SwiNE NUTRITION MANAGEMENT

Escaping the Second Parity Dip

WHY IT HAPPENS AND HOW TO MANAGE IT

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In a commercial swine system driven by precision and profit, the second parity dip is a costly and persistent challenge. Despite advances in gilt development and genetic improvement, many producers still face a noticeable decline in reproductive performance after the second litter. Why this decline occurs, and more importantly how it can be prevented, remains a key question in modern swine production.

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Through close collaboration with farms across Southern Africa, Canada, and Europe, valuable insight, into factors driving this 'phenomenon', has been gained. From the integration of on-farm data and experiences, and research backed strategies, a clearer understanding has emerged, along with practical approaches which aid in the mitigation of the second parity dip

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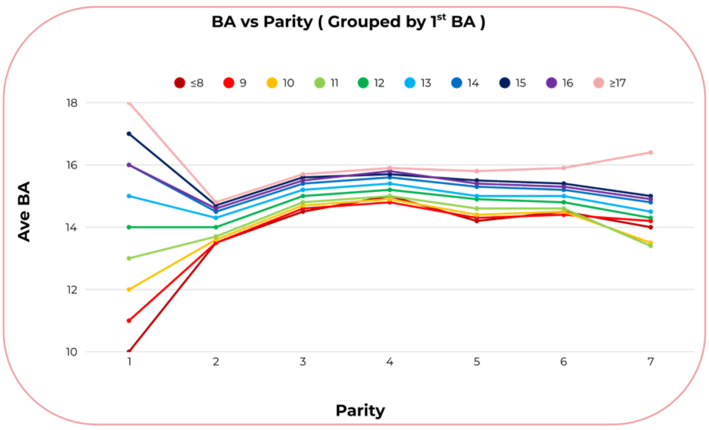
DEFINING "SECOND PARITY DIP"

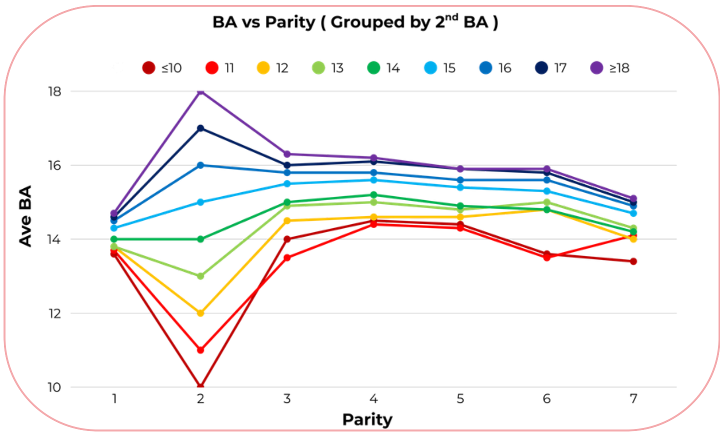
The second parity dip refers to a reduction in reproductive performance, most commonly seen as a decline in born-alive (BA) piglets, in a sow's second litter compared to her first litter. This is particularly frustrating when the gilt's first litter performed well, a result that may, ironically, contribute to the subsequent decline. This raises the question of whether the observed second parity dip is simply a regression towards the population average, rather than an abnormal decline.

When litter size is evaluated across parities (Graph 1), a clear pattern, in which performance from parity 2 onwards tends to converge towards the population mean, can be observed. Gilts that either under- or over-performed in their first parity often show less extreme results in later parities. The magnitude of this shift is influenced by multiple factors, many of which can be actively managed, while others seem to be driven by inherent biological limits.

CAN WE OBSERVE THE SAME TREND WHEN GROUPING ANIMALS BASED ON THEIR OTHER PARITIES?



Graph 1 *Average number of piglets born alive (BA) per litter across seven parities, with sows grouped according to first-parity litter size. The dataset comprised 8,900 gilts born between 2020 and 2024. Animals with first-parity BA below 10 or above 18 were excluded as outliers. Values represent mean BA per parity within each first-parity group.*



Graph 2. *Average number of piglets born alive (BA) per litter across seven parities grouped according to second parity litter size. The dataset comprised 8900 gilts born between 2020 and 2024. Gilts with a second parity BA below 10 or above 18 were excluded as outliers. Values represent mean BA per parity within each second-parity group.*

From **Graph 2**, a pattern similar to that observed in Graph 1 is evident, whereby animals grouped according to their second-parity litter size tend to shift closer to the population average in the subsequent parity. This convergence suggests that deviations observed in an individual parity are often temporary, with performance normalising as sows mature reproductively. Comparable trends have been reported when animals are grouped by later parities, indicating that regression toward the mean is a consistent feature of sow reproductive performance across parities. The extent to which this pattern can be influenced through management, versus reflecting inherent biological variability, remains an important question for both herd strategy and interpretation of parity-based performance data

THE FIRST LITTER PARADOX

Numerous datasets consistently demonstrate that a higher BA in her first parity is associated with improved lifetime reproductive performance. Paradoxically, this early success is also frequently accompanied by a reduction in litter size in her second parity. The high output during the first lactation is associated with substantial physiological demands; including higher weight loss, increased metabolic stress, and depletion of nutrient reserves; all of which may compromise subsequent reproductive performance.

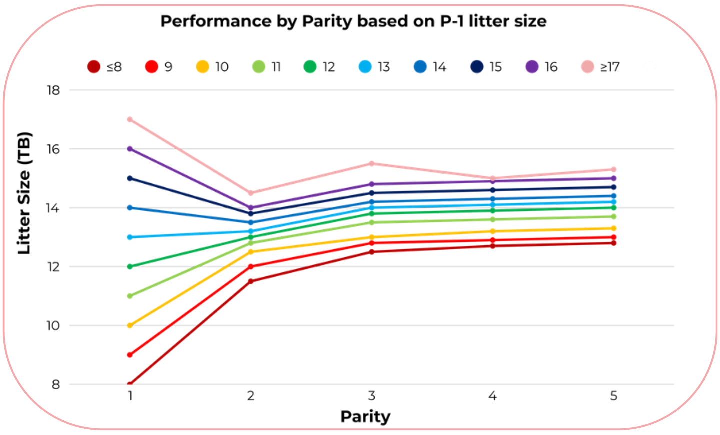
This pattern is evident in the figures presented, where animals who perform better in their first parity generally maintain high lifetime productivity despite experiencing a more pronounced reduction in second parity litter size. In contrast, animals with smaller first-parity litters often avoid a noticeable second parity decline but tend to exhibit smaller litters over their lifetime production.

Importantly, a large first-parity litter should not be interpreted solely as a stressor. It is also a marker of superior reproductive capacity, favourable hormonal development, and genetic potential. These gilts represent a physiologically subset of the population. The observed reduction in second-parity performance may therefore reflect differences in energy and nutrient allocation, with high performing sows prioritising milk production over rapid reproductive recovery. This prioritization increases tissue mobilization during lactation and elevates the need for targeted nutritional and management support post weaning.

The second-parity dip should not be dismissed, but it must be interpreted within the correct biological context. When a gilt underperformed in fist-parity and subsequently shows a further decline, this likely reflects a true reproductive limitation and warrants investigation and corrective action.

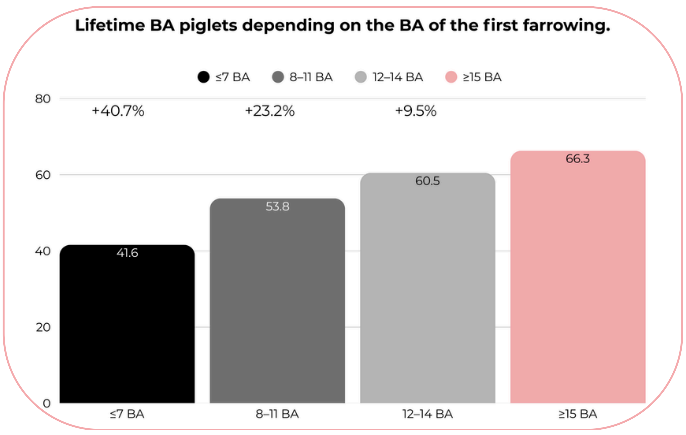
However, when a gilt produces an above-average first litter followed by a return towards the population mean, this pattern likely represents a natural biological response rather than a pathological failure. Recovery from an exceptional reproductive event should not be expected to occur without consequences in the next parity.. Importantly, early litter size remains a strong indicator of her lifetime productivity and sow potential.

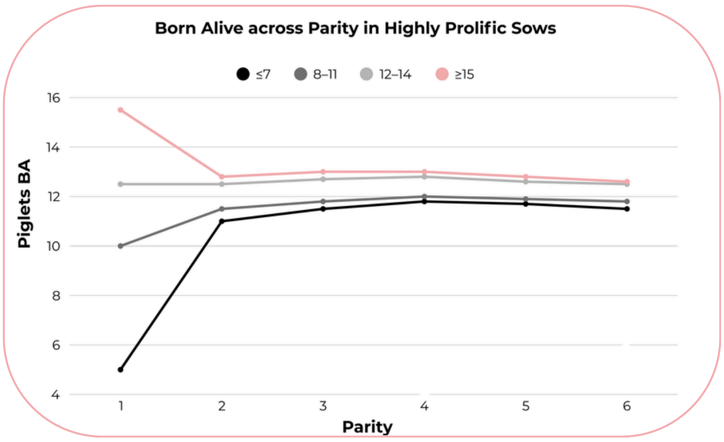
International research supports these conclusions. Data published by Pinilla et al. (2014) demonstrate that increasing first-parity BA is associated with improved lifetime performance, alongside a greater probability of observing a second-parity reduction in litter size.



Graph 3 *Performance by parity based on first-parity litter size in a population of 5,100 sows with complete reproductive records through five parities. Data were collected from multiple commercial farms in the US Midwest, encompassing differing health statuses and genotypes (approximately 70% CAMs). Sows are grouped according to first-parity total born (TB). Source: Pinilla et al. (AASV, 2014).*

Data published in Nutrition and Production Strategies for Today's Sows (NOVUS, 2025) report similar conclusions regarding first-parity born-alive (BA) litter size as a reliable indicator of lifetime reproductive performance. This textbook cites work by Iida and Koketsu (2015), which analysed reproductive records from 47,024 gilts across three to six parities. Their findings further support the association between first-parity litter size and subsequent lifetime productivity, and the results of that analysis are presented





Graph 4 *Number of piglets born alive (PBA) across parities for four sow groups classified according to the 10th, 50th, and 90th percentiles of PBA in parity 1. The analysis included 476,816 parity records from 109,373 sows across 125 commercial herds in Southern Europe.*

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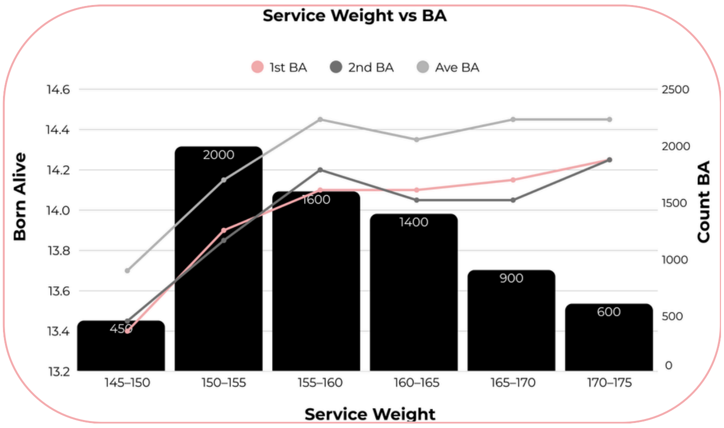
Managing this "The First Litter Paradox"

Managing the so-called First Litter Paradox requires recognition that part of the observed response is biologically inherent, while another part is modifiable through targeted management. Numerous studies have shown that gilts consume approximately 10–15% less feed during lactation than older sows. In warm climates (above 25°C), this limitation is exacerbated, with voluntary feed intake declining by up to 923 g/day for each degree between 27°C and 29°C. Under these conditions, meeting the energy and amino acid demands of a high-producing gilt, becomes increasingly difficult, particularly when large litters are involved.

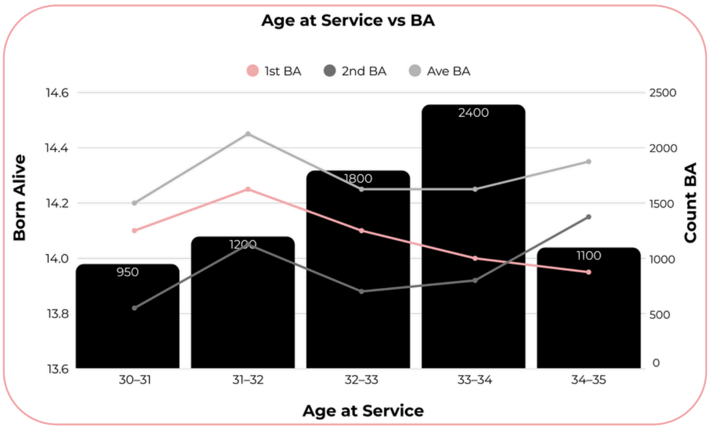
Diets must therefore be precisely aligned with requirements of the modern gilt at each production phase. Managing metabolic heat production through appropriate energy density, fat inclusion, and amino acid balance is critical to supporting intake while limiting excessive heat increment. Correct energy-to-protein relationships play a central role in sustaining milk production without excessive mobilization of body reserves, therefore improving recovery prior to the subsequent reproductive cycle.

Beyond nutrition, these intake constraints raise important questions regarding gilt preparation prior to first service. Specifically, are gilts being inseminated at the appropriate body weight, physiological maturity, and body condition? Data presented in Graph 5 and Graph 6, based on records from 8900 gilts born between 2020 and 2024, demonstrated a markedly stronger association between first-service weight and litter size over subsequent parities than between age at first service and lifetime performance. While optimal thresholds vary between countries, production systems and individual farms, the underlying trend remains relevant.

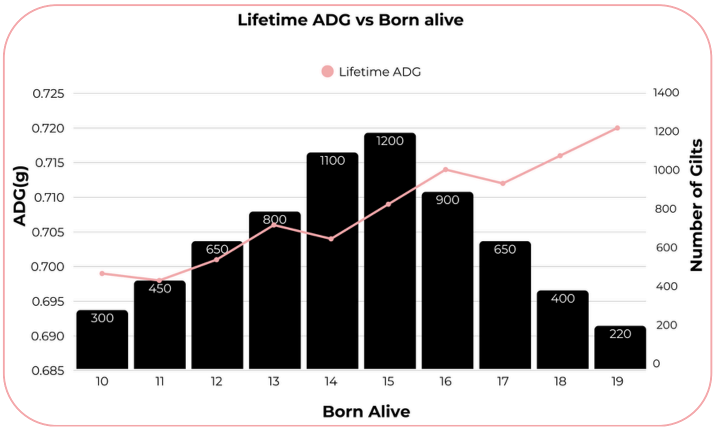
These findings reinforce the need to ensure gilts are not only of sufficient age, but also adequately developed, both in terms of body mass and physiological maturity, before first insemination. Continuous monitoring using body-weight measurements in conjunction with age-based growth and development curves should form the bases if gilt management programs. Regular adjustment based on observed performance allows producers to better support high-potential animals, mitigate the severity of the second parity decline while preserving the long-term advantages associated with superior firs-parity performance.



Graph 5 *Average litter size born alive grouped by parity against the service weight as a gilt. The dataset comprised 8,900 gilts born between 2020 and 2024.*



Graph 6 *Average litter size born alive grouped by parity against the service age as a gilt. The dataset comprised 8,900 gilts born between 2020 and 2024.*



Graph 7 *Average daily gain to first service against average litter size born alive. The dataset comprised 8,900 gilts born between 2020 and 2024.*

Genetic improvement is Outpacing Management Assumptions

Genetic improvement in commercial sow populations is accelerating rapidly. Modern gilts now enter production with significantly higher reproductive potential than previous generations, with most major genetic companies show a clear annual increase in BA trends. This genetic progress becomes evident earliest in gilts, yet it can distort expectations when their performance is directly compared with that of older sows that developed under different genetic and nutritional conditions.
One persistent management pitfall is the restriction of gilt feed intake to prevent excessive body condition.

While well intentioned, this practice may inadvertently limit physiological development during a critical growth phase, thereby constraining lifetime potential. Modern genotypes are characterized by faster growth rates and greater lean tissue deposition, necessitating continual re-evaluation of feeding strategies and ration formulations. Understanding the true appetite and growth capacity of contemporary gilts is there for more effective than attempting to compensate for developmental short comings after they have already manifested.

These considerations prompt an important question: how current are the guidelines, targets and rules of thumb still applied in gilt management? Advances in genetics and nutrition demand corresponding updates in management standards. Long-standing practices should be continuously re-examined to ensure they remain biologically relevant for modern animals.

On many commercial farms, gilts now reach 240 kg or more at farrowing, a parameter that correlates positively with lifetime reproductive performance. However, increased body weight alone does not eliminate the inherent metabolic constraints of first lactation. Feed intake capacity, physiological maturity, and thermoregulatory efficiency remain inferior to those of older sows, reinforcing the need for targeted support during this stage.

Reconsidering Litter Size and Mammary development

Another long-held assumption needing reassessment is the practice of loading gilts with large litters based on the belief that all teats must be actively suckled for the full 28-day lactation to ensure mammary development. Evidence suggests this assumption is unfounded. Teats only need to be suckled for 2–3 days to become functionally developed for future lactations (Sauerwein & Bruckmaier, 2019; Farmer C., 2018). Maintaining maximal litter size beyond this period is not required for further mammary development but substantially increases mobilisation of body reserve.

Excessive litter loads in gilt lactation are associated with thinner sows at weaning, reduced piglet weaning weights, and compromised subsequent reproductive performance. Strategic reduction of litter size to more manageable levels can maintain adequate mammary stimulation and milk removal while alleviatingmetabolic pressure on the sow, thereby supporting both immediate and long-term productivity.

Practical Management Strategies

Practical solutions to mitigate the metabolic burden of first lactation include reducing piglet load on gilts after the first 2–3 days of lactation, implementing early creep feeding strategies from as early as two days of age, and targeting a total creep intake of at least >1 kg/piglet by weaning. Farrowing houses/ Lactation rooms must be cooled rapidly to support sow feed intake while still maintaining an optimal microclimate for the piglets.

Not all gilts are created equal

Variation between individual gilts is substantial and must be actively managed. Not all gilts possess the same capacity to cope with the metabolic and physiological challenges of high litter output. When a gilt consistently under-performs or struggles relative to other individuals in the same production groups, early identification is essential.

In such cases, it may be preferable to remove the animal from the breeding system, rather than to allow for prolonged under-performance to negatively affect both sow efficiency and piglet outcomes. Early weaning of piglets from poorly coping gilts, followed by artificial rearing, can be used selectively to protect both sow welfare and piglet performance. While this approach should not become routine, but poor performers should be addressed earlier rather than later. Piglets can remain synchronized with the batch by staying in the farrowing crate with access to feed, milk, and water until normal weaning date.

Managing Weight Loss and Supporting Recovery

Even high performing gilts will lose body weight during lactation. When empty body weight loss exceeds>10–12%, some degree of physiological compromise may already have occurred. Nevertheless, targeted nutritional strategies post-weaning can assist in restoring reproductive potential.

Flushing of gilts and second parity animals prior to service has a pronounced impact on energy balance and body reserves replenishment. A positive energy balance improves hormonal regulation and ovarian activity, while increased blood flow supports fertility and embryo development. These effects can shorten recovery time and reduce the negative consequences of weaning a large litter.

An additional proven strategy is the targeted grouping of second parity sows and feed them at least 200 g/day more than the herd average during the first 30–40 days of gestation. This approach, particularly when body condition is compromised, improves embryo survival and implantation leading to higher total born in the subsequent parity; even when lactation losses were severe. Faster, early targeted body weight recovery during gestation have been shown to mitigate some of the negative reproduction dips caused during lactational weight loss.

Rethinking the Second-Parity Dip

Ultimately, the second parity dip should not be viewed as a genetic flaw, but rather as a management outcome. Through a strategic, data-driven approach, producers can:

- Support gilt physiology during lactation.
- Reduce unnecessary metabolic stress.
- Preserve sow condition for future productivity.
- Lower susceptibility to reduced reproductive efficiency.

If long-term sow performance is the objective, focus must begin during gilt rearing and continue through the first lactation. This requires smarter feeding strategies, improved cooling better, more strategic litter size management and a willingness to challenge outdated beliefs with current data.

It may also be necessary to reconsider how the second-parity dip is defined. A gilt that produces an above-average first litter and demonstrates exceptional lifetime performance is almost expected to experience a modest reduction in second parity output. This scenario differs fundamentally from that of a gilt with a below-average first litter followed by a further decline in parity two. While continuous improvement remains essential, these two situations should not be interpreted, or managed, in the same way.

The overarching goal should be...

The production of well-developed gilts capable of achieving above-average first-parity performance and sustained lifetime productivity.

Achieving this requires evaluation beyond the first two parities, linking performance from gilt development through at least parity six or seven. In this context, second-parity performance is not merely a risk point, but often a consequence of exceptional early reproductive output coupled with superior lifetime potential.

- Farmer, C., Hurley, W.L. & Holst, D., 2018. Mammary development and milk production in sows: implications for management strategies to enhance piglet survival. J. Anim. Sci. 96(6), 2285-2294.

- Kim, S.W., Easter, R.A. & Hurley, W.L., 2006. Growth of nursing pigs related to the characteristics of nursed mammary glands. J. Anim. Sci. 84(6), 1475-1481.

- Sauerwein, H. & Bruckmaier, R.M., 2019. Biology of mammary gland involution: relevance for dairy and livestock production. J. Anim. Sci. 97(3), 1345-1357.

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