ALPHAGENE

FEEDING AND NUTRITION GUIDE

SOWS AND FUTURE BREEDING STOCK

2021 EDITION

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OLYMEL

Collaborative production

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Introduction

The ALPHAGENE sow is a prolific, calm, and low maintenance sow that is easy to manage. Considering labour shortage and the installation of loose housing systems, these advantages are significant. During lactation, the ALPHAGENE sow is easy to feed and responds well to an aggressive feeding curve. Thus, the ALPHAGENE sow feeds a large and vigorous litter efficiently, without excessively mobilizing body reserves.

The ALPHAGENE sow's selection is based on the prolificacy criteria recognized for a maternal line, but also on growth performance. The sow provides 50% of the genetic potential to its offspring therefore must perform on the technical criteria which ensures profitability in sites 2 and 3 (growing and finishing phases). This selection criteria makes the ALPHAGENE sow both balanced and versatile.

The following guide presents the feeding recommendations to take advantage of the full potential of the ALPHAGENE sow.

1. Feeding the gestating sow

1.1 Feeding objectives during gestation

The feeding recommendations of the pregnant sow are intended first to meet the sow's maintenance requirements, then to ensure fetal growth, and mammary gland development. This period is also a suitable time to improve or maintain the sow's body condition. Ensuring adequate body condition during this time will result in the sow having sufficient body reserves to sustain high milk production without experiencing farrowing difficulties or compromising future reproductive performance. Ultimately, a well-fed sow will provide a large and vigorous litter, with high levels of colostrum and milk.

1.2 Body condition assessment

Several methods are used to assess sow body condition: back fat measurements, visual body condition assessments, sow weight, allometric tape or caliper tool. Regardless of the method chosen, the important thing is to evaluate the body condition of all breeding sows and adjust the feeding program accordingly.

In general, thin sows are more likely to have reproductive problems (lower farrowing rate, anoestrus) and compromised welfare (De Rensis et al. 2005; Serenius et al. 2006). Fat sows are more expensive to feed, have more difficulties at farrowing, the higher pre-weaning mortality (produce less colostrum) and lower feed intake during lactation (Kim et al. 2015). Maintaining the entire herd at an adequate body condition will ensure optimal longevity by maximizing reproductive performance and minimizing cost. The goal is to avoid extreme variations in terms of body reserves between the different stages (breeding - farrowing - weaning).

Table 1: Guideline of body condition at breeding according to visual evaluation score and backfat thickness.

Body condition at breeding	Body Condition Score	Backfat thickness, mm
Adequate	2.5 to 3	14 – 18
Thin	2 and -	13 and -
Fat	3.5 and +	19 and +

1.3 Feeding program

Table 2: Feeding program of gestating sows according to parity and body condition.

	Body condition[1]	Daily feed allowance (kg/day)[2]		
		0 – 35 d	35 – 90 d	90 – 115 d
Parity 1	Adequate	2.35	2.35	3.05
	Thin	3.15	2.35	3.05
	Fat	2.20	2.20	2.95
Parity 2	Adequate	2.50	2.50	3.20
	Thin	3.14	2.50	3.20
	Fat	2.35	2.35	3.20
Parity 3 and +	Adequate	2.55	2.55	3.25
	Thin	3.25	2.55	3.25
	Fat	2.35	2.35	3.25

[1] Body condition at breeding according to Table 1.
[2] Based on a gestation diet with net energy NRC between 1 965 and 2 015 kcal/kg.

1.4 Sow feeding program in large groups

Individual feeding systems developed for the management of sows in large groups make it possible to adjust sow feeding curves easily according to parity and body condition. This system allows for quick identification of sows that do not eat their daily feed allowance set in accordance with the desired objectives.

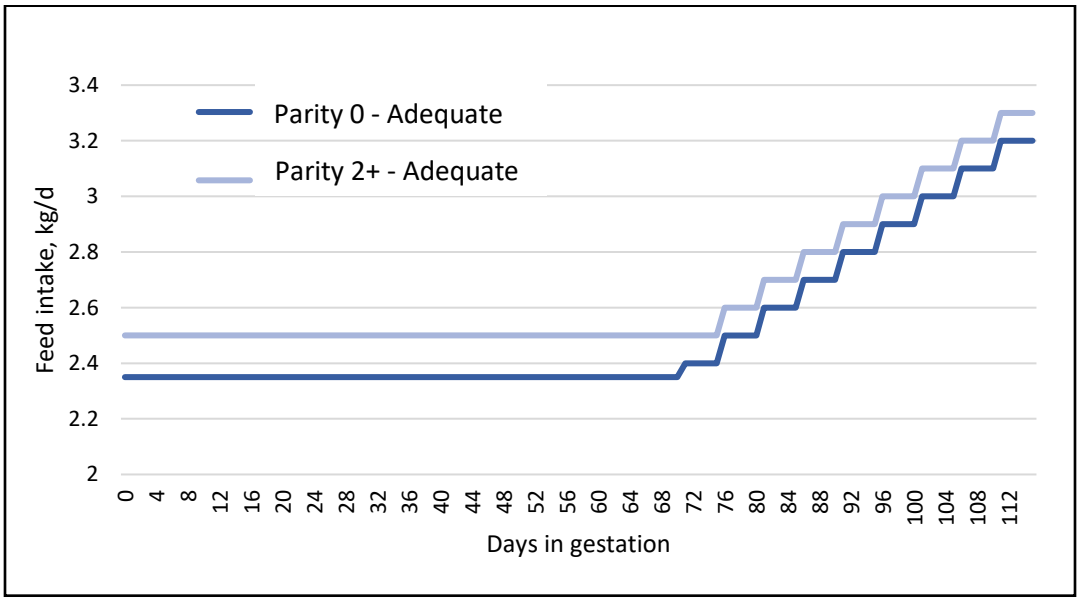

Figure 1: Feeding curves in gestation for ESF system (Diet with Net Energy NRC at 1 965 kcal /kg).

1.5 Nutrient specifications for gestation.

Table 3: Nutrient recommendations for sows in gestation

Nutrients	Specifications
Net Energy, kcal/kg[1]	1 965 to 2 015
Crude protein, %	12.0 to 15.0
Crude fiber, %	> 5.0
Digestible Amino Acids	
Lysine, %	0.46 to 0.48
Digestible Amino Acids ratio to lysine, %	
Methionine	30
Methionine + Cystine	68
Threonine	75
Tryptophan	19.5
Isoleucine	60
Valine	72
Minerals, %	
Calcium[2]	0.84 to 0.86
Digestible Phosphorus[2]	0.33
Sodium	0.22 to 0.27

[1]Net Energy values based on NRC, 2012.
[2]Calcium and digestible phosphorus values include what is released by phytase. Refer to the matrix values of the phytase manufacturer.

2. Feeding the lactating sow

2.1 Feeding objectives during lactation

Successful feeding of lactating sows depends on two things: on-farm feed management and feed formulation. Feed management includes the implementation of an aggressive lactation feed curve, controlling sow body condition during gestation and managing feed refusals. The objective in lactation is to maximize sow feed intake, thus the three elements of feed management should be closely monitored. Diet type is also important but comes secondary to sow consumption. Increasing sow consumption is the most effective way to increase the total intake of important nutrients such as energy and amino acids. This will help limit sow weight loss, while improving or maintaining milk production for optimal litter weight gain.

2.2 Feeding the sow before farrowing

Today's sows can be fed a lactation diet upon entry in the farrowing room (5 to 7 days before farrowing). During this period, it is recommended that the sow is provided 3.2kg per day, distributed over four meals. The shorter the time interval between the last meal and the initiation of farrowing, the less assistance the sow will need during farrowing and the lower the likelihood of stillbirths (Feyera et al. 2018). Maintaining high feed intake until the day of farrowing will result in higher early lactation feed intake and fewer problems related to constipation (maintaining a good digestive transit).

2.3 Feed intake of the lactating sow

The feed intake of lactating sows should be maintained ad libitum or as close to it as possible, if the feeding system does not allow ad libitum feeding. The recommended lactation feed curve is aggressive and increases rapidly post farrowing to meet the increasing nutrient demands of the piglets. The energy concentration of the diet will influence feed intake; the higher the energy density, the higher the energy consumption of the sow. However, excessive energy levels can affect feed intake (Xue et al. 2012). Generally, first parity sows consume 20% less feed and will lose more backfat and weight than multiparous sows A loss of 3 mm of back fat or 12% and 7% of body weight during lactation is acceptable for primiparous and multiparous, respectively (Shi et al. 2015; Gourley et al. 2017).

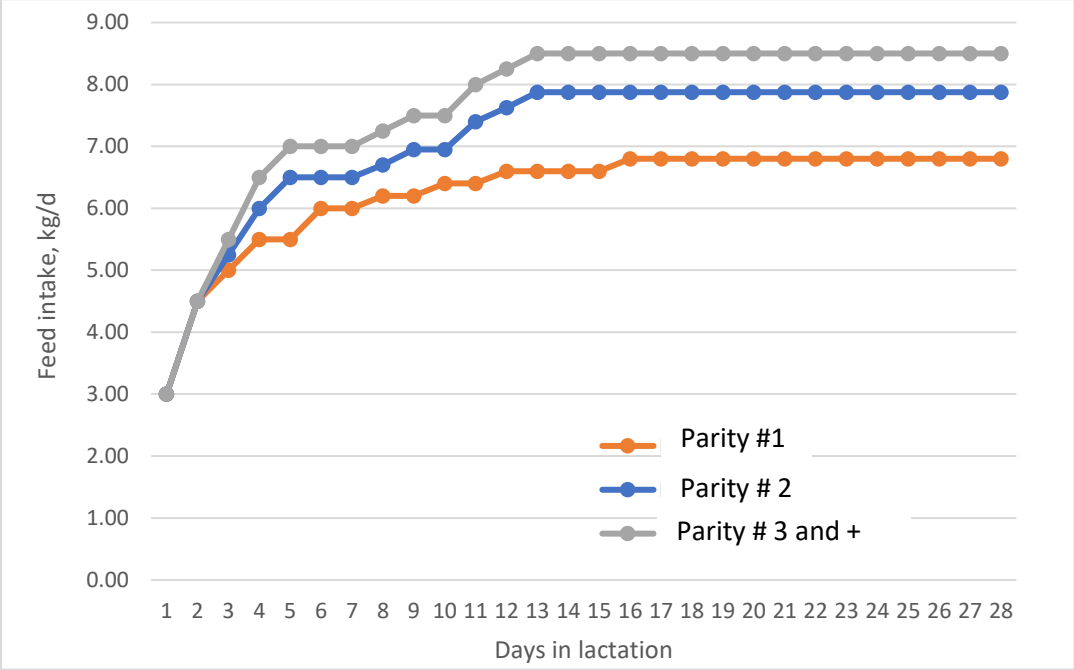

Figure 2. Lactation feeding curves for ESF system per parity (Feed with Net Energy NRC at 2 490 kcal /kg).

2.4 Feeding guidelines of the weaning-breeding interval « *Flush diet* »

Pre-breeding feeding is intended to positively influence ovulation rate, embryo survival and subsequent litter size. During this period, ad libitum feeding of a gestation diet is recommended. This practice is particularly important for primiparous and thin sows (Soede and Kemp, 2015). Gilts should be fed free-choice feed for 7-10 days before their expected breeding date. Weaned sows will be fed ad libitum from weaning to breeding.

2.5 Nutritional specifications of the sow in lactation

Table 4: Nutrient recommendation for sows in lactation.

Nutrients	Specifications
Net Energy, kcal/kg[1]	2 490 to 2 540
Crude protein, %	> 16.5
Digestible Amino Acids	0.94 to 1.02
Lysine, %	
Digestible Amino Acids ratio to lysine, %	
Methionine	28
Methionine + Cystine	59
Threonine	65
Tryptophan	19
Isoleucine	60
Valine	74
Minerals, %	
Calcium[2]	0.95 to 1.00
Digestible Phosphorus[2]	0.40 to 0.42
Sodium	0.20 to 0.25

[1]Net Energy values based on NRC, 2012.
[2]Calcium and digestible phosphorus values include what is released by phytase. Refer to the matrix values of the phytase manufacturer.

3. Feeding the future breeding stock

3.1 Feeding objectives for the gilts

Feeding the gilt during its growth period directly influences its future productivity and longevity within the herd. The diet should be specifically formulated to allow good bone growth and development of reproductive functions, while controlling growth. Ultimately, the animal will reach puberty at an age and body condition that optimizes its reproductive performance over several cycles and therefore promotes profitability.

3.2 Controlled growth and development

The feeding program of future breeding females is different from that of commercial pigs. Growth must be limited to ensure proper bone development and skeletal integrity. Ideally, a feeding program with specific diets for breeding stock will be maintained past 25 kgs live weight or after they leave the nursery. Calcium and phosphorus levels in these diets are higher than that of a typical finisher diet to ensure good bone mineralization. The diet will also be balanced with vitamins to promote development of reproductive function. Qualitative feed restriction is generally applied during gilt development, meaning the animal is fed ad libitum, but the energy and protein density of the diet is reduced to control growth rate. The targeted average daily gain from birth to first breeding is between 600 to 700 grams per day.

3.3 Gilt's target at first breeding

The goal of gilt development is to obtain a reproductively mature gilt with adequate weight and body reserve, at a young age to promote profitability. Studies have shown that weight at first breeding is a key factor with the greatest impact on gilt longevity and productivity, although it is indirectly related to age, backfat thickness and sexual maturity (Williams et al., 2005). The feeding program will be adjusted to achieve the objectives (Table 3).

Table 5: Objectives at first breeding.

	Target
Weight at first breeding, kg	135 to 160
Number of heats before first breeding	2 or 3
Age at first breeding, d	> 210
Backfat thickness, mm	> 14

3.4 Nutritional specifications for future breeding stock

Introduction of new breeding stock can be a challenge regarding building design and management of batch farrowing. Generally, when gilts enter the herd they will not be bred for a few days or even weeks later, during this time they will be provided a gestation diet. The amount to be distributed should be adjusted according to the expected breeding date and targeted breeding weight. Flushing should be applied 7 days prior to the planned breeding date (section 2.4.).

3.5 Nutrient specifications for future breeding stock

Table 6: Nutrient specifications for future breeding stock.

Nutrients	Specification 20 to 50 kg	Specification 50 to 80 kg	Specification 80 to 115 kg
Net Energy, kcal/kg[1]	2 275 to 2 325	2 275 to 2 325	2 275 to 2 325
Crude protein, %	> 16	> 14	> 12
Digestible Amino Acids			
Lysine, %	0.94 to 0.97	0.75 to 0.77	0.69 to 0.71
Digestible Amino Acids ratio on lysine, %			
Methionine	30	30	30
Methionine + Cystine	60	60	60
Threonine	65	68	68
Tryptophan	18	18	18
Isoleucine	55	55	55
Valine	70	70	70
Minerals, %			
Calcium[2]	0.85 to 0.90	0.75 to 0.80	0.75 to 0.80
Digestible Phosphorus[2]	0.35 to 0.38	0.31 to 0.33	0.30 to 0.32
Sodium	0.20 to 0.25	0.20 to 0.25	0.20 to 0.25

[1]Net Energy values based on NRC, 2012.
[2]Calcium and digestible phosphorus values include what is released by phytase. Refer to the matrix values of the phytase manufacturer.

References

De Rensis, F., M. Gherpelli, P. Superchi and R.N. Kirkwood. 2005. Relationships between backfat depth and plasma leptin during lactation and sow reproductive performance after weaning. Animal Reproduction Science. 90, 95–100.

Feyera, T., T.F. Pederson, U. Krogh, L. Foldager, and P.K. Theil. 2018. Impact of sow energy status during farrowing on farrowing kinetics, frequency of stillborn piglets, and farrowing assistance. J. Anim. Sci. 4;96(6) 2320-2331.

Gourley, K.M., G.E. Nichols, J.A. Sonderman, Z.T. Spencer, J.C. Woodworth, M.D. Tokach, J.M. DeRouchey, S.S. Dritz, R.D. Goodband, S.J. Kitt and E.W. Stephenson. 2017. Determining the impact of increasing standardized ileal digestible lysine for primiparous and multiparous sows during lactation. Translational Animal Science, 1, 4, 426–436.

Kim J.S., X. Yang, D. Pangeni and S.K. Baidoo. 2015. Relationship between backfat thickness of sows during late gestation and reproductive efficiency at different parities. Animal Science, 65:1, 1-8.

Serenius, T., K.J. Stalder, T.J. Baas, J.W. Mabry, R.N. Goodwin, R.K. Johnson, O.W. Robinson, M. Tokach, and R.K. Miller. 2006. National Pork Producers' Council Maternal Line National Genetic Evaluation Program: A comparison of sow longevity and trait associations with sow longevity. Journal of Animal Science, 84, 2590–2595.

Shi, M., J. Zhang, Z. Li, C. Shi, L. Liu, Z. Zhu and D. Li. 2015. Estimation of the optimal standardized ileal digestible lysine requirement for primiparous lactating sows fed diets supplemented with crystalline amino acids. Animal Science Journal 86, 891-896.

Soede N.M. and B. Kemp. 2015. Best practices in the lactating and weaned sow to optimize reproductive physiology and performance. In: The gestating and lactating sow. Ed. Chantal Farmer. The Netherlands. 452 p.

Williams, N.H., J. Patterson and G. Foxcroft. 2005. Non-negotiables of gilt development. Advances in Pork Production. Vol. 16. 281-289.

Xue L., X. Piao, D. Li, R. Zhang, S. Kim and B. Dong. 2012. The effect of the ratio of standardized ileal digestible lysine to metabolizable energy on growth performance, blood metabolites and hormones of lactating sows. Journal of Animal Science and Biotechnology, 3, 11.

Appendix: Sow vitamins and trace minerals specifications

Nutrients	Unit	Specifications
Vitamins		
Vitamin A	UI/kg	10 000
Vitamin D	UI/kg	1 500
Vitamin E	UI/kg	60
Choline	mg/kg	600
Folic acid	mg/kg	8.2
Biotin	mcg/kg	800
Trace elements		
Zinc	mg/kg	125
Iron	mg/kg	100
Manganese	mg/kg	40
Copper	mg/kg	15
Iodine	mg/kg	0.5
Selenium	mg/kg	0.3