Utilizing a Phileo Stress Relief Program to offset Heat Stress effects in Sows

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What is Heat Stress?

Heat stress occurs when a pig is unable to maintain a comfortable body temperature due to high environmental temperature and humidity. It is well established that bigger, mature pigs are more susceptible because of their size, body fat content, and inability to perspire in response to increased environmental temperatures. The effects of this are varied, with increased panting, reduced activity, lower feed consumption reduced growth performance and sow milk production (see **Table 1**). The metabolic effects are also varied, with increased inflammatory stress, gastrointestinal permeability, insulin levels and stress metabolites, reduced follicular development and reduced antibody levels in milk and colostrum (see **Table 2; Figure 1**). These increased stress indices are also associated with increased risk of pathogen proliferation and disease. While growing pigs may have some limited ability to move around their pen and marginally reduce their heat stress exposure, lactating sows with a high metabolic rate are unable to escape the heat because of limited mobility while nursing a large litter. Further, while all pigs acclimate over several days to increased environmental temperature, lactating sows, with a shorter duration to acclimate before weaning usually cannot become fully acclimated in time to mitigate some effects on themselves and their litter's well-being (*Pearce 2011; Machado-Neto 1987*).

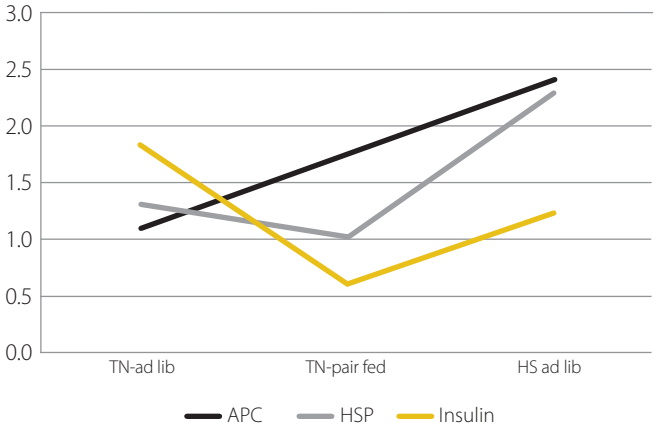
Table 1: Effects of heat stress on sow milk production.

Temp. (°F)	Milk Yield (lbs/d)	Reduction	Reference
64	16.5	-18%	*Quiniou & Noblet (1999)*
84	13.7		
68	21.6	-22%	*Noblet et. al. (2000)*
84	16.8		
64	18.3	-26%	*Quiniou et. al. (2000)*
84	13.4		
68	22.9	-30%	*Renaudeau & Noblet (2001)*
84	16.1		

Table 2: Decreased piglet serum IgG levels from d 0 to 3 after birth during heat stress.
(Machado-Neto, 1987)

	Thermoneutral (21.2 °C)	Heat Stress (31.7 °C)
Birth	0	0
d 1	29.9	19.6[b]
d 2	24.7	15.8[b]
d 3	19.4	13.1[b]
b, p<0.05)		

Figure 1: Effect of Heat Stress on Apparent Tight Junction Permeability Coefficient (APC), Liver Heat Shock Protein (HSP) and plasma Insulin (g-8/mL) in Growing Pigs at thermoneutral ad libitum feed (TN-ad lib), thermoneutral pair fed at heat-stress intake (TN-pair fed); heat stress ad libitum feed (HS ad lib). *(Pearce, 2011)*



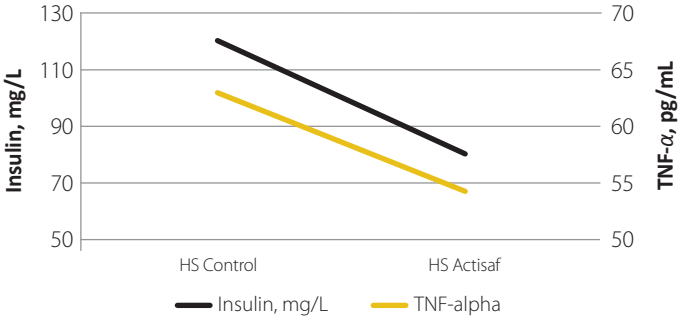
APC, µg/mL/min/cm^2; HSP, arbitrary units; Insulin g^{-8} / mL

Using ActiSaf HR+ and SelSaf as part of the Phileo Stress Relief Program.

ActiSaf HR+

ActiSaf HR+ is a live *S. cerevisiae* yeast probiotic concentrate that is pellet stable while also maintaining high viability in mash feeds. It has demonstrated improvements in sow and litter performance when fed at 0.5 lbs/ton in gestation and lactation or at 2 lbs/ton in lactation only. These benefits are three-fold. First, feeding ActiSaf helps reduce the inflammatory effects of heat stress as

Figure 2: Effects of Heat Stress on plasma Insulin (mg/L) and Tumor Necrosis Factor Alpha (TNF-alpha) in growing pigs fed diets with ActiSaf HR+. *(Baumgard et. al., 2015)*



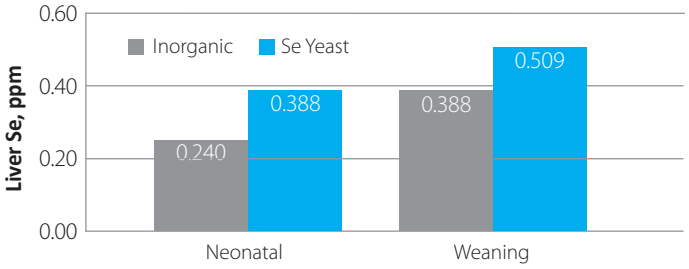
evidenced by reduced blood insulin levels and the proinflammatory TNF-α during heat stress (see **Figure 2**). Second, sows fed ActiSaf have shown improved hind-gut free radical scavenging, and better energy digestibility with a 28% increase in volatile fatty acid (VFA) fermentation from more efficient anaerobic hind-gut bacterial fermentation for metabolic energy needs. Finally, sows fed ActiSaf have demonstrated improved postweaning offspring growth performance, likely due to decreased proinflammatory immune responses, improved colostral immunoglobulin content and improved microbiota transfer during lactation (*Phileo by Lesaffre, 2020; 2021*).

SelSaf

An additional tool to help minimize the effects of oxidative stress during heat stress and periods of lower feed intake is the use of SelSaf selenium yeast to provide a dual-action source of selenium yeast to support optimal metabolic activity and higher selenium reserves.

SelSaf is a dual-action Se yeast that is a rich source of selenomethionine and selenocysteine. These selenoproteins acted as both a storage source of Se (selenomethionine) and a readily available source of Se (selenocysteine) for incorporation into selenoproteins and enzymes (see **Figure 3**). Thus, it provides a more consistent,

Figure 3: Effect of sows fed 0.3 ppm dietary Se from inorganic Se or organic Se from Se Yeast on their offspring newborn and weaned pig liver Se levels. *(Mahan & Parrett, 1996)*



balanced source of metabolically available Se during times of stress-induced low feed intake with selenomethionine from tissue stores and during more normal production periods with selenocysteine more immediately available.

Because heat stress increases proinflammatory stress (see **Figure 1**), the release of circulating free-radicals also increases. This becomes especially critical as feed intake is also reduced, thus dietary Se intake is lower. The storage Se provided by selenomethionine is then utilized to keep metabolic antioxidant status optimized and reduce the presence of free radical O- ions in circulation that increases cellular oxidative stress and pathogenic disease risk.

Conclusion

Nutrition, proper management and environmental accommodation can all help reduce heat stress effects. ActiSaf HR+ premium live yeast probiotic and SelSaf selenium yeast are part of these stress-reducing tools that help sows and their offspring better manage the effects of high temperature, lower feed intake, and subsequent immune challenges. By doing so, they help the sow and litter profitably maintain productivity, immune function, health and growth performance.