Water ï donôt let it rain on your performance

In the first of a short series of articles on some of the less obvious facets of pig farming, Paul Pemberton of Garth Partnership discusses the importance of that most basic element of survival, water.

Water is a fundamental requirement of all known life, and is also abundant in various forms across the globe. In the UK it is widely taken for granted that we will all have access to whatever water we need from a tap, and that it will be clean and safe. But does this easy access mean that we take our eye off the ball when it comes to watering our livestock?

Pig producers are generally well aware of water in one sense: cost. They must either pay for treated, sanitised mains water, or bear the cost of building and maintaining a borehole. But how much attention does water then receive in terms of quality and availability compared to feed and the various elements of housing?

Water is sometimes referred to as the 4th nutrient along with protein, carbohydrate and fat, to emphasise its importance to life. All these nutrients are required in biochemical processes, and a lack of any one of them will limit metabolism and growth. This becomes even more relevant when we ask animals to grow at supercharged rates as with the modern commercial pig. This article aims to discuss the important aspects of drinking water in pig production so that rational assessment and improvement can be made.

WATER QUALITY

This term refers to impurities in the water, which can be biological or mineral, and its acid or alkaline nature.

Minerals

All water, unless distilled, will have varying amounts of minerals, such as iron and salt. But an excess of many of these may have adverse effects, such as reduced palatability (eg: salt) or toxic effects (eg: lead). Others will have little direct effect on the pig but may accumulate as scale in pipes and on filters (eg: calcium and magnesium salts) thus reducing water flow and leading to problems with availability, which will be addressed later.

With so many variables, and little commercial interest to drive research, it is difficult to set targets and limits for mineral content, especially as some of them interact. Published figures for acceptable levels of minerals in drinking water for pigs vary quite widely, but it is interesting that they are almost invariably well above the levels deemed acceptable for human consumption. This suggests that mains water ought to be of consistently excellent quality in this respect, but contamination either before or on the farm means this is not always the case by the time the water reaches the pig. Regular testing of water taken from the drinkers can assess and quantify this.

Acidity

The acidity (or alkalinity) of water is partly dependant on the mineral content. Generally water should be roughly neutral, around pH7, but it can vary quite significantly either side of this with little ill effect. Strongly acidic water is unnatural but does little harm ï consider that a popular cola drink has a pH of around 4.

Biological

Tap water in the UK should have bacterial counts that are negligible or even undetectable. Farmed pigs are rarely so fortunate, but does it matter? As so often with this type of question, there is no definitive answer. High bacterial counts are often found in water with no obvious deleterious effect on the pigs. It will depend on precisely which organisms are present or what other substances may be associated with the high count.

Bacterial counts in water are traditionally carried out in two forms: ñTotal Viable Countò (TVC) and ñColiformsò. TVC is an indicator of general bacterial contamination, and any free-standing water or land run-off is likely to have at least a moderate TVC. Coliforms are most commonly derived from organic matter and are potentially harmful.

The bacteria that contribute to the TVC are generally harmless and have little effect on livestock performance. However, they may be useful to indicate that contamination has taken place at some point in the supply line since both mains water and deep aquifers (supplying boreholes) should be virtually sterile. For example, water samples can be taken and compared from a farm borehole and the pig drinkers. A high TVC in both indicates a damaged or faulty borehole, whereas a low TVC from the borehole but a high one from the drinkers suggests there is a contamination problem somewhere between the two, maybe a dirty header tank. Although the bacteria cultured may be insignificant themselves, their presence indicates the potential entry of more dangerous substances into the water supply.

Coliforms are potentially, but not necessarily, more directly harmful. This group includes pathogens such as *Salmonella* and *E coli* as well as non-pathogenic bacteria. Therefore, levels of Coliforms should be more strictly monitored and controlled than TVCs. Although various authorities have slightly varying target numbers, all seem to agree with this general principle.

Faecal coliforms are a sub-group that exist only in the intestinal tract of animals. The presence of these, therefore, gives a very specific idea of the nature of the contamination and the timescale. Faecal coliforms do not survive well outside the body so their detection indicates a recent contamination event. Distinguishing these from general coliforms is not technically straightforward so this is not a test that is currently widely available commercially.

WATER QUANTITY

This section will start with some numbers to try to convey a real sense of what we need to achieve. As with most livestock figures, there is a certain amount of

variability in pig water requirements depending on temperature, humidity, disease presence, dry matter content of the feed, and so-on. However, it is reasonable to work on an average for a newly-weaned pig on pelleted food of 150ml/kg/day. For a 10kg pig this is 1.5 litres per day. This might not seem a lot initially, but it is equivalent to an average pigman (tipping the scales at 80kg) drinking 12 litres a day or 21 pints! Imagine trying to consume 21 pints of water every day from a leaking tap (equivalent to a partially blocked nipple drinker) or from an excrement-contaminated mug (equivalent to an average river trough).

A finishing pig will have about half this water requirement relative to bodyweight, but this still leaves it needing to consume around 6-7 litres every day. Pigs have been shown to drink each day for a limited amount of time, after which they will cease drinking even if their physiological requirements have not been met. If the availability of water is poor, possibly because of low flow rates or high levels of competition for drinking spaces, performance will be affected due to inefficient metabolism and reduced feed intake.

It is easier for pigs to drink quickly, and therefore more easily meet their water requirements, from a surface of water (bowl drinker, river trough) rather than from a bite drinker, hence the common use of turkey drinkers for newly-weaned pigs. However, these can be wasteful from spillage or become highly contaminated, which can reduce palatability and encourage the spread of disease. Bite drinkers are more hygienic and easier to manage, and once familiar with them growing pigs seem to cope perfectly well as long as the water availability is good.

<u>Factors leading to low water availability and examples of solutions:</u>

Drinkers at incorrect height (usually too high)

- Place slats, or some other sort of step, under drinkers so small pigs can reach. Remove them as pigs grow so the drinkers do not become too low.
- Have drinkers at different heights in the same pen or yard to allow for pig growth. More drinkers per pen will be required to ensure enough drinkers are available at any one stage.

Drinkers placed in wrong part of pen

- Do not put drinkers in the lying area of a pen or yard. Pigs wanting to drink will be impeded by sleeping pigs, while sleeping pigs will be disturbed and agitated by those trying to reach the drinkers.

Insufficient drinking places

- Provide more drinkers or longer troughs. Figures for these are provided in the DEFRA Welfare Codes, such as one nipple drinker per 15 pigs on *ad lib* feeding, but these should be regarded as a minimum, not an optimum. Garth recommendations are often slightly more generous to the pig. Any group of pigs should have at least two drinking points to reduce the risk of ñbullyingò over a drinker.
- Reduce the number of pigs in the pen. This is obviously a less efficient solution as long as the stocking density is correct in the first place!

Inadequate flow rates

- Measure flow rates with a jug and a stopwatch, then compare them to the DEFRA Welfare Codes or Garth recommendations.
- Clean nozzles and filters of bite drinkers.

- Ensure bowl drinkers and river troughs do not become clogged or blocked by muck and straw.
- Check that pipes are not becoming furred up with scale, and install filters at source to reduce mineral levels in the system.

WATER IN HEALTH MANAGEMENT

As well as maintaining a good water supply to try to ensure optimal health and performance for pigs, the water may also be used to deliver a disease prevention or treatment programme. Drinking water is an excellent method of supply of medicines and supplements to pigs. Drugs can be administered quickly, accurately (as long as the pigs are drinking in proportion to their weight) and on a large scale, which is not usually possible with in-feed medication or individual dosing such as injection.

To dose accurately through the water takes some care, however. Tipping the whole daily dose of a drug into a header tank that is constantly re-filling is unlikely to provide a therapeutic dose to all pigs. The weight of the pigs and their water consumption must be estimated, and the drug distributed throughout the appropriate period with the header tank being filled manually (with water and drug) each time it empties. An easier and more accurate method is to use a dosing pump plumbed into the water supply. This feeds a fixed proportion of drug into the drinkers giving it an even distribution and, therefore, gives the best chance of all pigs receiving the target dose.

Water-soluble antibiotics are the most obvious example of drugs delivered through the water system. However, some antibiotics may be affected, and even inactivated, by certain components in the water. The data sheet for a new colistin sulphate product, for instance, states that the active ingredient may be antagonised by certain minerals such as iron, calcium and magnesium, although it does not specify what levels of mineral could cause this effect.

Anti-inflammatory drugs and some vaccines may also be given through the water. Because of the huge number of possible impurities and combinations of impurities it is impossible to fully assess all potential interactions, but the cleaner the water the less likely there will be any interference. Vaccines can be particularly sensitive and water systems delivering vaccines should be free of disinfectants, detergents and antibiotics. De-chlorination tablets may be necessary if mains water is used.

It is becoming increasingly common to acidify the feed or water as an aid to improving gut flora and protecting against enteric disease such as *Salmonella*. The treated water should have a pH of around 4 or slightly less, coincidentally very similar to the cola drink mentioned earlier.

Little imagination is required to see how a header tank full of organic matter, such as mould or a dead bird, could interfere with the activity of any of these products. Therefore, maintaining a good quality water supply, or at least knowing what impurities are present, could be vital to the success of a pharmaceutical health programme.

SUMMARY

- **Water is an often overlooked component of pig nutrition**
- **Water quality can be monitored to assess the risk of causing disease or affecting performance**
- **Ensure pigs have good access to water to fulfil their performance potential**
- **The water supply can be a useful and effective carrier of medicines if properly managed**

To enquire about water monitoring services or other aspects of water supply please contact Garth Partnership on 01262 488323.