

Optimizing dietary electrolyte balance to improve sow performance

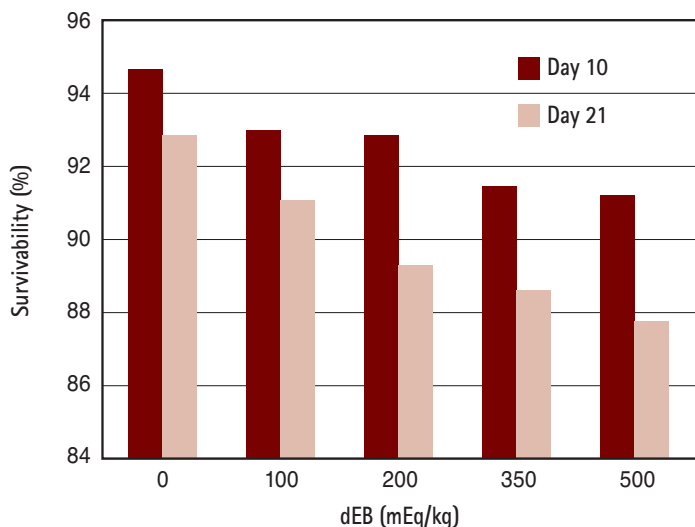
By Pieter van Wijck, Nutrition Partners Inc.

Dietary electrolyte balance (dEB) manipulation has been used for over 20 years to enhance lactation and reproductive performance in dairy cattle. Dietary electrolyte balance also plays an important role in optimizing sow performance. Improvements in genetics has resulted in larger litters being born and in turn, a larger litter is being raised by the sow, which puts additional strain on the sow's metabolism and body. Optimizing the sow's electrolyte balance in gestation and lactation is a tool we can use to help the sow cope with these larger demands.

What is dietary electrolyte balance?

Dietary electrolyte balance is the difference between the anions (negatively charged ions) and cations (positively charged

Figure 1. Effect of dietary electrolyte balance on survival of piglets at day 10 and 21.



Source: De Rouchev et al. 2003. J. Anim. Sci 81:3067-3074

ions) in the feed. It is expressed in milli-equivalents per kg feed (mEq/kg). The pig's body tries to keep the electrolyte concentration in balance. A feed with a high electrolyte balance will cause the pig to excrete sodium and potassium into the urine. A feed with a low electrolyte balance will cause the pig to excrete chloride into their urine. These two processes influence the pH of the blood. However, the sow's blood pH is very closely regulated and must stay close to a pH of 7.4. Pigs will mobilize or store calcium in their bone tissue to help regulate the pH in the blood. Mobilizing or storing calcium at certain stages in production can benefit production.

Gestation

A higher electrolyte balance in gestation feed will cause the sow to store more calcium in her bones. Feeding a diet with a low electrolyte balance for longer periods of time can cause poor bone mineralization and in the long run can lead to leg problems, and possibly increased sow culling rates.

Farrowing

A lower electrolyte balance around farrowing will cause the sow to mobilize calcium from her bone tissues. Sows have a high demand for calcium around farrowing because it is needed for muscle contractions and to start milk production. Not enough calcium can delay the farrowing process and result in a lower milk production. The same problem is well known in the dairy industry as milk fever. For sows this can result in slower births, which can result in more stillbirths, udder edema and hard feces. De Rouchev et al. (2003) reported a higher survivability and more pigs weaned from sows fed a lower electrolyte balance ration around farrowing as seen in Figure 1. Similarly, a trial on four sow farms (1,667 sows) in Germany reported that optimizing a sow's dietary electrolyte

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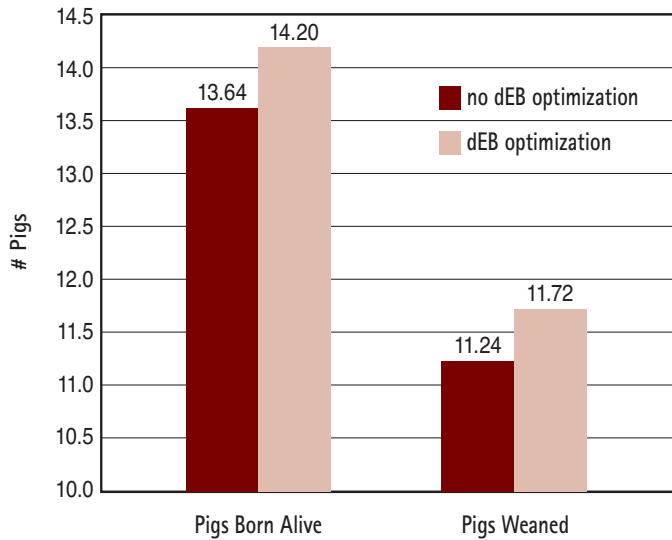
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Figure 2. Effects of optimizing dEB on number of pigs born alive and weaned.



balance resulted in an improvement in piglets born alive and weaned, and reduced pre-weaning mortality (Figure 2.).

Lactation

A lower electrolyte balance around farrowing is beneficial, but for optimal milk production a higher electrolyte balance during lactation is recommended. A higher dEB in lactation can improve milk production resulting in heavier weaning weights.

Bottom line

At Nutrition Partners we have been using the dEB concept successfully for the last couple of years improving reproductive performance. For example, improving the number of piglets weaned has a significant impact on the farm’s bottom line. Table 1, calculated using Nutrition Partner’s “NPI Farrow-to-Finish Analyzer” demonstrates the financial impact of a one per cent reduction in stillborn pigs and preweaning mortality at three different market prices on a farrow-to-finish farm;

- A one per cent reduction in stillborn pigs per litter is worth \$10.61 to \$21.73 per sow per year in \$1.20 to \$1.60 markets, respectively.
- Reducing preweaning mortality by one per cent has a value of \$10.93 to \$22.39 per sow per year in \$1.20 to \$1.60 markets, respectively.

Table 1. Financial impact of a one per cent reduction in stillborn and pre-weaning mortality at three market prices

\$ value/sow/yr	Reduction	Market Price		
		\$ 1.20	\$ 1.45	\$ 1.60
% Still born/litter	1.0%	\$ 10.61	\$ 17.56	\$ 21.73
% Pre-weaning mortality	1.0%	\$ 10.93	\$ 18.09	\$ 22.39

Conclusion

It is important to know the electrolyte balance of gestation and lactation diets for pigs. Feeding the right electrolyte balance at the different stages of production will improve bone mineralisation and sow performance which in turn improves the farm’s bottom line. ■

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