

Pig farms in hot and humid conditions

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Maximum profit is the desired objective of any business firm including pig farms. Higher investment in land, buildings and equipment and persistently high feed costs combined with lower market hog prices are forcing Thai producers to be more competitive and cost conscientious. Maximum number of pigs sold per sow per year along with minimum cost of gain in finishing pigs is an understandable target Thai producers are striving for.

Although sow fertility and pig's growth performance are influenced by several factors, only a few are key successes of pig farms in hot, humid conditions. Prevention of heat stress particularly in gestating sows and attempts to maximise feed intake in lactating sows and growing pigs deserve special attention. Performance figures and procedures to provide cure will be discussed.

Stress in gestating sows

Hundreds of gestating sows held in crates of 220 x 65cm and housed in the same building are a common feature of swine production in South East Asia (SEA). One may argue that similar operations can be found elsewhere such as in the United States and Europe but the real difference is the average daily temperature at noon time which can be as high as 40°C. Moreover, producers tend to pay attention to suckling piglets and nursery pigs more than gestating sows since mortality occurs more frequently in these groups. Therefore, gestation barns with no fans, staff or cooling system are commonplace.

Poor management in gestation barns was identified as a predisposing factor of suboptimum performance in lactation barns. Hot, humid environments in concert with limited space rendered gestating sows in chronic stress. High levels of corticosteroid in the blood of stressful animals depressed immune response making them highly susceptible to infection.

Gestating sows exposed to heat stress during the last trimester or in a poor body condition tend to produce a higher stillborn rate. On the other hand, the mammary glands of sows in excessive body condition acquire less alveolar cells. Therefore, fat

sows produced less milk and ate less as well. Sow comfort during the gestation period is critical for subsequent lactation performance. Gestation buildings should be equipped with fans and a water spray system. Sows should be put on condition slowly right after mating throughout the gestation period. This task requires skilled labour and commitment since a sow's body condition must be checked on a regular basis and the feed intake is adjusted in order to obtain the right body condition.

The majority of pig farms in SEA are, however, utilising untrained labour. The body condition of sows is understood but the procedure to accumulate sow body condition is wrong.

The body condition of sows is generally left unattended until 2-3 weeks prior to farrowing when excessive feed intake is initiated and rapid increase in body condition occurs. Fat sows, high feed intake, heavy foetus, high placental blood flow and hot, humid conditions altogether cause puffing sows. These sows are in chronic stress and can be found at noon or even early in the morning if cooling equipment is shut down too early the previous evening. There are some difficulties in the lactation room such as pre or post-farrowing illness, off-feed and sow mortality.

Abnormal increases in the incidences of slow farrowers, hypogalactia, agalactia and uterine infection should flag special attentions not only for lactating sows but also gestating sows.

Careful searching for puffing sows particularly in the group of late gestating sows at noon and early in the morning will provide a clue to the inadequacy of the existing cooling system. In such cases performance figures often reveal high sow mortality (>10% per annum). Lower than average of wean to first service interval (WFS < 5 days) accompanied by lower than average weaning weight (WW) are indicative of hypogalactic or agalactic conditions rather than high feed intake during lactation.

Last but not least, nursery death losses on several occasions may stem from chronically stressed gestating sows. Suboptimum milk production ensures low intake of colostrum making weanling pig more susceptible to disease infection. Then dams with impaired

immune response spread germs harboured in their body to their offspring. Several cases of serious death loss in 5-7 week old nursery pigs due to PRRS virus infection cannot be solved until gestating sows are managed properly.

Maximise feed intake

Minimised body weight loss of the sow during lactation is the most important strategy to obtain the best sow health prior to rebreeding. The nutrient density of the lactation diet should be high enough to fulfil the requirements of the sow particularly under hot, humid conditions where lactation feed intake is frequently a limiting factor.

The lactation diet must contain at least 1% lysine and 3250Kcal of metabolisable energy (ME). Avoid using ingredients of questionable quality in the lactation diet or palatability of the diet could be compromised. A typical lactation diet used in Thailand generally contain 40% broken rice, 20-25% rice bran, 20-25% soybean meal, 5% good quality fish meal and 3-5% added fat.

In conditions where temperature and humidity is high, the use of a lactation diet that generates less body heat is recommended. The diet high in crude protein content generates more metabolic heat than that low in crude protein. As far as the energy source is concerned, digestion of starch produces body heat more than that of fat.

The higher the body heat increment, the lower the lactation feed intake. As a consequence, a practical lactation diet should be formulated to contain low levels of crude protein and starch by using synthetic amino acid and fat. Nevertheless, crude protein should not be excessively low or reproductive activity post weaning will be delayed and the sow's milk fat content will be depressed.

A diet containing 1% lysine can be formulated to be a 16-17% crude protein ration. Likewise, a diet too high in fat content is difficult to handle. Therefore, fat content in a diet should be kept lower than 10%.

To minimise sow lactation weight loss, a good quality lactation diet must be accom-

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panied by a strategy to maximise feed intake during lactation. Procedures to maximise feed intake during lactation are;

- Feed gestating sows according to their body condition. Never feed the sow more than 2.5kg/sow/day or less than 1.8kg/sow/day when gestation diet contains 0.80% lysine and 3100 Kcal of ME. Overfeeding during gestation will depress feed intake during lactation.

- Avoid using medicated feed during lactation, if necessary, limit the use of medicated feed during the period from seven days before to seven days after the day of farrowing.

- Keep the body temperature of lactating sows low using drip cooling and fans while keeping the piglets warm and dry using a creep box and heat lamp. High ambient temperature is surely detrimental to lactating sows.

- Use wet feed particularly for first parity sows. Add one part of water to one part of feed. Wet feed may increase lactation intakes up to 10%.

- Put sows on the lactation diet seven days prior to farrowing dates. Reduce the feed intake to 1.5kg/day one day before and on the day of farrowing. Increase the feed intake by 0.5kg for three days and start feeding sows ad lib on the fourth day. The lactation intake must reach a peak by seven days after farrowed.

- Provide a large feed space and plenty of water supply.

- Keep the feeder as clean as possible. If frequent feeding is in practice while there is not enough labour to clean the feeder then the lactation intake will be severely depressed.

- Start feeding sows with one large meal (3kg) very early in the morning say 06:00am. Keep feeding sows continuously with several small meals (0.5kg) until 08:00am when all feeders are cleaned thoroughly. Repeat the same feeding method again in the evening. Ad lib feeding must be extended to cover the dry period. This is extremely important particularly for first parity sows. Inadequate feed intake during dry periods may result in prolonged wean to first service intervals, an indicator of sub-optimum fertility.

The consulting veterinarian should monitor the average wean to first service intervals (WFS), percentage of sows in heat by seven days after weaning (HYB7) and litter weight gain (LWG). If minimum body weight loss and maximum nutrient intake during lactation is achieved, a shorter WFS, higher HYB7 and LWG will become evident.

A realistic set of achievable performance targets is five days of WFS, 95% of HYB7 and 2.5kg of LWG. A frequently encountered situation in hot, humid conditions is minimum body weight loss that is not accompanied by good LWG. Such situations are indicative of a herd with too many hypogalactic or agalactic sows, which may relate to mismanagement during gestation periods described previously.

Nevertheless, if minimum body weight loss during lactation is achieved, short WFS and good sow fertility can be expected. It is noteworthy that the reproductive performance of sow farms in Thailand have improved continuously during the past 10 years.

A portion of this success is attributable to the extension of knowledge relating to sow's feed intake during lactation.

The grow-finishing period

The pig's upper limit to body protein deposition is known as Pd_{max} . Although Pd_{max} is affected by age, sex, genotype, environment and live weight, on a certain farm it is broadly constant between 20-100kg of body weight. In growing pigs, Pd_{max} varies between 90-160g/day. A modern genotype may deposit protein at the rate as high 180g/day. If protein is 17% of the composition of body weight gain, this can be translated into more than 1,000g/day of average daily weight gain.

If no other nutrients, such as crude protein and amino acids, limit the rate of body protein deposition (Pd), Pd increases linearly with energy intake until Pd_{max} is reached.

Further increases in energy intake increase the rates of body lipid deposition resulting in a fat carcass and poorer feed efficiency. The energy intake at which Pd_{max} is just reached indicates the point at which the feed efficiency is maximised.

In pigs between 20-50kg, Pd increases linearly with increase in energy intake toward Pd_{max} . Nevertheless, Pd_{max} is never reached until pigs are between 45-50kg when ingestive capacity is no longer a limiting factor.

Therefore, the most appropriate strategy is to provide pigs with a good quality diet high in nutrient density and feed them to appetite. Since it is almost impossible under commercial conditions to overly feed pigs at this stage, the better the feed intake is the better the carcass quality and feed efficiency.

In pigs beyond 50kg, the ingestive capacity grows beyond the energy requirement. It is quite possible in practice to feed them until the energy intake exceeds requirement for Pd_{max} . Excess energy intake results in excessive fat deposition and deteriorates feed efficiency and carcass quality.

Consequently, the use of a relatively low energy diet offered ad libitum or the use of a restricted feeding programme is recommended.

Unfortunately, quality works cannot be pursued due to the lack of quality labour in SEA combined with low payment. The hot, humid conditions further complicates the already difficult task by depressing feed intake and promoting spoilage of feed.

Therefore, the majority cannot maximise feed intake during the growing phase (< 50kg). Rather pigs are overfed during the finishing period (70-105kg). Overfeeding during the finishing phase is an easy task and

results in satisfactory average daily weight gain (ADG). The adverse effects are poor carcass quality and feed efficiency.

In order to maximise feed intake in pigs less than 50kg, small meals of a good quality diet must be provided several times per day in a clean feeder. Several small meals can minimise spoilage and improve digestibility.

The barn temperature must be controlled using fans and water sprays or showers must be provided at least in the afternoon. The stocking density should be at least 1.2m²/pig and the number of pig per pen should be 18-20.

The number of pigs in a barn affects air quality and this has been shown to influence growth performance. Therefore, not more than 600 pigs should be in a single air space. In addition, the all-in all-out (AIAO) management scheme must be used in order to minimise disease interferences, particularly respiratory ones which may reduce pig's appetite.

As far as the diet quality is concerned, grower diets must not contain ingredients of questionable quality such as cotton seed meal, palm kernel or rapeseed meal. These ingredients can be used more successfully in finisher diets.

Grower diets should contain common ingredients such as corn, soybean meal or fishmeal. Poor quality fat is not only harmful to animal health but also worsens diet palatability. The essential amino acids should be balanced appropriately or feed intake will be less. The feed intake of female growers is more problematic than that of a male.

Avoid using grower diets with an excess of protein since females are less tolerant to such diets. Phytogetic products, volatile oils and oligosaccharides may improve diet palatability as well as animal health.

Conclusion

Inadequate feed intake is the single most important factor affecting the efficiency of swine production in South East Asia.

Hypogalactia, agalactia, slow farrower and pre or post farrowing illness may indicate that sows have been under prolonged stressful conditions during gestation periods.

Low feed intake during lactation and low weaning weight associated with acceptable wean to first service interval are usually the final outcome.

Therefore, good management during the gestation period is one of the keys to improving feed intake during the lactation period. Under feeding during the growing phase (< 50kg) accompanied by over feeding during the finishing phase (70-105kg) is another problem of feed intake in grow-finishers.

Although such practices will lead to satisfactory average daily gain, the feed efficiency and carcass quality will be poor. A good quality diet, skilled labour and proper management are required to improve feed intake in growing pigs. ■