The pig farms of Great Britain have a long history of high welfare input into the care of baby piglets. Farrowing rooms are usually staffed by the most highly motivated people on a pig farm. After each birth, sow colostrum is produced for up to 36 hours, when normal milk production and consumption takes over for around three more weeks. In Europe, weaning is restricted to at least 21 days, whereas in other countries it can occur earlier, which can boost production numbers in the farrowing areas. A certain level of mortality is expected in the first three weeks of a piglet’s life. The newborn piglet is much smaller than its mother so any physical interaction, such as a sow lying or treading on a piglet, can be catastrophic.

A very common cause of clinical problems in baby piglets is considered to be diarrhoea, or scours.

In the following example, a typical family-owned, farrow-to-finisher pig farm called the local veterinary group to investigate diarrhoea among the suckling piglets. The breeder pigs were kept in groups correlating to the relevant periods of mating, early and late gestation, farrowing, pre-mating and cull sows. The farmer reported few problems with respiratory diseases.

You visit the farm and encounter aging farmers who own 60 sows in a closed herd. They have had an unskilled ‘pigm an’ as manager, whom you meet in a chaotic office (Fig. 1). You go through the patchy records of matings, farrowings and numbers of piglets thought to be surviving in each litter. You then enquire about possible scours amongst the piglets and walk around the farrowing house. You confirm that several litters have scours that are soft, pasty and grey (Fig. 2). They appear to be most typical in litters where you estimate piglets to be 10-14 days of age (Fig. 3). Affected piglets appear ‘rough coated’ and smaller than litter-mates. The farmers state they carry out vaccinations of their pregnant gilts and sows with ‘E. coli vaccine’. Their routine processing procedure for new born piglets appears to include cleaning of the navel, iron injection, tail docking and teeth clipping only, with Mycoplasma vaccinations at around three weeks old.

**QUESTIONS**

1. What is your tentative diagnosis?
2. What are some of the clinical and pathological signs associated with this condition?
3. How critical is an accurate diagnosis and how would you go about making it?
4. What secondary effects could this problem cause?
5. What is the likely origin of this farm problem?
6. What treatment and prevention would you advise for this particular problem?
7. The farmer objects to spending money on the problem. What steps will you and the farmer have to take to establish the financial scale of the problem?
8. What other benefits will come from taking these steps?
ANSWERS

1. The presence of loose pasty faeces (that resemble yellow–grey toothpaste) in ill-looking piglets (rough hair coat, hair standing out, hollow flanks) at 10–14 days of age, that show moderate loss of condition or weight, is most suggestive of coccidiosis due to *Isospora suis*. The life cycle of *Isospora* and its usual habitat in farrowing areas means that the age of affected piglets, combined with the type of diarrhea, can be distinctive.

2. Intestinal coccidiosis in the pig can be caused by one of the genera *Eimeria*, *Cryptosporidium* or *Isospora*, with the latter being by far the most significant. *I. suis* invades the intestine of young piglets, causing moderate to severe diarrhoea with subsequently decreased weight gain, poor performance and reduced productivity. The disease often occurs around the second week of life. It is characterized by yellowish or grey pasty to liquid diarrhoea for one to several days, with dehydration evident even though nursing from the mother usually continues.

Post-mortem examinations of piglets affected with *Isospora suis* usually show fibrinous enteritis which mainly affects the middle and posterior part of the jejunum. Villous necrosis and atrophy are frequently described. Infection occurs in cells lining the small intestine, with various stages of the life cycle evident in routine histological sections. This can be further confirmed by demonstration, by semi-quantitative methods, of large numbers of *Isospora suis* in faeces from euthanased or dead piglets. Low counts may not be confirmatory. It is not worthwhile to collect or examine faeces from the mother, as these are always negative on routine examination.

3. There are many other causes of problems in suckling piglets. The main non-infectious causes of piglet death in the farrowing areas include:
   a. overlays or crushing of piglets by the sow’s body and feet
   b. piglet starvation due to lack of milk caused by common udder problems such as coliform mastitis or agalactia.

Savaging of the piglets by gilts can be avoided by making them accustomed to the sight of piglets prior to farrowing.

There are also a number of other common infectious causes of diarrhoea in piglets, which include:
   a. Coronaviruses; such as TGE, PED or HEV
   b. Clostridial infections; such as *C. perfringens* or *C. difficile*
   c. Rotavirus type A
   d. *Escherichia coli*; such as ETEC K88.

These all have slightly different clinical presentations – for example, ETEC usually occurs in piglets in the first week of life.

However, diagnostic tests are usually needed to confirm the presence of coccidiosis as the dominant problem. The most accurate results are generally confirmed by euthanasia and post-mortem examination of the fresh gastrointestinal (GI) tract of a few typical cases in piglets from affected litters (Fig. 4). Faecal samples alone are usually insufficient to pinpoint the cause of a scour problem in piglets.

4. Morbidity for coccidiosis can be high, but mortality is generally low except for cases with secondary bacterial infections. Because coccidiosis occurs in the period just prior to weaning of the piglets, cases can have a profound effect on enteric problems which arise just after weaning, such as post-weaning colibacillosis and proliferative enteropathy due to *Lawsonia intracellularis*. Some studies have shown considerable reduction in performance in groups of post-weaned pigs with coccidiosis, compared to those without coccidiosis, due to the increased likelihood that the compromised gut at weaning can allow these pathogens to enter and thrive. Therefore coccidiosis is one of the key factors that can affect gut health and predispose to other infections.

5. The life cycle of *Isospora suis* is complex and includes both sexual and asexual cycles within the host. Numerous new-generation oocysts are passed via the faeces into the environment 5–7 days after uptake of sporulated oocysts - the so-called pre-patent period. Development of these oocysts to reach the infective stage (sporulation) in the environment can occur within 12 hours to three days. Oocysts can survive outside the pig for many months and are resistant to most disinfectants. Therefore the farrowing area on this older style farm may have been infected many years ago by infected piglets and the...
infection is easily carried from one litter to the next by its survival on the floor of the farrowing areas. Due to its short pre-patent period, it is considered highly reproductive. Coccidia - farrowing areas are contaminated quickly and heavily by infected piglets.

6. Treatment of clinical cases is usually with sulfa-trimethoprim products and electrolytes when clinical problems require immediate intervention. However, prevention of disease is always the key aim in pig production, in this case to prevent damaging changes to the pig intestines. Unlike for chickens, no piglet vaccines are available. Therefore, various anti-coccidial drugs, such as sulphadimidine and the symmetrical trizintrione toltrazuril (Baycox® 5%, Bayer HealthCare), have been developed and tested for prevention against isosporosis. The latter is recommended as the only coccidiocidal agent registered in the UK and elsewhere specifically for the control of porcine neonatal coccidiosis. A single treatment of toltrazuril of 20 mg/kg body weight for 3-5 day old piglets is indicated to prevent clinical signs of isosporosis in piglets. This prevention dose is usually delivered as a 0.7 ml oral bolus from a hand-gun. Care must be taken to ensure that the operator checks that each piglet receives the dose properly and does not regurgitate it. Toltrazuril has consistently proven an effective preventive for coccidiosis, with repeated studies on farms showing an increased average daily weight gain of treated piglets, more homogenous piglets at weaning and reduced clinical disease.

The time for intervention in piglets is critical; use of a preventative drug should take place at 3-4 days of age so that it can kill all intracellular stages of the parasite within newly infected piglets in relation to the life cycle and age of onset of disease. Extensive field usage in Germany and elsewhere has shown that the prevention of coccidiosis (such as with Baycox) in day old piglets infected immediately postpartum with I. suis and Clostridium perfringens type A provided better gut health and resulted in reduced mortality and diarrhoea and better weaning weight.

Besides specific coccidiosis action, other key improvements to gut health in piglets start with vaccination of sows/gilts twice during late pregnancy for lactogenic immunity against E. coli and Clostridia. Before entry of the sow into farrowing areas:

- a. sows should be washed and cleaned, particularly the udder - this will reduce udder infections during farrowing
- b. the floor should be adequately washed, cleaned, disinfected and rested for an adequate down-time.

Piglets should be kept warm and dry on draught-free floor areas.

7. The records on this or any other farm need to enable a visiting veterinarian to be able to calculate where any problem is occurring and its extent. The minimal set of records needed on a pig farm is:
   a. number of females and matings performed
   b. number of females returning to heat
   c. number of females not pregnant (not in pig)
   d. number of births occurring
   e. number of piglets born alive
   f. the number and age of suckling pig deaths
   g. the cause of death of each suckling piglet
   h. the number of pigs weaned and an average weaning weight.

Only with this information can you establish that the level of piglet death due to diarrhoea is sufficient to stand out from background reproductive performance on the farm.

8. This information will also enable the key features of reproductive performance on a farm to be evaluated.

It is therefore important to place obvious scour problems in young suckling pigs into economic on-farm context. Poor sow appetite and feed intake are major issues in modern sow breeds during gestation and lactation and they must be monitored to confirm that agalactia is not occurring and adequate milk production is present for the piglets. Sow water intake must be constant and clean. Cooling for sows in summer months is often vital.

Dystocia issues and failure by piglets to get adequate colostrum may often be related to staffing of farrowing rooms - is there night-time and day-time staff to assist farrowing, fostering, cleaning and correct piglet processing?

The targets for pig performance in the UK are set by the National Pig Association and the Animal and Horticulture Development Board. These pig industry bodies regularly assess UK and international figures for key farm statistics such as output of pigs per sow per year, neonatal mortality and wean-to-finish mortality. The informative websites of these bodies should be consulted and considered in conjunction with key management issues in each farm situation such as flooring, housing etc.