Setting a new benchmark for pigs to reach their genetic potential

Studies have shown that pigs within a commercial grow-finish environment only achieve 70% of their growth potential compared to pigs reared in a less challenging and unrestricted research environment. Researchers have highlighted this 30% gap in pig performance as a key area for improvement using both management and genetic selection to reduce the impact of stressors on pigs reaching their genetic potential under commercial conditions.

by Gwendolyn Jones,
Anco Animal Nutrition Competence.
www.anco.net

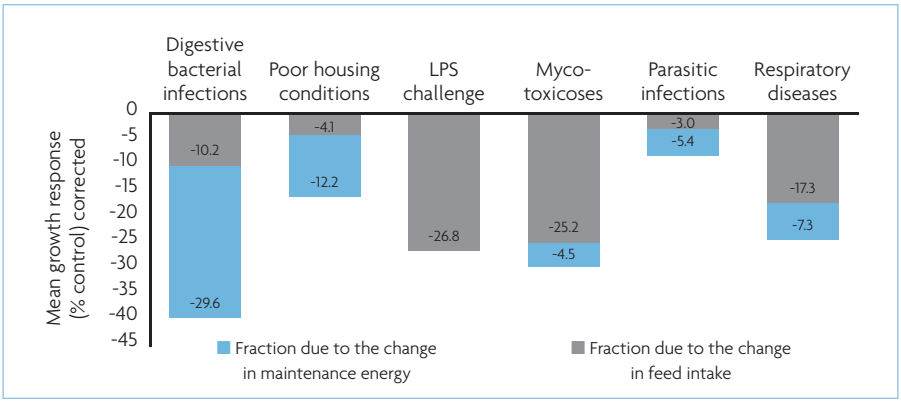

Fig. 1. Partitioning of the reduction in average growth rate following a challenge. Average starting weight of pigs 10kg (adapted from Pastorelli et al 2012, meta-analysis).

There are indications that improving the ability of pigs to cope with stressors may be a better way of improving pig performance than selecting only for increased growth potential from pig genetics researchers. Resilience in pigs has been described as the ability of pigs to cope and recover from stressors and is on the cusp of becoming a new benchmark in pig production.

Why resilience?

Average daily gain is a function of the pig's production potential as well as the ability of the animal to cope with stressors and unforeseen challenges. Breeding and management strategies that result in more resilient pigs will increase the capacity of pigs to reach their genetic potential under commercial conditions and improve production efficiency on farms in a sustainable way.

Furthermore, it is expected that resilience research will benefit the health and welfare of pigs and reduce the use of antibiotics or treatments in general on pig farms. An economic value associated with improved resilience in pigs beyond reduction in production losses and health costs is a reduction in labour time and costs, as animals show less problems and become easier to manage.

The response of a pig to stressors in terms of minimising the impact of a stressor and quickly recovering from it is defined as resilience. So, the capacity of the body to withstand challenges to its stability is considered as resilience. There are many different types of stressors a pig can potentially encounter throughout its productive lifetime, which again can impact its performance.

Quite often the first noticeable impact of stressors will be a reduction in feed intake in pigs. However, there are also reactions on the cellular and gut level of the pig, such as oxidative stress and inflammation in response to stressors, further reducing the available energy for growth, as those type of stress reactions will increase requirements for maintenance energy.

Ultimately the pig's capacity to adapt efficiently will determine the extent of those stress reactions and the impact they will have on growth performance over time.

Fig. 1 summarises the findings of a meta-analysis study across 122 published pig trials, studying the impact of selected stressors found under commercial conditions on reduction in average daily growth rates in growing pigs.

It is also looking at how much of the reduction in growth rate was due to an increase in maintenance energy and how much was related to a reduction in feed intake. According to this data some stressors, such as respiratory disease, lipopolysaccharides (LPS) and mycotoxins have a greater impact on feed intake than maintenance energy requirement. This might also be expected from heat stress.

However, when it came to challenges associated with the gastrointestinal tract, a large part of the reduction in average daily gain was due to an increase in maintenance requirements. Other stressors which were not covered by this study are: human handling, vaccination, dust, ammonia or out of feed and water events, which can all also have an impact on performance of pigs to a greater or lesser extent.

Spotting resilience in pigs

Single time-point measurements have been said to be of limited value because they do not measure responses to and recovery from

Continued on page 22

Continued from page 21
stressors. Although there are exceptions, such as productive longevity as it is a single measurement of the accumulated consequence of adaptive capacity and resilience.

Otherwise repeated measurements over time have been found to be key to determine resilience in animals. This is where new technologies, such as automated monitoring, sensors and computer vision come into their own greatly facilitating the ability of producers to collect data from repeated individual measurements in pigs on farm.

It is also making the recording of individual feed intake in group-housed pigs more accessible, which would otherwise be difficult to do on farms.

Recently several research groups have taken different approaches to measuring resilience in pigs, some using production data, some behavioural data and others are currently using artificial intelligence to monitor tail posture in pigs.

But what they all have in common is that they are looking at repeated observations to detect the number of fluctuations or deviations from an expected standard over time.

Some suggest that the individual day-to-day variation in feed intake could be utilised to quantify resilience to heat stress, whereby pigs with more day-to-day variation in feed intake would indicate that pigs are less resilient.

Genetic researchers in the US confirmed that fluctuations in feed intake or duration at the feeder over time are indicators for resilience in pigs to a variety of stressors, including disease and can be used as heritable measures of general resilience in pigs.

The variance of deviations in daily feed intake and deviations in daily duration at the feeder during the finishing phase were positively genetically correlated to mortality and number of treatments required in pigs.

A pig welfare research group from the Netherlands is using the pig's tail posture and intactness as the main indicator for resilience. The theory behind it being that more resilient pigs are less inclined to start tail biting and this is also related to tail posture – curly versus straight.

Managing for resilience

Geneticists have certainly started to pave the way to breed more resilient pigs by determining phenotypic parameters that are suitable as resilience indicators.

Behavioural research is highlighting the opportunity to improve resilience in pigs through management practices, such as enriched housing.

In piglets the location of sow feeders during lactation have been shown to matter in the piglet's ability to adapt to the weaning process.

Nutritional solutions that help to build the adaptive capacity of the pig to stressors for more energy efficient responses could also play a role in managing resilience.

More research is underway to gain a better understanding of how nutrition and other management practices can effectively support pig resilience.

Closing remarks

The resilience approach requires us to make a shift in how we evaluate the impact of breeding and management strategies in pigs.

While the proposed resilience indicators are not always easy to measure under commercial conditions using conventional practices, the development of new technologies helping farmers to monitor individual animals for precision livestock farming is certainly speeding up progress required to facilitate this.

This approach also highlights the need for adaptability to future events over optimisation and improving efficiency under known conditions for pigs and farms.

There is no time like the present Covid-19 crisis to remind us of the uncertainty and unpredictability in our lives and farming, bringing home the need for resilience. ■