An opportunity to improve the iron status in newly weaned piglets

The introduction of hyper-prolific sows has led to an increase in the number of weaned piglets per sow, placing greater stress on newly weaned piglets. Bigger litter sizes are often reflected in lower-average weaning weights, and so continued focus on ways of improving post-weaning growth is important.

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As a result, pig production systems are becoming increasingly interested in the iron status of piglets, due to its potential impact on performance and sudden death.

There are low levels of iron in sows' milk, and pigs housed in confinement are susceptible to anaemia if they are not administered an iron injection (typically 200mg) early in life.

However, recent research has shown that even with an iron injection, modern pigs from high milk production sows may still become borderline anaemic by weaning (35% of piglets), and may be susceptible to poor post-weaning growth.

Although generally seen as beneficial in mitigating anaemia, iron injections may also potentially have some negative effects associated with higher oxidative stress on the animal. Indeed, studies have indicated that the requirement for biological antioxidants increases in piglets that have had an iron injection.

Even with current practices, anaemia in pigs at post-weaning can have a deleterious effect on growth. Therefore, any new post-weaning feed applications that can mitigate the effects of iron deficiency should be explored.

Factors reducing iron bioavailability

A dietary factor that affects iron bioavailability is the presence of phytate, a strong chelator of divalent metal ions, reducing bioavailability. Traditionally, piglet diets were made up of highly digestible animal proteins, which contain significant levels of high bioavailability haem iron.

However, with a focus on lower cost diets, more expensive animal proteins used in starter feeds have been replaced by higher use of vegetable proteins, which are low in iron and relatively higher in phytate content than a conventional diet.

This results in, even when supplemented with iron (100-200ppm), an increased phytate to iron ratio, poorer iron bioavailability and may be a contributory factor to poor on-farm iron status immediately post-weaning.

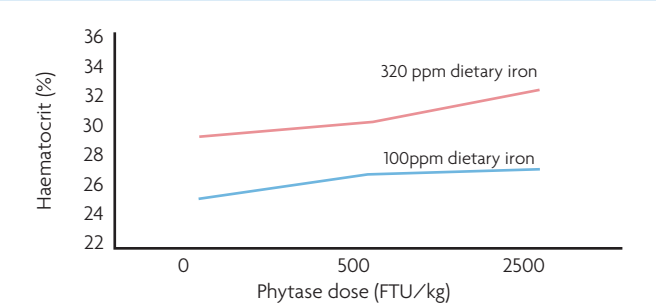

Fig. 1. Effect of dietary iron and Quantum Blue phytase dose on the iron status of piglets at 21 days post-weaning (measure as proportion of haematocrit) (Iron P<0.05, Phytase P<0.05, Iron × phytase interaction P<0.05. Laird et al., 2017).

High doses of phytase to improve iron status

Phytate and its lower isomers can reduce the bioavailability of protein and divalent metal ions such as iron and zinc. Supplementation of 1,500-2,500FTU/kg phytase (superdosing) aims to achieve near complete breakdown of phytate (IP6) and the lower isomers (IP5-IP2) resulting in increased mineral bioavailability.

A recent study (Fig. 1) showed that increasing doses of Quantum Blue in weaner pigs linearly increased iron status measured as the percentage of red blood cell (haematocrit) in both low (100ppm) and high (320ppm) iron supplemented diets with the highest hematocrit levels being associated with the highest iron and highest Quantum Blue dose (2,500FTU/kg).

When compared to the control diet of 100ppm iron and no use of phytase, piglets fed high iron (320ppm) and 2,500FTU/kg Quantum Blue resulted in an improved ADG (+40%) and FCR (+16%).

There is increased interest in research on improving iron status of piglets, with the target of reducing anaemia and improving post-weaning performance.

One application that may be beneficial in improving iron status of the weaned piglet is the use of higher levels of phytase to unlock the dietary iron potential bound by phytate. ■