiotic - determined by sensitivity testing, given at the earliest sign of diarrhoea. In an outbreak, strategic medication of all pigs at birth may be necessary. This should not be a long-term approach.

Equally important as part of the treatment programme is the provision of electrolytes to reduce the severe dehydration that actually kills many piglets. These must be kept clean and fresh, and in severely affected pigs be actively administered orally e.g. by syringe.

**Control and Prevention**
The principles of control revolve around:
1. Reducing spread of infection
2. Reducing reservoir of infection
3. Increasing immunity in sows and piglets

- The disease will spread by any physical movement of scour between pens and buildings. Use of disinfectant foot dips between pens and rooms is vital - keeping the foot dip fresh, clean and at the correct dilution rate. Control of flies, mice etc. is also vital.
Active cross-fostering of piglets is discouraged in the face of an outbreak.

- The farrowing pen in which a previous litter has been affected is a reservoir of infection if not thoroughly cleaned. Cleaning should involve the use of detergents to remove the protective grease film (derived from high fat lactation and creep diets), power washing and disinfecting - using a DEFRA approved product at the appropriate dilution rate. The longer the pens can be rested between batches the better. Fumigation of rooms may be an additional technique to employ. Removal of slurry from channels under slats reduces the risk of flies bringing infection back to the pen surface.

Cleanliness of the sow is also important. The sow should, if grossly contaminated, be washed and dried before entry to a clean pen and she should not spend an excessively long time in the crate before farrowing - 3 to 5 days is preferable. Legally it cannot be more than 7 days.

In the outdoor environment, burning of old beds, moving of farrowing arcs (where applicable) and avoidance of lying boards will all help control disease.

- Immunity in the sow can be raised by vaccination given prior to farrowing and works very well to protect piglets for the first three to four days of life. Sow vaccination will not protect piglets beyond this age.

**Viral Scour**
A range of viruses can affect young piglets producing scour. These include PRRS virus, Rotavirus, TGE/PED and many others. In all cases the viruses damage the finger like projection that normally increase the surface area of the gut (villi), reducing the digestive and absorptive area. This allows undigested material to pass through the gut, overloading it with both nutrients and fluid. Viral scour can occur very early in life - indeed some pigs can be born scoured.

Hygiene and improving immunity in the sow (see below) are key to control and survival, and recovery of piglets can only be achieved by maintaining hygiene using easily available electrolytes (e.g. Lectade : Elanco) which can overcome the reduced gut function.

**Coccidiosis**
Coccidiosis in the pig is caused by a parasite called Isospora suis. There are a range of other coccidia (Eimeria sp), often found in the pig, but these are generally thought to be harmless although in rare cases can cause disease in young adults.

The parasite has a direct lifecycle between pigs (i.e. there is no intermediate host) with oocysts shed from an infected individual into the environment, in which they undergo a temperature dependant maturation process, before infecting other animals orally. The organism then colonises the small intestine, developing through a number of stages and causing gut damage leading to scour. This process takes several days and, as such, Coccidiosis does not occur below five days of age, and most typically is not seen until ten days old.

The disease is seen in all types of system but is always associated with hygiene failure.

**Clinical Signs**
Scouring will be seen in all or part of the litter from about 10 days of age. The scour will usually be yellow and creamy and careful observations may reveal blood flecks. Death is rare in uncomplicated Coccidiosis although, where E coli or Rotavirus become involved, mortality can occur.
Loss of condition will be apparent in affected individuals and the overall consequence will be reduced weaning weights - herd average weight at 25 day weaning can drop by 1kg per pig during an outbreak - and gut damage at weaning that may trigger secondary post weaning enteritis. The reduced weaning weights will have implications on overall growth post-weaning.

Response to treatment in an affected individual with antibiotics is generally very poor and, in many cases, the scour will stop spontaneously at weaning - suggesting that the gut damage induces milk intolerance.

In many affected herds, one or two pigs in the litter may show early and mild signs of scour at 7 days of age, with the rest of the litter becoming affected 5-7 days later, as the young pigs act as generators of the parasite.

**Diagnosis**

The clinical picture described will provide a strong indication of the role of coccidia although because it is possible to have combined infection with other agents a laboratory diagnosis is desirable.

Despite the fact that carrier sows and affected piglets shed coccidial oocysts in their faeces, these are very difficult to detect and, even if found, do not necessarily mean that this is the cause. The only reliable method of confirming the diagnosis is to sacrifice acutely affected, untreated typical individual pig and examine the gut. Grossly they may be thickened and inflamed but histopathology is essential for confirmation.

On many farms, the response to treatment and control measures is used to support the diagnosis.

**Control**

Hygiene plays a major part in the control of Coccidiosis. The oocysts that are shed in the faeces, which develop into infective stages in the environment - provided the temperature exceeds 16°C - are very resistant to conventional disinfectants. Effective treatments are fire (flame gun) and limewashing of the pen - in the latter case, the lime must be allowed to cure for 4 days before stock are placed in the treated pen.

There are claims that some dry disinfectants have anticoccidial effects and may be useful adjuncts to treatment of the environment. Thorough washing of pens is vital and problems, typically - though not exclusively - occur in continually occupied rooms and on certain type of floors where thorough cleaning is difficult (solid, cracked concrete, moulded plastic slats). The veterinary surgeon may also prescribe specific anticoccidial treatment to be given orally as a preventative measure but the timing of such treatments must be carefully considered and strictly adhered to.

In the outdoor herd, arcs must be moved between consecutive farrowings and where problems occur, boards should be avoided. The provision of wallows in farrowing paddocks increases contamination of the udder and should be discouraged (they will also encourage litter desertion in hot weather).

**Worms**

A rare worm - Strongyloides ransomi - can infect piglets in utero or via colostrum/milk and produce scour in piglets as young as two to three days. It is most likely to occur in sows kept outside on permanently occupied ground where the parasite can build up.

Where seen worming of sows pre-farrowing using a preparatory wormer is highly effective.

**A word on "Feedback" or Controlled Exposure**

Feeding back infected material and bedding from a scour episode (or indeed faeces from sows post-farrowing) to sows in late pregnancy (never before 75 days gestation) has, historically, been used as a method of increasing immunity in sows to help protect piglets.

(Feeding back placental tissue and dead piglets is banned absolutely by legislation.)

In some infectious diseases, feedback can be the only...
way of stopping an outbreak (e.g. viral disease such as Rotavirus) but in some cases can actually cause more harm than good (e.g. Coccidiosis).

It should not be used routinely as a technique (indeed it is questionably legal under feedingstuffs legislation, designed to reduce Salmonella infection) and should only be done under strict veterinary advice.

**Conclusion**

Scour is commonly seen in young piglets. Control depends upon environmental and managemental attention, diagnosis and appropriate vaccination or medication.