Heat Stress: Capsicum vs Fennel

By Joshua A. Jendza, PhD – Sr Research and Technical Services Manager, QualiTech, LLC

Heat stress and Livestock performance

Heat stress exists whenever animals are exposed to prolonged periods of elevated temperatures, which impair their ability to maintain a normal body heat level. The net effect of chronic heat stress is reduced performance, feed efficiency, and an increase in susceptibility to pathogens as the animals attempt to reduce metabolic heat production.

The problem with Capsicum

Capsicum is believed by many to help with heat stress by virtue of the flushing effect. Anyone who has eaten spicy chili peppers can attest to the ability of capsicum to increase blood flow to the skin, which in an animal experiencing heat stress, could aide in evaporative cooling. However, research into this potential benefit, has not turned up the expected result.

Heat stressed pigs fed a supplement based on Capsicum and Saccharine demonstrated higher respiration rate and rectal temperature than heat stressed pigs not consuming the additive (**Figure 1**), suggesting they were experiencing an increase in heat stress[1].

Anesthetized rats injected with capsaicin at 5 mg/kg body weight[2] experienced (**Figure 2**):

1. Increased metabolic activity (O_2 consumption)
2. Transient increase in skin temperature
3. Prolonged increase in core body temperature measured at the colon

This suggests that while capsicum may be able to increase evaporative cooling via the flushing effect, this benefit is brief and ultimately outweighed by a much longer and more pronounced increase in metabolic heat production.

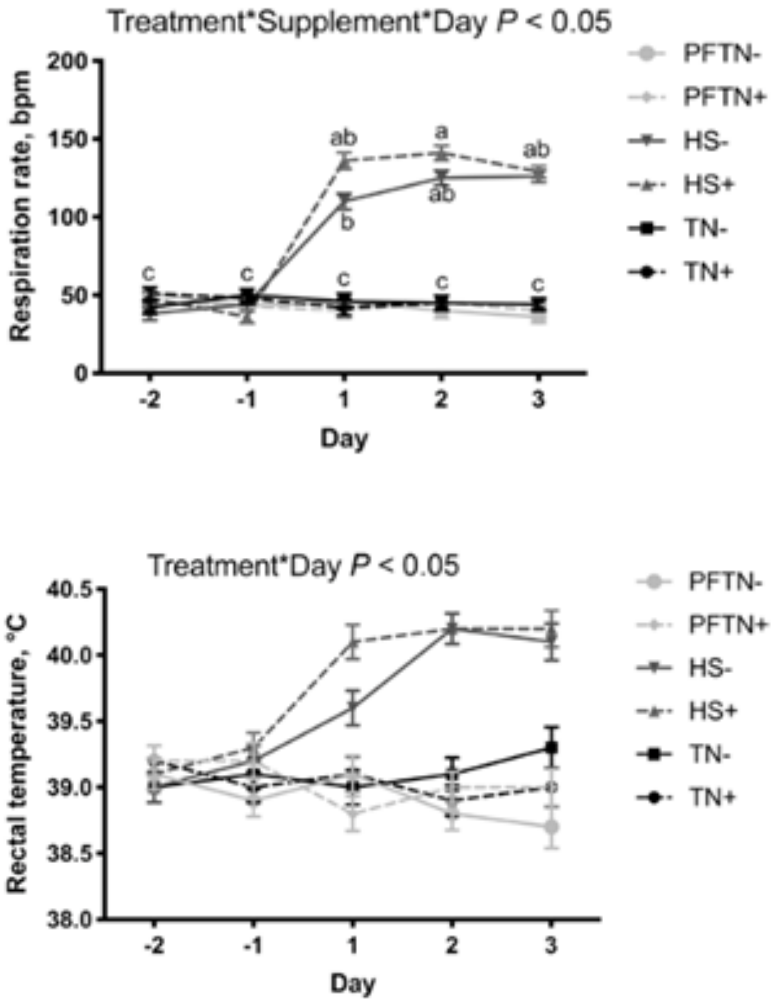

Figure 1. Effect of a capsicum + succinate (+ or –) feed additive on heat stress response of pigs reared under thermoneutral (TN), heat stress (HS) or TN pair-fed to match the HS pigs (PFTN)[1]

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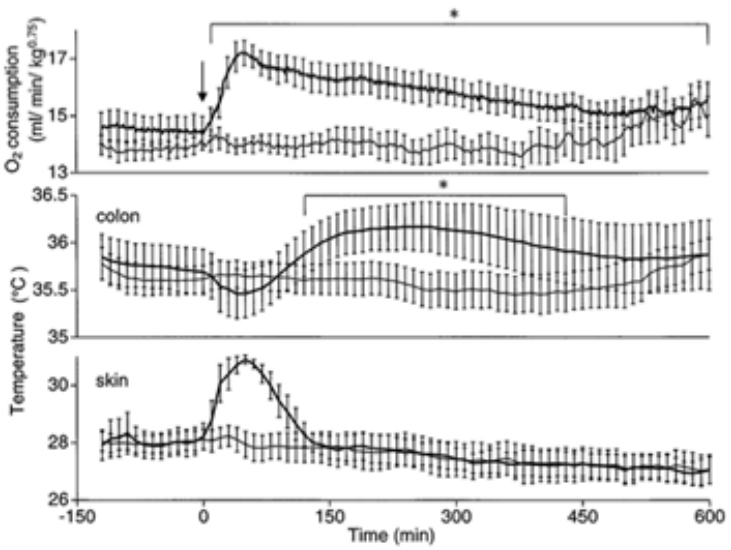

Figure 2. O_2 consumption and temperature of colon or skin of rats after injection (5 mg/kg; thick lines; n = 8) with capsaicin or a placebo (thin lines; n = 6; *P < 0.05)[2]

The promise of Fennel

By comparison, supplementation of heat-stressed calves with fennel has consistently shown improved rate of gain (**Figure 3**), and reduced severity of heat stress (**Figure 4**).

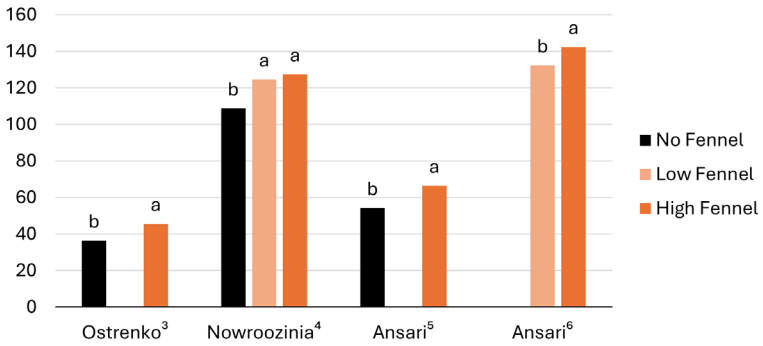

Figure 3. Body weight gain (lbs) of calves consuming fennel oil or fennel seed powder, and experiencing heat stress.

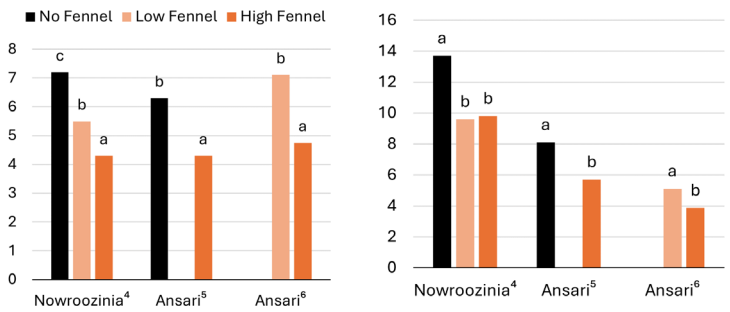

Figure 4. Days of elevated rectal temperature (left) and days of diarrhea duration (right) of calves consuming fennel seed powder, and experiencing heat stress.

Conclusions

Capsicum does not appear to reduce the severity of heat stress because it pairs a transient flushing effect with a prolonged increase in metabolic heat production. By contrast, **Fennel is consistently effective at reducing the severity of heat stress and protecting performance.**

References
1. DOI: 10.1093/jas/skaa131
2. DOI: 10.1152/ajpregu.1998.275.1.R92.
3. DOI: 10.1007/978-981-99-4165-0_16
4. DOI: 10.3168/jds.2021-20221
5. DOI: 10.3168/jds.2022-21776
6. DOI: 10.1016/j.anifeedsci.2023.115861

BioEdge™ Defend combines Fennel with Garlic to create a flavor-based additive that helps defend your beef cattle from flies, ticks, lice, worms and from environmental stressors like heat and humidity.

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