

Adapting pig nutrition in order to manage heat stress

Pigs are very sensitive to heat and humidity and this may adversely affect their performance levels, health and comfort. When temperatures are above the upper critical limit, pigs are less active and their appetite is depressed. Adapting their nutrition is a way to counteract this situation and maintain farm profitability and animal welfare.

by Pierre Montnach,
Pig Product Manager,
CCPA Group, France.
www.ccpa.fr

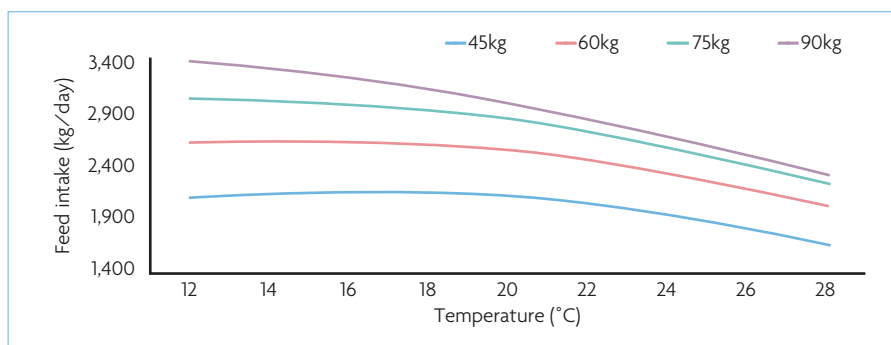


Fig. 1. Variation of voluntary feed intake with temperature and body weight (N. Quiniou, 1999).

Because of their intense metabolism, lactating sows are particularly sensitive to high temperatures. Above 22°C (71-72°F), each degree induces a reduction of 190g/d of the voluntary feed intake, which leads to a reduction of the milk production.

To compensate this feed intake fall, there will be an increase in body reserve mobilisation. As a consequence, the piglet weight gain during the suckling period will be negatively affected and the weaning weight will be impaired.

Moreover, the reproductive performance of the sows after weaning will be affected, with an increase of infertility rate, a decrease of the subsequent litter size, and an increase of the weaning to oestrus interval (WEI).

Influence of heat stress on finisher pigs

Pigs are particularly sensitive to heat stress because for each Celsius degree above the neutral ambient temperature threshold, their voluntary feed intake declines by an average of 95-100g. Heavier pigs are even more sensitive to heat stress because their subcutaneous fat counteracts heat loss,

through conduction and convection (Fig. 1).

Besides, another physiological adaptation of the animals during heat stress is an increase of respiration rate. Indeed, as pigs can not relieve themselves by sweating, panting is their way to remove excess heat. This situation drives an increase of carbon dioxide emission, with an evolution of blood pH (blood alkalosis) which can prejudice the global organism efficiency.

Piglets and growing pigs are also affected by heat stress at the intestinal and gut level. Indeed, there is a redistribution of blood to the periphery, to maximise radiant heat dissipation, while vasoconstriction occurs in the gastrointestinal tract. Therefore, the reduction of nutrients flow to the gut epithelium compromises the intestinal barrier integrity, which may lead to intestinal permeability and leaky gut.

Moreover, in a heat stress situation, the activity of digestive enzymes decreases and intestinal glucose transport increases (mainly a decrease in maltase and sucrose activity), which leads to a reduction of the digestibility of the feed.

As a consequence of all these phenomena, during heat stress, performance indicators such as the average daily gain of finishing pigs are significantly impaired (Table 1).

What should be done in case of heat stress?

- Increase ventilation and airflow.
- Use a cooling system such as a sprayer to freshen the air (and regularly check if it is in good working order).
- Reduce stocking density.
- Maintain drinking water temperature as low as possible.
- Increase water availability (water consumption up to six times more than normal).
- Avoid feeding between 10.00am and 4.00pm (the hottest period of the day).
- Improve the digestibility of the feed.
- Increase dietary energy density, using fat instead of starch.
- Minimise excess of non-essential amino acids and fibres.
- Supplement electrolytes and antioxidants through the water supply or the feed.

To prevent the feed intake drop because of high ambient temperature, CCPA Group has designed a specific blend of feed ingredients which supports the dry matter intake. Indeed, Axion ThermoControl contributes to improve the digestibility of the feed thanks to specific plant extracts.

These active components which are also selected for their palatability, stimulate the activity of the key enzymes which contribute to feed digestibility (amylase, lipase, trypsin and chymotrypsin) and pancreatic secretion (bile acid). As the digestibility of the feed is improved, sows

Continued on page 28

Table 1. Influence of temperature rise on pig growth.

Temperature (°C)	17	20	24	28
Digestible energy intake (MJ/d)	33.1	32.1	29.8	26.7
Average daily gain (g/d)	900	915	876	793

	Control	Axion ThermoControl	Comments
Number of animals	200	200	–
Individual initial pig weight (kg)	30.8	31.9	–
Individual final pig weight (kg)	100.4	103.5	–
Average daily feed Intake (kg/d)	2.39	2.44	+1.9%
Average daily gain (g/d)	864	900	+4%
Feed conversion ratio	2.77	2.71	-2.2% of FCR

Table 2. Improved growth and better FCR with Axion ThermoControl. CCPA Group field trial, Mexico, 2016.

Continued from page 27

and pigs are able to increase their feed intake. Plant extracts are also active in the general metabolism regulation, with a reduction of the heart rate of the animals and a reduction of their body temperature. The management of the mineral fraction of the feed via the use of Axion ThermoControl also contributes to boost the feed intake of the sows and pigs, with a better balance of the electrolyte needs.

Maintaining performance levels

Axion ThermoControl is effective during the fattening period where heat stress

induces a deteriorated feed intake, and a slower growth. For example, in Mexico, a field trial was realised on 400 finishers. In December 2016, the ambient temperature was on average 30°C and Axion ThermoControl was incorporated into feed, in a trial group of 200 pigs.

Table 2 illustrates the performance results obtained for the trial and control group of animals.

Another field trial was led in Asia (Taiwan), on two groups of 60 sows, in October 2017. The ambient temperature was between 30-35°C.

The use of Axion ThermoControl clearly increases sows feed intake and, as a consequence, milk production was

	Control	Axion ThermoControl	Comments
Weaning (days)	28	28	–
Number of sows	60	60	–
Total feed intake per sow (kg per sow)	80-90	110-120	+1kg/day
Weaning weight (kg)	6	6.5-7	+ 0.5 to +1kg/piglet
Carcase sow weight (kg)	–	+10kg	–
Oestrus expression	-	++	Farmer observations

Table 3. Better sow's feed intake and heavier weaned piglets with Axion ThermoControl. CCPA Group field trial, Taiwan, 2017.

improved with an increased weaned piglets weight (Table 3). Besides, sow's weight losses during lactation were reduced for the group of sows with Axion ThermoControl: +10kg per sow.

In order to evaluate the risk level of heat stress on farms, the CCPA Group has also developed for pig producers a heat stress application for smartphones (Iphone and Android) entitled: ThermoTool, which can be downloaded for free on Apple Store and Google Play.

Thanks to this application, breeders can anticipate heat stress over five days and quickly adapt, if necessary, the management of their farm and the animal nutrition. ■