METRIC Technical Bulletin
MANAGING CHOICE GENETICS®
CG PARENT GILT REPLACEMENT THROUGH PARITY ONE

Emphasizing proper CG parent gilt development and herd introduction will yield rewards in total herd output and productivity as parity one litters represent a significant portion of litters farrowed. For example, a herd with a 45 percent annualized replacement rate and 2.3 litters per sow annually will have 20 percent of all litters farrowed by gilts.

Years of selection for rapid lean growth have resulted in Choice Genetics maternal lines with larger mature body size and less body fat. Furthermore, these animals continue to grow and do not reach mature body size until second or third parity.

Genetic selection for higher lean growth, larger litter size, and greater milk production has led to increased emphasis on nutrition and management for CG parent replacement females. In addition to a feeding regimen, a development program must properly manage the health and maturation of replacement gilts to optimize growth, reproductive development and performance, weaning weight, and longevity. A well-managed gilt replacement program will produce superior lifetime value and return on genetic investment.

Nutrition for Developing Gilts

Proper nutrition is necessary for CG parent gilts to express their reproductive genetic potential. This potential includes traits such as fertility, litter size, milk yield, temperament, and longevity in the breeding herd.

Gilts should be fed ad libitum and weigh 132-145 kg at 210-240 days of age. Daily feed intake should be at least 2.7 kg per head from 104 kg body weight until breeding. Achieving these age and weight guidelines may require adjusting the energy and amino acid levels of the diets. It should be expected that some developing gilts within a group might achieve excessive body weight and condition. For cases in which gilts have met these age and body weight guidelines but mating must be delayed, gilts must be limit-fed gestation feed or fed a low-energy diet ad libitum. Gilts on limit feed diets should receive at least 16 grams of digestible lysine per day. Dietary energy levels can be reduced by adding low-energy ingredients such as soy hulls or wheat midds. In the event that limit feeding some gilts is necessary, gilts should be returned to ad libitum or larger feeding rates for about two weeks prior to mating. In general, gilts consuming larger quantities of feed will ovulate more eggs.

Targets at First Mating	
Age	210 to 240 days
Body Weight	132 to 145 kg
Estrus number	2 to 3

The nutrition program for replacement females is different from commercial finishing programs. A strategy that emphasizes structural development and reproductive maturation is preferable to either maximizing growth rate or minimizing feed cost per unit of gain. Dietary calcium and phosphorus levels for growing gilts should not decline throughout their development. Diets containing adequate minerals are critical to ensure proper bone growth and structural development. Diets should contain nutrient levels within the ranges in Table 1.

Table 1. Dietary Specifications for Developing Replacement Gilts[a]

	Body Weight, kg			
	23-45	**45-82**	**82-104**	**104-Breeding**
Metabolizable Energy, kcal/kg [b,c]	3164/3351	2513/3351	3197/3351	3219/3351
Total Lysine, % [b]	1.18/1.25	0.95/1.00	0.81/0.85	0.72/0.75
TID Lysine, % [b]	1.03/1.09	0.84/0.89	0.72/0.75	0.64/0.67
Available Phosphorus, %	0.31	0.31	0.35	0.40
Ca, %	0.65	0.65	0.67	0.70
Total Ca:Total P				
without Phytase, %	1.15-1.2	1.15-1.2	1.15-1.2	1.15-1.2
with Phytase, %	1.1-1.15	1.1-1.15	1.1-1.15	1.1-1.15

[a]Above levels based on ad libitum feeding.

[b]Diets without added fat/diets with added fat; example: 3164 kcal ME/kg with 1.18% total lysine and 1.03% digestible lysine if no added fat; 3351 kcal ME/kg with 1.25% total lysine and 1.09% digestible lysine with added fat for 23-45 kg body weight phase diet.

[c]Metabolizable energy values reflect the following values for ingredients: corn, 1500; soybean meal (47.5%), 1430; fat, 3800 kcal/kg.

From approximately 82 kg body weight, gilt development diets should be fortified with higher vitamin and trace mineral levels than terminal commercial diets would contain for finishing. Gilt development diets also should include additional vitamins typically excluded from terminal finishing diets; specifically, biotin, folic acid, thiamine, pyridoxine, and choline. This is commonly achieved by using a "sow premix'. From about 82 kg weight and with ad libitum feeding, the vitamins and trace minerals supplied via a sow premix can be included at 80% of normal inclusion for sow gestation diets. However, extra biotin, Vitamin E, and zinc may be added to the diet to facilitate hoof development and integrity, and to enhance immune competency. See suggested dietary levels in Table 2.

Table 2. Suggested Dietary Levels for Developing Gilts

	Body Weight, kg			
	23-45	**45-82**	**82-104**	**104-Breeding**
Biotin (added), mg/ton	--	--	300	300
Zinc (added), ppm	90	90	200	200
Vitamin E (added) I.U./g	.0441	.0441	.06615	.0882

If the recommended diet for developing CG parent gilts after 104-kg body weight cannot be fed, gilts should be fed a fortified gestation diet at a quantity to meet the *Targets at First Mating* (above). If animals are limit fed, return gilts to full feed for two weeks prior to mating.

Body Condition
Choice Genetic gilts should continue growing and depositing body fat during the development period prior to mating. This allows the gilts to reach puberty at an earlier age and will result in greater fertility. Last rib, off midline fat depths should be approximately 16 mm at first mating.

Pregnant gilts should be fed to sustain weight gain while minimally increasing fat reserves. Last rib, off midline fat depth at farrowing should be 17-19 mm. It is detrimental for gilts and sows to be over-conditioned at farrowing. Be sure to monitor condition and adjust feeding rate during pregnancy. Proper condition should be accomplished by mid-pregnancy, as it is not advisable to decrease feed amounts during the last four weeks of pregnancy. It has been seen with the CG parent gilts that a condition score above 3 is detrimental to feed intake during lactation. Many factors will affect the optimum daily feeding rate for a gestating gilt. These include seasonal temperatures, geographical location, location in barn, facility type, dietary ingredients, ration and energy level. An optimum daily feeding rate during early and mid-pregnancy likely will vary between 1.4 and 2.3 kg. of feed according to these variables, in addition to individual animal variation.
It is suggested, beginning about day 85 to 90 of pregnancy, to "bump" or increase the daily feeding rate above the prior "basal" or "maintenance" rate. The nutrient needs for pregnancy increases quite dramatically after day 85 as compared to needs prior. The specific feed amount to increase will vary for different farms according to the individual herd so not to result in excessively large and over conditioned gilts at farrowing.

Nutritional Specifications in Gestation and Lactation
Nutritional recommendations for CG parent gilts must provide for maintenance, growth and milk production. Maintenance requirements are affected by temperature, body weight and body composition (lean has higher maintenance demands than fat). Gilts nursing litters of 13 pigs or more will have higher daily nutrient requirements than those nursing fewer pigs, due to greater milk production. CG parent gilts are capable of nursing large litters and weaning heavy pigs. Table 3 presents approximate daily nutrient recommendation estimates for gilts in gestation and lactation.

Table 3. Daily Nutrient Requirements for Reproducing Gilts		
	Gestation	**Lactation**
Weight, kg	136	159
Avg. litter gain, kg/day	--	2.8
Maintenance ME, Kcal/day	4,200	4,740
Gestation gain ME, Kcal/day	1,650	--
Milk ME, Kcal/day[a]	--	15,750 [b]
Total ME, Kcal/day	5,850	20,490 [b]
Total lysine intake, grams/day	12 (day 0-80)	70[c]
Total lysine intake, grams/day	17 (day >=80)	
TID lysine intake, grams/day	11(day 0-80)	65[c]
TID lysine intake, grams/day	15.5 (day >=80)	
Available Phosphorus intake, grams/day[d]	7	25

[A]6945 Kcal ME required per kg of litter gain.
[b]Minimum needed beginning by day 7 of lactation.
[c]Average lysine intake per day for the entire lactation period.
[d]Balance Ca to 1.1 to 1.20 ratio to the total phosphorus required to achieve available phosphorus.

Dietary recommendations are presented in Table 4. Diets should be adjusted for feed intake, production level, season, and environmental effects such as temperature and housing, to ensure that the nutrient requirements illustrated in Table 3 are met. ***Because of these many variables, body condition and weight loss status should dictate both feeding rates and diet formulation.***

Table 4. Suggested Dietary Specifications for the Gilt and First Parity Sow		
	Gestation	**Lactation**
Metabolizable Energy, kcal/kg[a]	3142	3263-3307
Total Lysine, %	0.70-0.75	1.20-1.30
TID Lysine, %	0.61-0.65	1.07-1.17
Crude Fat, %	3.0	5.5-6.5
Crude Fiber, %	2.5-3.0	2.5
Total Ca, %	0.85	0.85
Total Ca:Total P		
without Phytase, %	1.15-1.2	1.15-1.2
with Phytase, %	1.1-1.15	1.1-1.15
Available Phosphorus, %	0.45	0.45
Salt, %	0.40-0.50	0.40-0.50

[a]Based on ingredient metabolizable energy values as follows: corn, 1500; soybean meal (47.5%), 1430; fat, 8378 kcal/kg.

Ad libitum Feeding in Breeding and Gestation

On some farms, CG parent gilts gestate on self-feeders. This strategy can be successful, but requires a diet lower in metabolizable energy content than a typical corn/soybean meal gilt gestation diet. Low energy ingredients such as soy hulls work best and are necessary to lower energy enough to prevent excessive weight gain when feeding bred gilts ad libitum. The metabolizable energy content of an ad libitum gestating feed would need to be only 2425 to 2535 kcal/kg. Pregnant gilts allowed to eat ad libitum must be monitored closely to achieve proper body condition and weight targets. Diet formulation may require adjustment depending on environmental temperature, stocking density, and feed consumption.

Lactation Feeding

During lactation all sows must consume feed to support both maintenance and milk production. First parity gilts, however, have additional nutritional requirements because they have not finished growing. Therefore, feeding programs for parity one animals must consider growth in order to maximize productivity. Generally, parity one sows consume 20 percent less feed in lactation than mature sows. Inadequate feed intake to support maintenance, growth, and milk production results in a loss of muscle and fat stores. This negative energy and protein balance results in tissue loss (i.e. weight loss), increased wean-to-service interval, lower farrowing rate, fewer pigs born in the second litter, and a higher culling rate. In addition, gilts that are over-conditioned at farrowing will consume less feed during lactation and may experience farrowing difficulties, milking problems, body fat depletion, and increased weight loss. Increased energy and protein intake during lactation minimizes tissue loss and can increase piglet growth as well as sustain high reproductive performance in the next parity. Nutrition programs designed specifically for high producing young herds will improve both reproductive performance and economic results. Often production teams can only achieve a certain feed intake independent of energy; at this point it is more important to achieve the required lysine/protein level needed to support maintenance, growth, and milk production.

Amino acid intake during the first lactation can have dramatic effects on litter growth or weaning weight, days to estrus, and subsequent reproductive performance. Lactating gilts that consume insufficient quantities of dietary amino acids will break down muscle protein to meet nutrient requirements for milk production, which depresses reproductive performance.

For startup herds, diets must be formulated with higher amino acid levels to compensate for the imbalance between feed intake and nutrient demand. Diets should be energy dense while remaining flowable and palatable. Additional biotin, zinc, and Vitamin E may be beneficial for hoof health and development, in addition to immune system development.

The most effective method of increasing nutrient intake is to boost daily feed intake during lactation. In properly fed and managed first parity females, milk production will increase through the first two weeks of lactation. The ad-lib feeding schedule below serves as an example:

(Example) Feeding Protocol to Maximize Daily Lactation Feed Intake		
DAY	**6:00 AM**	**4:30 PM[a]**
0	Farrow	0 – .9 kg
1	1.4 kg	1.4 kg
2	1.8 kg	1.8 kg
3	Ad-lib	
4	Ad-lib	
5	Ad-lib	

[a]The final feeder check should be conducted as the last activity of the day to minimize time without feed.

This method simplifies the feeding process while maximizing intake during the first week after farrowing. If maximum feed intake is not achieved by day 14, significant body muscle and fat breakdown will occur. Even this transient catabolic period can decrease subsequent reproductive output. The strategy of checking feeders more than two times daily (keeps feed fresh, feeders clean and minimizes feed wastage) is critical for a successful reproduction.

Wean-to-Estrus Interval:
The goal for young weaned sows is to minimize the weaning-to-estrus mating interval. A short wean-to-service interval is related to a longer standing heat period, higher farrowing rates, and larger litters.

To counter continued tissue catabolism and weight loss at weaning, while replenishing nutrient reserves and achieving maximum ovulations, a young weaned sow must be fed as much as possible during the wean-to-service period.

Following mating, sows should be fed according to individual body condition. These young sows should continue growing throughout their second pregnancy. Additionally, sows need to regain lost tissue from lactation and replenish nutrient levels as soon as possible. Fat reserves must be deposited prior to the next farrowing. For thin sows, continue feeding at high levels through breeding and early pregnancy. This may require 3.2-3.6 kg of feed daily until optimum condition is reached. Once optimum condition is reached, daily feeding rate should be reduced to a "basal" or maintenance rate for the specific farm conditions, which sustains the desired body condition. Fat depth at subsequent farrowing should be 16-19 mm typically.

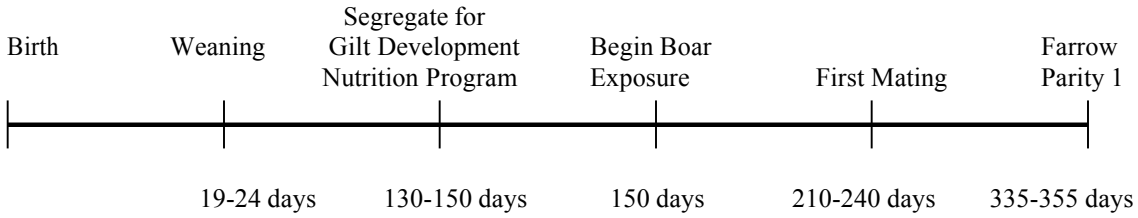
Replacement Gilt Health Management
Minimizing health differences between replacement CG parent gilts and the herd they enter is achieved through proper isolation and acclimation. Isolation and acclimation programs vary depending on disease status, but usually last 30 to 60 days. During isolation, replacements are blood tested for specific pathogens, observed for signs of illness, and vaccinated. Acclimation consists of exposing replacement gilts to pathogens on the sow farm via cull animals and/or biofeedback regimens. Consulting and planning with the herd veterinarian and Choice Genetics Health Services can minimize health concerns and impact the performance of the breeding herd.

Production systems vary as to how long gilts are segregated from commercial animals for the purpose of development. Rearing gilts on-site is an effective method for aging as well as for acclimatizing them to the herd health status. This gilt development program can be effective with either wean-to-finish facilities or in dedicated facilities where feeder gilts are brought in from a matched health source. Some producers have gilt development facilities within the sow complex while others elect to use off-site development barns. In either case, health can be a key limiting factor to the herd achieving high reproductive performance. All efforts should be made to maintain a high- health status in the breeding herd.

Exposure to Boars

One way to effectively reduce age at puberty is by exposing CG parent gilts to mature boars on a regular basis beginning at 150 days of age. The exposure and physical contact will help stimulate the reproductive system of gilts and hasten the onset of estrus (puberty) in developing gilts. The method of exposure can be modified for a given facility and labor constraints, but the greatest response comes when gilts receive full physical contact with mature boars (>10 months of age) for 15 minutes per day. Up to 80 percent of the effect of reducing age at puberty can be obtained if gilts receive fence line boar exposure continuously, which is often the most practical under commercial conditions.

In gilt development, boars stimulate puberty via pheromones from the salivary glands. When gilts are eligible for breeding, however, the same pheromones are responsible for eliciting a standing heat response. For gilts to exhibit a standing heat response, it is critical that boar exposure be a novel event. A boar should not be close enough to stimulate gilts for at least two hours before he is presented for heat detection, as gilts may become refractory to the boar stimuli. Such exposure can result in up to 30 percent of gilts failing to express heat.



Summary

Management of the CG parent gilt will affect lifetime productivity. Many studies clearly show that first parity performance is influenced significantly by age of gilts at first mating. Producers should adhere to a target of at least 210 days of age prior to entry into the gilt breeding pool and an average age of 230 days for first service. The goal is to have gilts reach puberty early enough that first mating occurs on the second or third estrus. Meeting this goal may require changes in traditional gilt development, but the benefits in parity one litter size, lactation performance, rebreeding efficiency, and lifetime value far outweigh any additional costs.

CG parent gilt development and management through parity one can have dramatic effects on short-term and long-term productivity. Feeding and health protocols assure that gilts are in good condition when first eligible to be mated. Exposure to boars stimulates early puberty, which is associated with increased fertility. The combination of boar exposure and delayed mating results in larger first litters and greater productivity. Finally, knowledge of the nutrient demands of high producing genotypes will assure the maintenance, growth, and milk production of first parity females.

Managing CG parent gilt development through proper nutrition, management, and health programs greatly influences both short and long term profitability by improving longevity in the breeding herd and increasing sow lifetime value.