Effective management of sows for increased prolificacy

In the pig business, high prolificacy means the ability to give birth to large numbers of pigs. Sows that can wean 12 or more pigs per litter are highly productive. We must consider not only pig count but also pig birth weight, pig quality, and pig viability.

Non-survival to weaning is detrimental to production of the surviving pigs as colostrum, milk, and other resources are wasted on pigs that die. Weaning weights or 21-day weights provide useful information.

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Sow productivity is perhaps best assessed by examining the number of full value quality pigs and their weight at nine weeks of age. The number of full value pigs marketed per sow per year is a measure of pigmanship and management skill, but it all begins with the productivity of the sow.

We expect that after a lactation of 17-25 days, the sow will express an obvious and fertile oestrus within seven days after weaning, conceive upon mating, and bear a subsequent litter of equal or better quality than the previous litter.

We expect that the sow will be able to stay in the herd and produce 6-8 litters of healthy, high quality piglets.

The highly prolific sow

The primary influence that causes the high pig born live numbers is the genetics of the sow. Highly productive sows derive from genetic lines that have been selected for generations for good reproductive performance.

Extreme individual sows in the extreme prolificacy genetic lines can predictably and repeatably give birth to more than 20 pigs per litter and produce more than 40 live born pigs per year.

It is well said that 'extremes are dysfunctional' since the most extremely prolific Taihu breeds can give birth to many pigs but such pigs are of relatively low commercial value.

At the opposite pole, selection for extremes in rapid growth rate, carcase muscling, and piglet survivability generally drives the system toward fewer pigs born live, substandard lactation performance, infertility, and skeletal dysfunctionalities.

The biological opposition of maternal traits and 'market hog' (terminal) traits has led to the development of 'static cross' genetic programmes where sow lines derive from 'maternal' lines heavily selected for reproductive traits and the sires of the market pigs derive from lines selected for growth, muscling, and market-appropriate conformation.

The gilt that becomes a prolific productive sow is typically the first or second cross of two or three genetic lines, typically Large White, Landrace, or Chester White, that have been selected strongly for reproductive traits.

The crossing of unrelated genetic lines produces hybrid females that optimise genetic potential. The best genetic programs combine generations of data recordkeeping and computer-based 'BLUP' prediction technology with visual evaluation of reproductive soundness.

Developing the gilt

Gilt selection begins when her sire and dam are mated. We know which litters are going to provide future productive females.

Gilts have significantly higher dietary protein and amino acid requirements than do barrows, and those gilts that will be kept for breeding purposes should be fed diets that meet their maximal requirements, and they should be raised in sow and litter environments that allow them to grow maximally.

High value gilts should not be fed the budget-minded diets designed for commercial market hogs. Enhanced levels of vitamins, minerals, phosphorus, and calcium are needed. Traditional gilt rearing methods that starve the gilt, force her to grow slowly, and limit her skeletal development are detrimental to modern genotypes. Excessive commercial focus on minimising the cost of feeding replacement gilts is misdirected economy.

Feed gilts ad-libitum to reach 125-150kg and about 20mm P2 backfat at about eight months of age.

Research has shown that gilts fed organic chromium at 400-600ppb during development have more pigs.

Purchase only clean negative stock

Any incoming animals should be isolated for 60 days and retested 30 days after arrival to the isolation facility.

Purchased breeding animals must be seronegative for PRRS and wild-type PRV virus. Herds that are vaccinating for PRRS should buy seronegative animals and vaccinate them as appropriate.

In pseudorabies (PRV) prevalent regions, replacements should be vaccinated with gene-deleted vaccine and test negative for field virus.

Where Classical Swine Fever (CSF) is endemic, animals should be free from persistent infection (PI) as determined by PCR. Serology is useless to determine CSF status except for presently rare cases where pigs are vaccinated with the new CSF subunit vaccines.

Vaccination and controlled exposure

Gilts in preparation for breeding should be vaccinated twice for Parvovirus, Erysipelas, and Porcine Circovirus 2 (PCV2).

Herds with a history of PCV2 problems should sequence the farm virus and use a vaccine appropriate to their situation.

In regions where PRV, FMD, or leptospirosis are prevalent, vaccinate gilts accordingly. Expose and acclimate gilts to the sow herd about 30 days prior to breeding.

There exists in all swine herds viruses such as enteroviruses, sapeloviruses, and astroviruses that can cause stillbirths, mummifications, embryonic death, infertility, and shaker pig syndromes.

It is impossible to vaccinate against these 'SMEDI viruses' but their impact can be minimised by exposing gilts to faeces from the sow herd and to culled sows 30 days before mating, such that the gilts become exposed and immune before pregnancy.

Mating gilts

Mature gilts should be heat checked twice daily (am and pm) by direct boar exposure, and mated on their second or third lifetime heat. Inseminate gilts at the detectable onset of oestrus and repeat insemination every 12 hours until the end of heat (when she will no longer stand for the boar).

Gestation feeding

The nutritional needs of pregnant swine and their foeti are not high. A 14% crude protein diet containing 0.65% lysine, 0.9% Ca and 0.7% P is adequate for sows and gilts in all stages of gestation.

Feed a basal level of 2kg gestation diet daily and increase or decrease feeding levels to body condition score 3.0 or P2 backfat 17-22mm at farrowing.

Minimum feeding level is 1.8kg/day. Increase feed 500g per day during the last three weeks of gestation. Feeding high dietary fibre during gestation can improve sow satiety, reduce stress levels, and improve foetal growth. Sows need more feed in cold weather and less feed in warm weather.

Vitamins and trace minerals are important. Supplement 750-900ppm choline, 70-100+ppm vitamin E, 5-10ppm folate, 5-6ppm pyridoxine, 200-250ppm Zn, 500ppb biotin, and 50ppb B12.

Producers are well advised to add 0.2ppm organic Se in addition to the typical 0.3ppm inorganic Se (in countries where permitted).

Sows should have ad libitum

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access to water at all times, and some form of environmental cooling should be provided (drippers and fans are ideal) when the temperature is 28°C or above.

Sow mortality

The highly productive sow can be sensitive and susceptible to high mortality rates. Gestation housing should be dry and well-ventilated. Accurate diagnosis is essential in any situation of sow mortality.

The most common cause of sow mortality is gastric ulceration due to feeds being ground too finely. Feed particle size should be 600-800 microns. There is no economic advantage to grinding sow feeds more finely than 600 microns. Pelleted feeds are attractive to the eye but are far more likely to cause ulcerations. Do not feed pelleted feeds to valuable breeding swine.

The second most common cause of sow mortality is urinary tract infection (UTI). These are usually sudden deaths, but some vulvar discharge may be observed in gestation.

The common causes are water deprivation and alkalinising diets. Urine can be collected early in the morning and tested with common pH paper. Ideal pH should be 5.5-6.5 (slightly acidic). Herds experiencing discharge problems or UTI losses often have sow urine pH of about eight.

In such cases, examine the diet and remove alkalinisers such as bicarbonate. Ammonium chloride added to the diet can acidify urine and is effective along with good water provision in stopping UTI problems. Consult with your nutritionist and your veterinarian.

The third most common cause of sow losses is lameness. Most lameness is rooted in structural unsoundness of breeding animals. Common causes of unsoundness are legs that are too straight and hypoplasia of the medial claw (small inside toe).

Deficiency in biotin and/or zinc can render the hoof susceptible to cracking and infection.

Gestation feeding to improve piglet birth weight

There are sow feeding programs such as 'bump feeding', and 'bu-bu-gao', phased gestation feeding, addition of fish meal, dietary fat, etc., that attempt to increase piglet birth weight in high prolificacy sows but in most cases there is no positive effect and often strong negative effects if sows become overfat.

It has been recognised for more than 30 years that litter weight and individual birth weight are chiefly controlled by genetics. This is a function of mature body size. Elephants are bigger than rats at birth, and Charolais calves are bigger than Jerseys. The pig at birth is similarly subject to his mature body size.

Increasing dietary protein and increasing gestation feeding amounts can effectively waste money, waste feed, and produce overfat sows but have little to no positive impact on piglet birth weight and piglet viability.

Three dietary interventions in late gestation can have a predictably positive impact on piglet birth weight and piglet viability. These are:

- Addition of organic chromium has been demonstrated to improve total litter birth weight and individual pig birth weights. The optimum level of dietary chromium is 600ppb rather than the oft-cited 200ppb. The Cr effect is apparently due to modulation of insulin response. Cr is incorporated into new cells in the sow's body as they are formed. Provide Cr to the developing young gilt and continuously long-term to the sow.
- Carnitine when provided at 50ppm during the last three weeks of gestation does not modify birth weights but does substantially improve piglet viability and early growth.
- Lignocellulose, a specialised insoluble/fermentable fibre source derived from forest resources, can predictably increase piglet birth weights by 100g per pig when added to late term gestation diets (last 2-3 weeks of gestation) at the rate of 75g per day.

Preparation for farrowing

Individually feed sows in gestation such that the P2 backfat level does not exceed 22mm at farrowing.

Overfat sows have farrowing difficulty and increased stillbirth rates. Fat sows tend to have lactation failure, eat poorly in lactation and lose too much weight in lactation, have prolonged wean-to-oestrus interval, and produce smaller litters at the subsequent farrowing as compared with sows that are not overfed in gestation.

Constipation is one of the most common causes of lactation failure in sows. High fibre diets pre- and post-farrowing and/or a chemical laxative such as potassium chloride or potassium magnesium sulphate (K2Mg[SO4]2) are effective in preventing absorption of dopaminergic endotoxins that commonly block prolactin release in sows with lactation failure. Avoid feeding high fibre throughout lactation as it can reduce feed intake.

Colibacillosis in the piglet can be effectively halted by prefarrowing vaccination of sows. Use the four-strain (K88, K99, 987p, F41) E. coli vaccine or laboratory prepared farm specific killed bacterins.

Routine use of 'preventive' antibiotics for control of piglet diarrhoea is illogical and deprecated.

Lactation feeding of sows

Avoid restricted feeding in lactation. Full feed beginning the third day post farrowing. Low fibre, high protein diets with minimum 0.95% lysine should be provided three or four times daily.

The highly productive sow needs about 60g of lysine per day in a balanced protein-amino acid matrix. If all sows are cleaning up their feed and no sows have any feed left before the next feeding, then sows are indeed underfed.

Addition of water to the sow feed can increase feed intake, but wetting of feed should be a simple process not a time-wasting ritual. Put the feed supply near the farrowing room, otherwise workers will be reluctant to full-feed the sow.

There is no such thing as diarrhoea due to excessive milk production. If diarrhoea occurs, get a diagnosis of the underlying disease. Full-feeding sows from day three to weaning increases weaning weights, reduces wean to oestrus interval, and increases ovulation rate, embryo survival, and increases born live at the subsequent litter. Continue to full-feed the sow from weaning to rebreeding.

Piglet processing

Where quality labour is available, attendance at farrowing can reduce piglet mortality. A farrowing powder can dry the pig at birth.

Provide three heat sources at farrowing, one behind the sow, and one at either side of the sow, to warm the pig when he is born, and to warm him while he reaches a teat on the right or the left side of the sow.

Do not tie off the navel, but trim it and dip in strong 10% iodine tincture (not tamed iodine) to chemically cauterise the navel and prevent infection. Tooth cutting is a major cause of morbidity and mortality in farms that still cut the teeth. There is no viable argument to justify cutting the teeth of the piglet and intelligent management has discontinued the practice.

Antibiotics are not necessary at birth unless there is a serious disease problem, and in those cases antibiotics should be an emergency stop-gap measure pending broader control by vaccination or other logical disease management.

Iron injections are essential to prevent anaemia. Moderate dosages of iron 75-150mg, given at day two and repeated at day 10 are preferable to a potentially oxidising iron overload.

Crossfostering can be done safely at birth to even up litters, but later crossfostering spreads infectious disease and is counter-productive.

Castration can be done easily at day seven. Consider use of a local anaesthetic and an analgesic when castrating piglets, as it is not only humane and civilised but it can enhance profitability.

Supplemental feeding (creep feed or milk replacer)

It is impossible for even the best sows to provide sufficient milk for large litters. Creep feed or supplemental milk should be provided.

Sow milk contains about 1.8-2.0% digestible lysine on a dry matter basis. Eighty years ago it was noted that supplemental milk and creep feeds should have lysine levels similar to sow milk.

More recent research suggests that the milk of the sow is not quite perfect for the pig, and a milk diet with about 2.4% lysine might maximise pig performance.

Inducing the fairly smart pig to consume perfunctorily proffered pellet of low quality but sugary 1.35% lysine diet is not easy.

Some nutritionists gave up on the concept of 'creep feeding' as supplemental nutriture and say that the feed provided to the piglet is not to replace or supplement milk, but just to 'teach the pig how to eat'.

We may call 'nonsense' on this. Neonatal pigs are precocious and express natural rooting behaviour that drives them to consume earth to get iron essential for life.

They do not need to be taught how to eat, they know that at birth. Earth, in the form of organic peats, can be offered to pigs on the floor of their farrowing crate, and they consume it readily due to innate grubbing behaviour.

Peat and humic substances can be provided to the pig early in life and then mixed daily with a high quality creep feed which the pig consumes along with the peat, and the pig can thus quickly be transitioned to consuming significant amounts of creep feed by day seven or before.

The economics of feeding a high quality creep feed or milk replacer to a piglet are compelling. The maintenance needs of the pig and more are being met by the sow milk they consume.

That means that, in effect, about 100% of supplemental milk or high quality creep feed can be utilised directly for piglet growth, and it is quite possible to see milk replacers and good creep feeds produce more than 1kg gain for every 1kg of creep feed consumed. ■