Four feeding practices for supporting gestating and lactating sows

Building on advances in sow feeding, such as the use of electronic sow feeders (ESFs) and automated top-dress devices, emerging feeding practices aim to bring an even more tailored level of precision to support gestating/lactating sows and their piglets.

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Beyond fine-tuning nutrient profiles and adjusting feed allocation to complement the growth and conditioning goals of individual sows, diets can be tailored to respect the physiological changes sows experience during different phases of gestation and lactation, as well as among sows of different parities.

Below, we touch on four feeding practices that can contribute to a more precise sow feeding strategy from gestation through lactation.

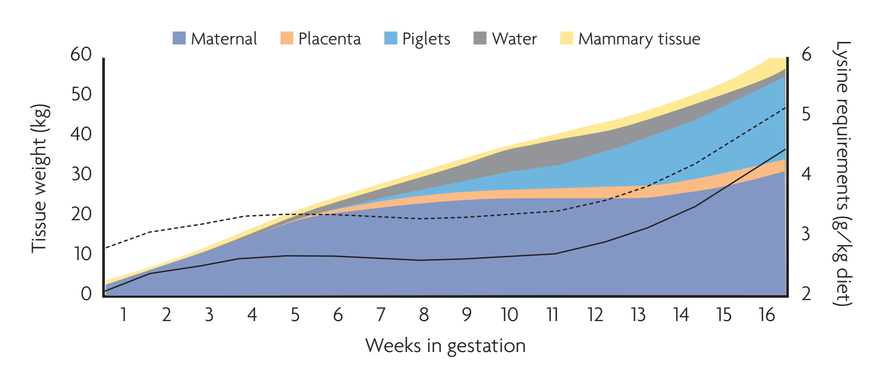

Fig. 1. Sows experience an increase in mass of various tissues during gestation. The image above depicts the modelled requirement for SID lysine level in the diet for gilts (dashed line) and sows (solid line).

PRACTICE 1: Blend gestating sow diets to complement developmental factors and sow parity

One common practice is also a bit of a paradox. While it is common to supply four unique diets across a piglet's first two months of life, sows are typically fed the same diet across all four months of gestation. Throughout different gestational phases, both the sow and her foetuses experience shifting demands for nutrients.

For example, during early gestation, the sow's diet must supply her needs for maternal gain of protein, fat, and skeletal reserves. At the same time, the diet must supply nutrients that contribute to optimal conditions for her embryos to implant. The middle phase of gestation is characterised by an acceleration in placenta development as foetal growth slowly increases.

And in late-stage gestation, foetal growth increases dramatically, while the sow's mammary tissue increases in preparation for lactation (Fig. 1). Different levels of protein (and likely amino acids) as well as energy are required by the gestating sow across these stages of lactation. For example, digestible lysine varies in concentration levels throughout gestation to meet the sow's shifting needs.

However, a sow's parity also influences requirements. Compared to their older counterparts, younger parity sows generally require a higher level of lysine in their diet to help meet increased needs for maternal protein gain.

Electronic sow feeders (ESFs) have the capability to offer blended feeding programmes. This approach feeds two diets containing different nutrient profiles to partially address the needs of sows at different parities. By attenuating nutrients according to a sow's parity, feeding programmes can help avoid overfeeding protein in the early or mid-gestation phase, while during late gestation, the diet can support piglet weight gain without jeopardising the sow's protein reserves.

PRACTICE 2: Blend the lactating sow's diet to complement stage of lactation

Similar to the shifts in nutrient demands a sow experiences during gestation, her demands also vary according to stage of lactation. As milk production, feed intake, and the mobilisation of maternal reserves vary in a non-proportional manner during lactation, these fluctuations also influence nutrient demands and the balance for energy, protein, and specific amino acids from the diet.

A typical sow feeding programme will have a ratio between energy and protein deficit of -38 MJ/d: -46g/d protein in week one of lactation. This ratio will be -36 MJ/d: 107g/d protein in the second week. And in the third week of lactation, the ratio will be -19.1 MJ/d: 49g/d protein.

Beyond three weeks, the follicles that will yield oocytes for the next pregnancy begin development. This process requires insulinogenic properties in the diet that may not be essential during the early weeks of lactation.

Similar to blending diets during gestation, a practice of blending diets during lactation can help accommodate lactating sows' evolving needs more effectively compared to feeding a single diet.

PRACTICE 3: Fine-tune the diet with top dressings at select times

Neither an ESF nor diet blending alone are panaceas. ESFs have limits on the number of diets that can be blended, as well as the number of nutrients that can be blended into a diet. And as noted earlier, changes in animal physiology demand dietary adaptations beyond energy and lysine levels.

Top dress technologies provide an opportunity to expand the variation of nutrients delivered in a diet.

Optional hardware is available on most ESFs that enables specific nutrients or feed supplements to be introduced during certain times of gestation. Nutrients, such as targeted amino acids, may be added to support health and/or foetal development objectives, or nutraceuticals may support various physiological developments in the gestating sow.

One example of a nutritional intervention aimed at sows relates to interventions that aim to increase mammary tissue. A sow's amount of secretory tissue at the end of gestation establishes the amount of colostrum she can make available to her farrowed litter. Essential to piglet survival and development, an intake of 250g colostrum per piglet has been deemed a vital threshold by several studies.

Beyond meeting this basic intake level, colostrum intake supports development as reflected by the relationship between a piglet's colostrum intake and its weight gain through lactation.

Supplementing a high-prolific sow's diet with dietary components that target the growth of mammary tissue could potentially help her supply adequate colostrum to larger litters.

PRACTICE 4: Consider a self-serve delivery model from farrowing unit through lactation

Sows entering the farrowing unit typically receive a single lactation diet from about one week prior to farrowing until weaning. A transition diet may be introduced to deal with specific issues. For example, a sow's diet may be supplemented with fibre to reduce constipation.

While traditional feeding systems have typically offered sows a single diet fed 2-3 times per day, the benefits of a 'self-serve' feeding model should be considered. Such 'self-service' systems allow the sow to determine not only when she eats, but also how much she eats. Research conducted by Trouw Nutrition has demonstrated that sows permitted to feed ad libitum from the time they enter the farrowing unit consumed 5kg on average in the transition period.

Additionally, researchers saw an increase in feed intake occur during lactation, more rapidly than on a conventional lactation feed curve (Table 1). A higher level of intake during the transition phase and early lactation results in higher milk production and heavier piglets at weaning.

Economic and environmental aspects of feeding programmes

Beyond the four feeding practices described above, the economic and environmental aspects of any adaptation to livestock production must be considered.

Any feeding innovation must be evaluated for its economic feasibility. Factoring the value of productivity gains against the cost of the innovation can help inform the decision to adopt a feeding practice.

For example, if we assume a value of €50 for every piglet that is sold at market, every percent reduction in mortality equates to €7.5 per litter gained, based on an assumption of 15 piglets born alive.

By delivering nutrients at precise times when they are needed by the animal, targeted nutritional interventions can contribute to producers' margins and support animal welfare.

As environmental sustainability becomes a bigger focus in production environments around the globe, feeding practices should also be considered through the lens of their impact on the environment.

Again, blending diets has been shown to have measurable impacts on sustainability. Researchers calculated that blend feeding two diets can potentially reduce nitrogen and phosphorous losses by 17% and 15%, respectively, while simultaneously saving 3.6% on feed costs.

While not a blueprint for gestation and lactation feeding programmes, the four feeding practices described above can help address the complex, dynamic, and specific requirements of sows across gestation and lactation and breeding from parity to parity.

Integrating these technologies into operations on the commercial farm can complement targeted nutritional interventions, helping support reproductive performance in high-prolific sows and contributing to the survival and development of litters. ■

References are available from the author on request

Table 1. Lactation performance in multiparous sows fed according to a traditional 'step-up curve' (n=23), or fed ad libitum from entering the farrowing house and through lactation (n=25).

	Ad libitum	Conventional
Birth weight (g)	1,381 ± 47	1,406 ± 48
Litter size	14.8 ± 0.6	15.0 ± 0.6
Weaning age (days)	25 ± 0.4	25 ± 0.4
Piglets weaned	12.7 ± 0.3	12.8 ± 0.4
Weaning weight (kg)	7.62 ± 0.21[a]	7.10 ± 0.14[b]
Litter weight (kg)*	97.0 ± 2.3[a]	90.2 ± 2.2[b]
Feed intake (kg/d)	7.1 ± 0.2	6.6 ± 0.2
Sow body weight loss (kg)	17.6 ± 3.2	19.8 ± 2.6

*corrected for litter size; [a,b] $P<0.05$