

Benefits of Using Permeate in Piglet Diets



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What is Permeate?

Permeate is a by-product of the removal of proteins from milk, resulting in a high concentration of lactose (approximately 80%) while also containing a portion of all the vitamins and minerals from milk and/or whey. Lactose, or “milk sugar,” is milk’s naturally occurring sugar and a source of energy (carbohydrate).

Why Use Permeate in Piglet Diets?

> Research shows that feeding permeate increases feed intake and weight gain after weaning [1, 2, 4].

The benefits of feeding lactose on weaned pig performance and health are well documented, demonstrating that lactose digestion in nursery pigs supports intestinal integrity and nutrient utilization. Permeate, with its high concentration of lactose, is the most common, cost efficient, and preferred source of easily digestible energy for newly weaned pigs to help them transition to dry feed.

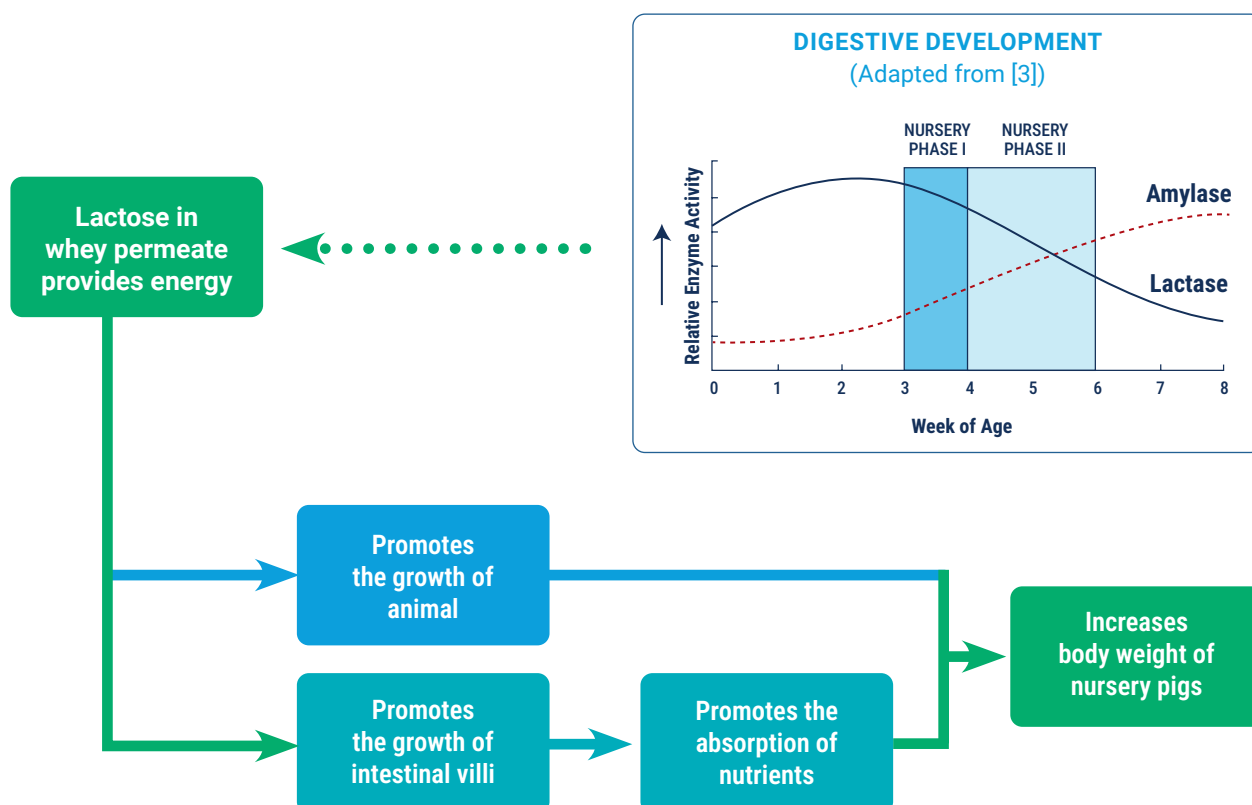
> Increasing nursery pig weight gain leads to heavier market weight.

Nursery pigs fed the optimal amount of permeate can increase weight gain, decrease days to market, and increase producer profitability [1, 10, 11].

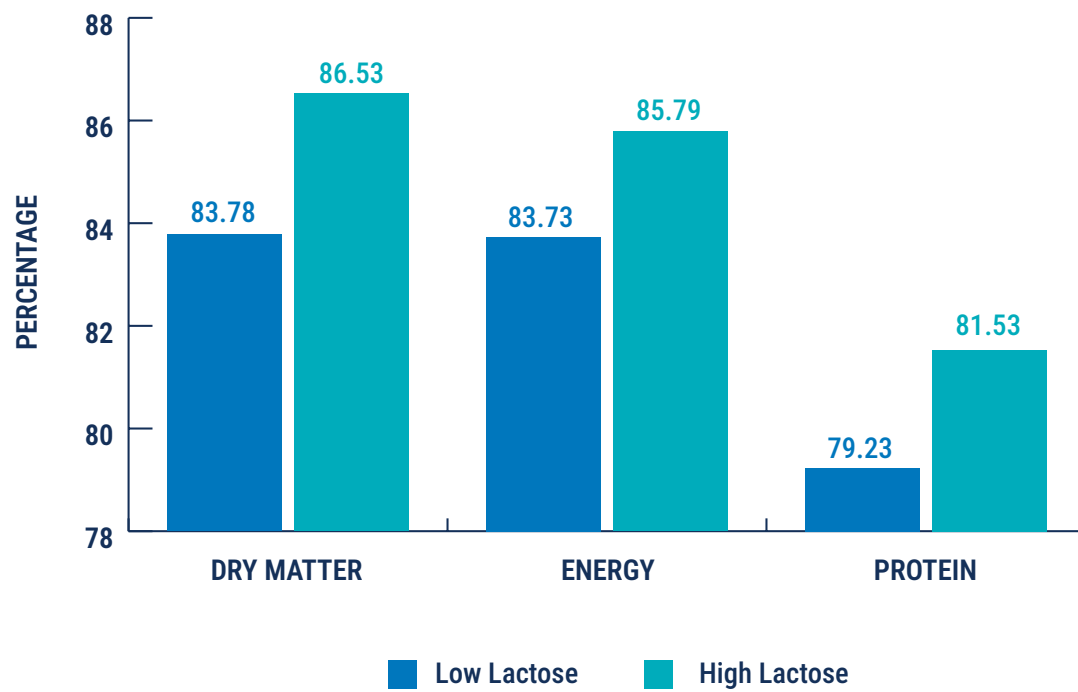
PERMEATE CONSUMPTION IMPROVES NUTRIENT UTILIZATION

- The expression of the digestive enzyme lactase is high in young pigs, allowing for easy digestion of lactose, making permeate an excellent energy source [3, 14].
- Sufficient energy intake supports villi growth, which may enhance the absorption of nutrients in the small intestine [4, 12].

FLOW CHART 1



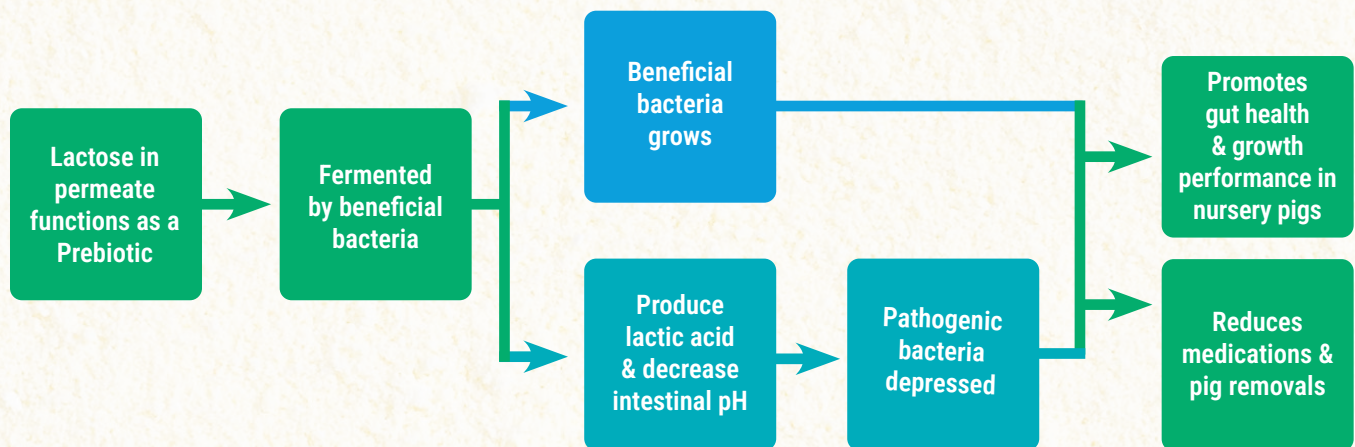
EFFECT OF LACTOSE LEVEL ON NUTRIENT DIGESTIBILITY 7 DAYS POST-WEANING [4]



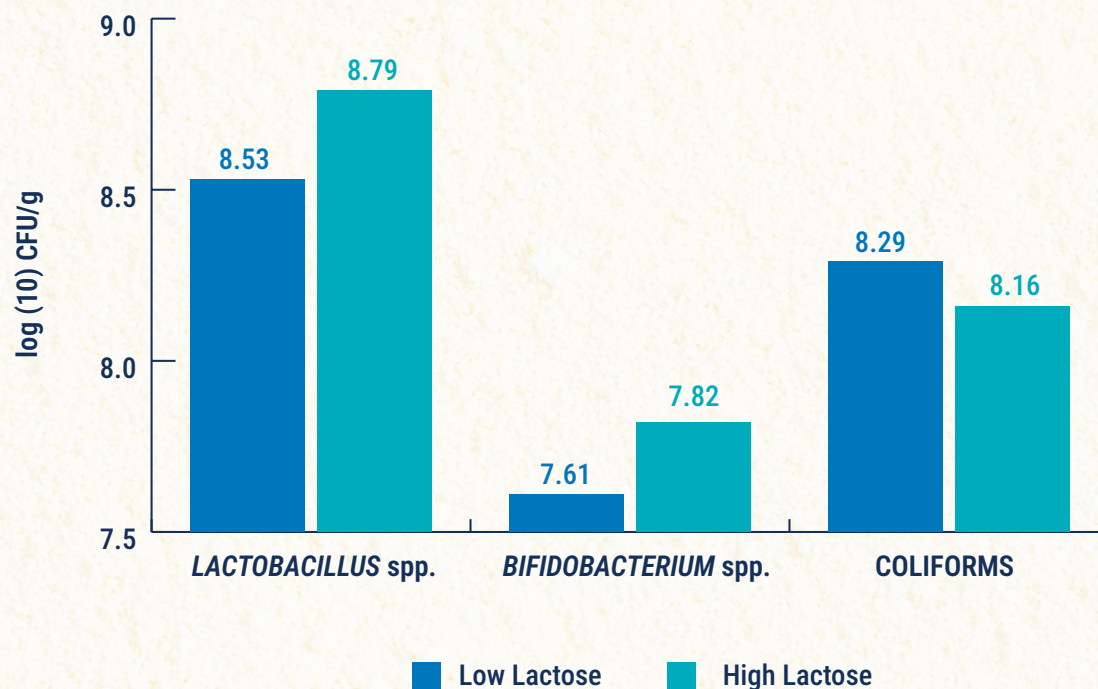
Permeate Consumption Improves Gut Health

- Good gut health allows pigs to thrive in the nursery. Lactose in permeate can function as a prebiotic to promote the proliferation of beneficial bacteria including *Lactobacillus* spp. and *Bifidobacterium* spp. [4, 5, 13].
- Lactic acid produced by lactic acid-producing bacteria from lactose in permeate may decrease intestinal pH to control the population of pathogenic bacteria [2, 4, 5].

FLOW CHART 2

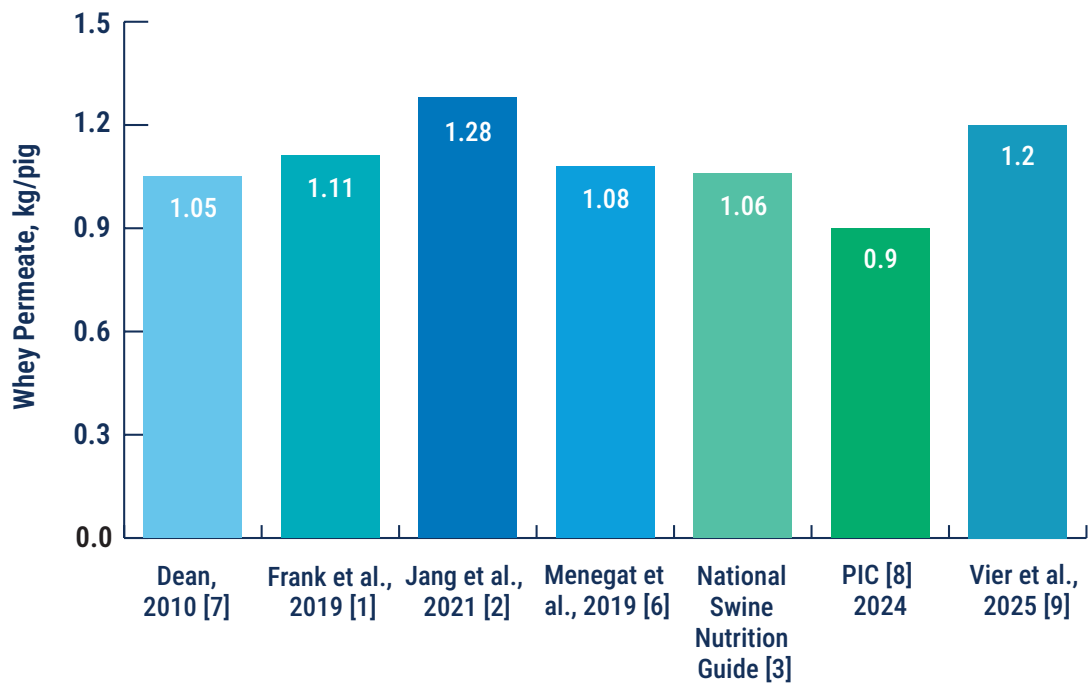


EFFECT OF LACTOSE LEVEL ON BACTERIA POPULATIONS 7 DAYS POST-WEANING [4]

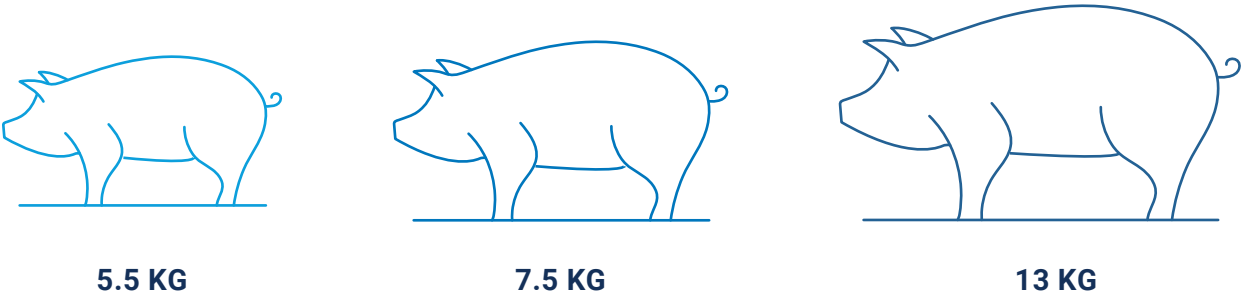


Feed 1 KG Permeate to Optimize Growth Performance in Nursery Pigs

WHEY PERMEATE CONSUMPTION TO OPTIMIZE PIG PERFORMANCE



An Example of How to Feed 1 kg Whey Permeate



Pig weight, kg	5.5-7.5	7.5-13
	NURSERY PHASE I	NURSERY PHASE II
Feed Budget/Pig	2.5 kg	7.5 kg
Lactose Level	14.0%	6.0%
Permeate Inclusion	17.5%	7.5%
Permeate Target = 1 kg/pig	0.44 kg/pig	0.56 kg/pig



References

- [1] Frank, J.W., E. Scholtz, C. Neill, and J. De Jong. 2019. Effects of dietary lactose level on nursery pig performance. ADSA-ASAS Midwest Meeting, Omaha, NE (Abstr. 152).
- [2] Jang, K.B., J.M. Purvis, and S.W. Kim. 2021. Dose-response and functional role of whey permeate as a source of lactose and milk oligosaccharides on intestinal health and growth of nursery pigs. *J. Anim. Sci.* Vol. 99(1):1-13.
- [3] National Swine Nutrition Guide. 2010. Nursery swine nutrient recommendations and feeding management. P. 65-79.
- [4] Kim, J., P.L. Schinde, Y.X. Yang, K. Yun, J.Y. Choi, J Lohakare, and B.J. Chae. 2010. Effects of dietary lactose levels during different starter phases on the performance of weaning pigs. *Livest. Sci.* 131: 175-182.
- [5] Pierce, K.M., T. Sweeney, P.O. Brophy, J.J. Callan, E. Fitzpatrick, P. McCarthy, and J.V. O'Doherty. 2006. The effect of lactose and inulin on intestinal morphology, selected microbial populations and volatile fatty acid concentrations in the gastro-intestinal tract of the weaning pig. *Anim. Sci.* 82: 311-318.
- [6] Menegat, M.B., R.D. Goodband, J.M. DeRouchey, M.D. Tokach, J.C. Woodworth, and S.S. Dritz. 2019. Kansas State University Swine Nutrition Guide: Nursery Phase Feeding Program.
- [7] Dean, D. 2010. Optimal starter lactose levels maximize returns. *Feedstuffs.* 82(30).
- [8] PIC® 2024 Nutrient Specifications Manual.
- [9] Vier, C.M., J.C. Montoro, J. Arroyave, M. Spindler, J. Guo, J. Holen, A. Betlach, L.E. Ochoa Zaragoza, D. Wilson-Wells, N. Lu, S. Sritz, W.R. Cast, and W.A. Orlando. 2025. Effects of different lactose programs on growth performance, mortality and morbidity, and diarrhea incidence of nursery pigs. *J. Anim. Sci.* Vol. 103, pg. 72-73 (Suppl. S1).
- [10] Tokach, M.D., R.D. Goodband, J.L. Nelssen, and L.J. Kats. 1992. Influence of weaning weight and growth during the first week postweaning on subsequent pig performance. *Kansas State Swine Day.* pg. 15-17.
- [11] Faccin, J.E.G., F. Laskoski, H.S. Cemin, A.P.G. Mellagi, M.L. Bernardi, R.R. Ulguim, F.P. Bortolozzo, and M.D. Tokach. 2020. Evaluating the impact of weaning weight and growth rate during the first week post weaning on overall nursery performance. *J. Swine Health Prod.* 28(2):70-78.
- [12] Acosta, J.A., N.K. Gabler, and J.F. Patience. 2020. The effect of lactose and a prototype *Lactobacillus acidophilus* fermentation product on digestibility, nitrogen balance, and intestinal function of weaned pigs. *Transl. Anim. Sci.* 4(2):641-654.
- [13] Daly et al., 2014. Dietary supplementation with lactose or artificial sweetener enhances swine gut *lactobacillus* population abundance. *Br. J. Nutr.* 111:30-35.
- [14] Zhao, J., Z. Zhang, S. Zhang, G. Page, and N.W. Jaworski. 2021. The role of lactose in weanling pig nutrition: a literature and meta-analysis review. *J. Anim. Sci. Biotech.* 12, 10.

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