Impact and management of heat stress in swine production: a Brazilian perspective

Interview with Bruno A. N. Silva, Ph.D., Institute of Agricultural Sciences ICA, Universidade Federal de Minas Gerais, Brazil

Bruno Silva is a professor and researcher in swine nutrition and production and environmental adaptation at the Universidade Federal de Minas Gerais and a specialist in the field of nutritional requirements and environmental adaptation of pigs in tropical regions. At Lallemand’s 9th International LEVUCELL SB technical meeting in Ho Chi Minh City, Vietnam, Oct. 25, 2017, he gave a lecture about nutritional solutions to improve the performance of highly prolific sows in a tropical humid climate.

Lallemand: What are the current challenges of Brazilian swine production?

B. Silva: The Brazilian pig industry is one of the biggest in the world, and we are the fourth biggest pork exporter. Still, we have a lot of challenges. First, the reduction of production costs is a major challenge, as we have to deal with high commodity prices, especially corn and soybeans, the main raw materials in Brazil. Feed sums up to around 70 - 80% of the total production cost. Second, we have to improve efficiency. For this, we are looking towards a shift in terms of investments, especially in technology. Third, we look to animal welfare issues. So far, we do not have the same pressure as in Europe or the USA, but things are starting to change, especially driven by international demand as a leading exporter in pig meat. Finally, heat stress is an important issue as we have some tropical climates and sub-tropical areas.

What is the cost/impact of heat stress on Brazilian swine production?

B. Silva: Heat stress has an impact on all animal categories: it has a negative impact on milk production in sows, and it has an impact on grower-finisher performance, translating into a huge economic impact. Field and university studies show impact around 20-25% on milk production and, subsequently, piglet performance. In finishers, heat stress impacts protein deposition, which is reflected on carcass quality. So heat stress really impacts the whole cycle.

What is the impact of genetics on sows’ heat sensitivity?

B. Silva: I definitely see genetics as a tool to help us cope with heat stress challenges. Selecting pigs and sows with a more efficient thermoregulatory response is essential. There are already genetic lines in the Brazilian market, which are more robust against heat stress. There is a huge difference in terms of productivity compared to non-selected sows, especially regarding feed intake. Feed efficiency and milk production are also improved. The way these sows use nutrients is more efficient and the sows are more tolerant to heat. This is one tool, but others exist too.
How do you rank the importance and feasibility of genetics, environmental measures and nutrition, to mitigate the impact of heat stress?

**B. Silva:** Environmental changes are the first strategy to adopt. There is no nutritional strategy or genetic selection that can actually compete with the benefits of changing the environment. If you change the environment, you allow the sow to have more efficient thermoregulation and keep up with its genetic potential. Pigs have a very limited thermoregulation system. It is effective to work with cooling systems that improve heat dispersion via sensitive processes, such as floor cooling, drip cooling or snout cooling, or changing the whole climate in the building. However, these environmental changes are costly and not accessible to all farmers, even though studies have shown that — depending on the system used — the investment can pay for itself in one year. Genetics is effective too, but this is a longer term as it takes about five generations. Nutrition can be a short-term option with less investment.

You conducted a trial at Brazil University with live yeast *Saccharomyces cerevisiae* var. *boulardii* CNCM I-1079, can you tell us about this?

**B. Silva:** Within nutritional approaches, one hypothesis is that if we could improve gut health, improve digestion efficiency, we could probably improve nutrient absorption and improve milk quality. What we observed in this trial was that the sows supplemented with the probiotic improved their output: piglets were heavier with higher weaning weights. When looking at milk composition, we saw a higher fatty acid profile, indicating that the piglets clearly benefited from the sow’s improved gut health and function, which leads to better nutrient absorption and, consequently, improved milk composition.

Was improved digestibility the main driver?

**B. Silva:** One of the drivers. We’ve also observed a stimulation of the feed intake for the sows receiving the live yeast.

Which nutritional strategy would you recommend?

**B. Silva:** There are several strategies that can be used under heat stress:

- Reducing crude protein (e.g., reducing soybean meal and supplementing industrial amino acids) is one alternative to reduce the thermal effect of the feed.
- Modifying the electrolytic balance, inducing a metabolic acidosis. One of the effects of heat stress is a respiratory alkalosis: excess of CO$_2$ is lost through panting, leading to an increased respiratory pH. The body releases acids to compensate — which induces a complexation of protein molecules with calcium, which is no longer available for milk production. Reducing crude protein also helps reduce the electrolytic balance.
- Improving feed digestibility by enhancing digestive microflora (e.g., feed additives such as live yeast as seen in our trial, but also antibiotics, as these are still allowed in South America).
- The use of flavoring to stimulate feed intake by sensory imprinting, especially when the temperatures are cooler in the day. We published studies that have shown that the constant use of flavors could enhance feed intake and attenuate negative effects of a chronic heat stress. Depending on the region, there can be strong daily fluctuations between day and night. Thus, there are moments when the sows have the opportunity to eat more. We have done some field trials in this area with very interesting outcomes.