

## Isotonic Solutions for Key Production Challenges

Isotonic liquids are a new development in pig nutrition, but evidence suggests they are likely to play a fundamental role in future feeding strategies. Research by animal health and nutrition company, Tonistry International, confirms that supplementing young piglet diets at key stages of their lifecycle, with nutrients that are precisely targeted to optimise gut integrity and protect cellular function, does offer potential to improve health and performance across the entire production phase.

### Pre-weaning Support

Pre-weaning is one of the most important stages in a pig's lifecycle. Piglets are born with relatively underdeveloped intestines which grow at a rapid rate for the first few weeks after birth. The first ingestion of the colostrum causes acceleration in the small intestine growth, that doubles its weight and increases the length by 30% with three days after birth (Xu et al., 1992). It would take a young calf about six months to develop an intestine to the same level as a piglet would develop in about 3-4 weeks.

Tonistry International has developed a solution that specifically targets enterocytes, intestinal cells that cover the lining of the small intestine. **Tonistry Px** is an isotonic protein drink that contains the key ingredients needed to nourish the intestinal cells, the enterocytes. These enterocytes are the final gateway for the absorption of proteins, carbohydrates, amino acids and key nutrients into the body. By supporting the enterocytes, Tonistry Px helps pigs overcome key productivity hurdles piglets face, in particular pre-weaning mortality.

Where other products focus on feeding the pig, Tonistry Px feeds the intestine. Tonistry focus on micro-ental nutrition. This is the delivery of small amounts of water, salts, electrolytes and readily absorbed nutrients (glucose, amino acids and small peptides) directly to the gastrointestinal tract (Devey, 2010). Using a sweet and sour flavour, the highly palatable liquid formula appeals to the piglet's appetites, the solution delivers the nutrients specifically to nourish the enterocytes in the gut.

A global meta-analysis of 60 trials across Europe, Asia and the US, involving over 125,575 piglets, showed that using this isotonic protein solution (Tonistry Px) had a positive influence on reducing pre-weaning mortality. On average there was a reduction of pre-weaning mortality by 20% observed. This amounts to 0.32 piglets per sow per litter or an extra 0.75 piglets per sow per year. On a 1,000-sow farm that is an extra 750 piglets per annum. The reduction in pre-weaning mortality is understood to be due to this micro-ental approach, to improve gut health and the functionality of the small intestine.

A common cause of death among piglets is diarrhea. Some forms of e-coli can increase the risk of diarrhea. In another study, it was found that Tonistry Px significantly reduces the number of e-coli cultures by 57% versus a control in pre-weaning. In the same study, it also showed a significant increase in Lactobacillus (good bacteria) by 3.5 times the control. The presence of lactobacilli in the gut has been shown to provide the host with advantages of fighting off potential pathogens and can modulate the immune response.

It is important to note that pre-weaning mortality is not limited to just the smallest piglets, it occurs across all weight categories. In a study from the US, it was shown that administering Tonistry Px from an early age reduced mortality rates equally across light, medium and heavy-birthweight pigs. Producers risk maximising the potential of the litter by only considering the smaller pigs. The

number of lighter pigs tends to be smaller in a litter compared to that of medium and heavy birthweight pigs. Pig producers must look to improve the intestinal health across all birthweights.

An additional benefit of feeding the intestine by focusing on micro-enteral nutrition is the increased feed intake and subsequent weight gain. As the surface area of the villi are greater, there is more capacity for the enterocytes to process more, piglet's appetites increase, and they naturally consume more feed. In that same study from the US, piglets supplemented with Tonisity Px from days 2-8 weighed an extra 100g at day eight and an extra 783g at day 40 compared to the control, showing a 10% increase in average daily gain. These trials have been repeated across the globe, showing similar success rates on increased weight gain and a reduction in pre-weaning mortality.

### **Post-weaning Hydration**

When piglets have proper access to fresh and good quality water post-weaning, they will usually start drinking about 3-5 hours. However, it takes up to 30-35 hours for 85 to 90% of the pigs to start drinking, and more than one week to rebalance fluid intake post-weaning. As far as feed intake is concerned, about half of the piglets start eating in the first four hours post-weaning but it takes more than a day to see 90% of them consuming feed (Pluske *et al.* 2003; Wilcock *et al.* 2009). This pushes the piglet's gut towards an inflammatory state which can degenerate in disease and mortality.

Tonisity have the perfect solution to minimise weaning disruption in the form of **Tonisity PxW (PxW)**. PxW is a concentrated, water-soluble solution that is designed to be administered to weaning-age pigs through ordinary water lines. It is specifically designed to improve water intake and intestinal function during the weaning transition. Consisting of an innovative and palatable combination of amino acids and electrolytes, that hydrates and encourages feed intake during this stressful period.

Tonisity recently completed a meta-analysis performed on seven farms and 31,861 weaner pigs across the US. Fluid intake, mortality and fall behinds were the key measurements recorded. A 5-day protocol was used to deliver PxW (or water) to newly weaned pigs, with an average weaning age of 18.5 days, who had just arrived at wean-finish barns. Transit time from the farrowing site was anything between three and 15 hours. Pigs started drinking PxW from as early as 30 minutes post-weaning. After 12 hours post weaning on day one, PxW consumption was 1.4 times higher than water consumption, after 24 hours this rose to 2.1 times that of water. On average across the five days, PxW was consumed 1.7 times more than water. Mortality in the control groups was 0.7% compared to 0.3% in the PxW groups, a 57% reduction or four pigs per 1,000 weaned. Fall behinds or weaker pigs that needed to be moved to hospital pens, were 4.4% in the control group and 2.6% in the PxW group, a 41% reduction in weak pig removals or the equivalent of 18 more pigs per 1,000 weaned.

Tonisity PxW also helps reduce labour time as it can be administered through the water lines. Through the effects on mortality and fall behinds, an important reduction in the work and expense associated with treatments and removals is also achieved. Producers can see positive results almost immediately, by reading water meters, and evaluating initial fluid intake of the solution versus water consumption. PxW can also be given to pigs before transport, where pigs are exposed to various stress factors like space restrictions, travel conditions and transit time. It helps them cope with this challenging situation and improves their hydration. Recent trials have also shown that it is compatible with water medication/vaccination. With Tonisity PxW we see that pigs are thriving, not just surviving.