

Fact sheet – Impact of increased feed intake during late gestation on reproductive performance of gilts and sows

Márcio A. D. Gonçalves, DVM, PhD; Steve S. Dritz, DVM, PhD; Mike D. Tokach, MS, PhD; J. H. Piva, DVM; Joel M. DeRouchey, MS, PhD; Jason C. Woodworth, MS, PhD; Robert D. Goodband, MS, PhD

This practice tip includes a fact sheet on the impact of increased feed intake during late gestation on the reproductive performance of gilts and sows

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Conflict of interest

None reported.

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MADG, SSD: Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, Kansas.

MDT, JMDR, JCW, RDG: Department of Animal Sciences and Industry, College of Agriculture, Kansas State University, Manhattan, Kansas.

JHP: PIC/Genus, Hendersonville, Tennessee.

Corresponding author: Dr Márcio A. D. Gonçalves, Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, College of Agriculture, Kansas State University, Manhattan, Kansas.

Dr Gonçalves is currently with PIC/Genus, 100 Bluegrass Commons Blvd, Hendersonville, TN 37075; Tel: 615-265-2729; Fax: 615-265-2848; Marcio.Goncalves@GenusPLC.com.

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FACT Sheet: Impact of increased feed intake during late gestation on reproductive performance of gilts and sows

“Bump feeding” during late gestation is a widely used practice, generally defined as increasing daily feed intake by about 1 kg from day 90 of gestation to farrowing. The goal is to provide the gestating sow the extra energy and amino acids needed in late gestation to satisfy the exponential growth of the conceptus.¹ Unfortunately, almost all the reported studies in this phase of gestation evaluated increasing feed intake and thus increased intake of all nutrients, including energy, amino acids, vitamins, and minerals. Most likely, as indicated by modeling, the requirement for these nutrients are not increased proportionally.¹ From a practical perspective, increasing feed intake rather than specific nutrients is easier to accomplish, since the daily feed allowance can be increased without the need for a different diet or supplement.

What is the impact of increasing feed intake in late gestation on sow characteristics?

Body weight gain. Increasing feed allowance by 1 kg per day during late gestation increased sow body weight gain by 6.9 ± 0.8 kg (Table 1).²⁻⁴

Backfat. Gilts and sows fed 2.3 kg daily during late gestation lost 1.6 mm of backfat, whereas backfat was not altered in those fed 3.9 kg daily,⁵ and this difference was maintained until weaning. However, other research³ found no evidence that increasing feed intake influenced backfat.

Lactation feed intake. Two studies^{2,5} had no evidence for differences when evaluating control versus increased feed intake during late gestation, whereas a third study³ observed that gilts with increased feed intake during late gestation consumed 17% less feed during lactation. However, it has been reported⁶ that increased feed allowance during the whole gestation period reduces feed intake during lactation.⁶

Weight loss during lactation. One study² observed more weight loss during lactation when feed intake was increased from 1.8 to 3.1 kg per day in late gestation, whereas another³ observed an interaction ($P = .02$) between parity and feeding level in which weight loss during lactation in the subsequent cycle was greater in gilts fed increased feed intake, but there was no difference for sows.

Wean-to-estrus interval. Two studies observed no evidence of altered wean-to-estrus interval (WEI),^{2,4} whereas one study³ observed a 0.4-day shorter WEI for gilts fed an extra 0.9 kg per day above maintenance, with no evidence for differences in sows.

What is the impact of increasing feed intake in late gestation on litter characteristics?

Total born. Several studies have observed no evidence for differences in total born when the daily feed allowance was increased beyond the nutritional requirement during late gestation, as expected due to total born being defined in the first third of gestation.^{3-5,7} One experiment² observed a tendency ($P < .10$) for an increase in total born when gilts

Fast facts

Each 1 kg per day increase in feed intake increases body weight gain of gilts and sows by 7 kg from day 90 of gestation to farrowing.

Effects of “bump feeding” on individual piglet birth weight are modest, averaging an increase of 28 g per piglet.

The impact on piglet birth weight appears to be related to increased energy rather than amino acid intake.

and sows were fed 3.1 kg per day compared to 1.8 kg per day during late gestation.

Born alive and stillborn rate. The impact on born alive and stillborn rate is not consistent between studies. An earlier study² observed a tendency for more piglets born alive (9.7 versus 10.0; $P = .06$), whereas other studies^{3,5} have observed no difference. A recent study conducted in a large-scale commercial research facility⁴ observed a smaller number of born-alive pigs due to a higher stillborn rate (6.5% versus 4.4%) in sows on a high energy intake compared to a low energy intake, but no effect in gilts.

Total litter birth weight: Increased feed intake during late gestation had a positive impact in one study⁷ for gilt litters; however, three other studies³⁻⁵ observed no differences in total litter birth weight.

Individual piglet birth weight: An earlier study² observed a 40-g higher individual born-alive piglet birth weight for females fed increased amounts of feed during late gestation, independent of parity. Two additional studies^{3,7} observed this positive impact of increasing feed intake during late gestation in gilts, but not in sows. However, individual piglet birth weight might have been confounded with litter size in one of the studies,³ whereas amino acids might have been deficient in the control diet in the other study.⁷ However, a third study⁵ evaluated increasing feed intake from a higher basal level (7.5 versus 12.7 ME Mcal per day) than did previous studies and found no differences. A recent study⁴ observed that increased feed intake during late gestation increased individual born-alive piglet birth weight by 30 g per piglet. That study observed that this improvement was influenced by high energy rather than high amino-acid intake.

Pre-weaning mortality. Several researchers were unable to detect evidence of an influence on pre-weaning mortality when feed intake was increased during late gestation.^{2,3,5} A recent study⁴ observed a 1.2% reduction in pre-weaning mortality in piglets suckling from females fed 20 g lysine per day compared with females fed 10.7 g lysine per day during late gestation.

Piglet weaning weight. While one study² observed higher piglet wean weight (5.20 versus 5.37 kg) from females fed increased amounts of feed during late gestation, two others^{3,5} observed no differences. Other studies measured birth weight, but not weaning weight.

Table 1: Descriptive summary of experiments evaluating increased feed intake during late gestation

| Exp* | Type | Start day of gestation | Litters/tx (n) | Total born (n) | Control | | Increased feed intake | | Increased by treatment | |
|-------------|-----------|------------------------|----------------|----------------|-------------|---------------|-----------------------|---------------|------------------------|-------------------------|
| | | | | | Mcal ME/day | SID Lys g/day | Mcal ME/day | SID Lys g/day | Female BW gain† | Piglet birth weight (g) |
| 2 | Both | 90 | 540 | 10.6 | 5.8 | 10.6 | 10.2 | 18.4 | 5.7 | 40 |
| 3 | Gilts | 90 | 21 | 14.3 | 6.8 | 11.9 | 9.8 | 17.1 | 5.7 | 86 |
| 3 | Sows | 90 | 32 | 12.4 | 7.9 | 11.9 | 11.4 | 19.9 | 5.4 | -109 |
| 4 | Gilts | 90 | 371 | 14.2 | 5.9 | 10.7 | 8.9 | 10.7 | 5.6 | 24 |
| 4 | Gilts | 90 | 371 | 14.2 | 5.9 | 20.0 | 8.9 | 20.0 | 9.1 | 28 |
| 4 | Sows | 90 | 181 | 15.1 | 5.9 | 10.7 | 8.9 | 10.7 | 9.0 | 47 |
| 4 | Sows | 90 | 181 | 15.3 | 5.9 | 20.0 | 8.9 | 20.0 | 10.8 | 19 |
| 5 | Both | 100 | 57 | 11.2 | 7.5 | 10.8 | 12.7 | 18.3 | 4.8 | 10 |
| 7 | Gilts | 100 | 24 | 12.5 | 7.0 | 9.8 | 12.9 | 18.2 | ND | 126 |
| 7 | Sows | 100 | 51 | 12.9 | 7.9 | 11.2 | 13.9 | 19.5 | ND | -69 |
| Ave‡ | NA | 90.6 | NA | 12.6 | 6.0 | 13.5 | 9.6 | 16.6 | 6.9 ± 0.8 | 28 ± 20.4 |

* Experiment number, corresponding to a reference number.

† Body weight (BW) gain expressed as kg/kg of extra daily feed. Assuming a corn-soybean-meal-based diet with 3252 kcal/kg of ME, is the amount in kg of BW gain per kg of extra daily feed above the basal level. For example, if the amount of daily feed is increased from 2 to 3 kg in late gestation, the gilt or sow will be 7 kg heavier at farrowing.

‡ Weighted on the basis of the number of sows in each study.

Tx = treatment; ME = metabolizable energy; SID Lys = standardized ileal digestible lysine; Ave = average; NA = not applicable; ND = not done.

Estimated economic impact. An economic model was conducted using a dataset with 5186 individual observations of piglets from birth to carcass.⁸ The model accounted for different survivability and growth performance from birth to carcass and assumed 0.9 kg extra feed per day for the last 21 days of gestation at a feed cost of \$0.24 per kg. The estimated impact of changing the population's average piglet birth weight by 28 g has a modest net impact on feed cost of approximately \$0.46 per marketed pig.

On the basis of our review, more research is clearly needed to examine feeding management practices for highly prolific sows. In conclusion, each 1-kg increase in daily feed allowance during late gestation is associated with approximately 7 kg of additional body weight gain for gilts and sows. The impact of increased feed intake during late gestation on piglet birth weight is modest and appears to be associated with an increase in energy rather than amino acid intake. A descriptive summary of the literature showed that piglets from females that received increased feed intake during late gestation were on average 28 ± 20.4 g heavier at birth.

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References

1. National Research Council. Proteins and amino acids. In: *Nutrient Requirements of Swine*. 11th rev ed. Washington, DC: National Academy Press; 2012:15-44.

2. Cromwell GL, Hall DD, Clawson AJ, Combs GE, Knabe DA, Maxwell CV, Noland PR, Orr DE, Prince TJ. Effects of additional feed during late gestation on reproductive performance of sows: A cooperative study. *J Anim Sci*. 1989;67:3-14.

*3. Shelton NW, Neill CR, DeRouche JM, Tokach MD, Goodband RD, Nelssen JL, Dritz SS. Effects of increasing feeding level during late gestation on sow and litter performance. *Proc Kansas State University Swine Day*. Manhattan, Kansas: Agricultural Experiment Station and Cooperative Extension Service. 2009;38-50.

4. Gonçalves MAD, Gourley K, Dritz SS, Tokach MD, Bello NM, DeRouche JM, Woodworth JC, Goodband RD. Effects of amino acids and energy intake during late gestation of high-performing gilts and sows on litter and reproductive performance under commercial conditions. *J Anim Sci*. 2016;94:1993-2003.

5. Miller HM, Foxcroft GR, Aherne FX. Increasing food intake in late gestation improved sow condition throughout lactation but did not affect piglet viability or growth rate. *Anim Sci*. 2000;71:141-148.

6. Weldon WC, Lewis AJ, Louis GF, Kovar JL, Giesemann MA, Miller PS. Postpartum hypophagia in primiparous sows: I. Effects of gestation feeding level on feed intake, feeding behavior, and plasma metabolite concentrations during lactation. *J Anim Sci*. 1994;72:387-394.

*7. Soto J, Greiner L, Connor J, Allee G. Effects of increasing feeding levels in sows during late gestation on piglet birth weights [abstract]. *J Anim Sci*. 2011;89:86.

*8. Matthews N, Jones C, Jungst S. Effect of birth weight on subsequent pig performance. In: *PIC Tech Memo*. Hendersonville, Tennessee. 2009;ES41-338.

* Non-refereed references.

