

Avoiding the Summer Slump in Reproductive Performance

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Do an excellent job of identifying and culling problem breeders!

- Repeat breeders have lower farrowing rates; example:
 - Service 1 farrowing rate = 89.9%
 - Service 2 farrowing rate = 80.2%
 - Service 3 farrowing rate = 50.0%
- Thus, each time a repeat breeder is put in the group, she lowers the farrowing rate of the group!

Farrowing rate of repeat breeders is different between farms.

Farm A			
Number services	Gilts	Parity 1	Parity 2+
1	90.2	85.6	87.3
2	80.2	81.5	80.0
3	55.6	64.3	64.5

Farrowing rate of repeat breeders

Farm B			
Number services	Gilts	Parity 1	Parity 2+
1	79.7	81.3	83.2
2	78.2	67.9	65.6
3	47.4	---	63.1

Do an excellent job of providing females with boar stimuli when:

- Stimulating estrus
- Detecting estrus
- Inseminating females

Because of a high ventilation rate and a low number of boars in the facility, a “Boar Smell Stick” may be needed.

A “Boar Smell Stick” is made out of a 1” PVC pipe and rags. The stick is soaked in preputial fluid, saliva, and boar urine.



Except for gilts, use oxytocin in each dose of semen (5 IU; .25 mL if 20 IU/mL)

Effect of oxytocin on farrowing rate

Month mated ^c	In semen ^a	In vulva ^b	Control
Jan to Mar	88.5	92.9	87.3
Apr to Jun	86.4	80.7	76.7
Jul to Sep	73.0	56.3	54.4
Oct to Dec	84.4	81.7	77.8
Overall	83.0	77.3	74.9

^a 4 IU oxytocin added to dose of semen just before insemination
^b 4 IU oxytocin injected in vulvar lips at time of insemination
^c Study was conducted in Spain

Effect of oxytocin on average total number piglets born per litter

Month mated ^c	In semen ^a	In vulva ^b	Control
Jan to Mar	12.2	10.8	10.1
Apr to Jun	11.9	11.3	10.1
Jul to Sep	10.8	10.5	8.5
Oct to Dec	11.2	11.3	9.8
Overall	11.5	11.0	9.7

^a 4 IU oxytocin added to dose of semen just before insemination
^b 4 IU oxytocin injected in vulvar lips at time of insemination
^c Study was conducted in Spain

Do an excellent job of preventing All types of stress!

• Critical times are:

- **First three days after mating**
 - Ova need to stay in oviduct 48 to 56 hours after ovulation
- **Days 10 to 28 after mating**
 - Days 10 to 12 female receives signal to maintain pregnancy
 - Days 12 to 28 blastocysts implant in uterus

Build a larger pool of cyclic gilts before heat-stress starts!

Suggested age of gilts when starting boar exposure is:

- Crossbred gilts
 - 150 to 170 days
- Purebred gilts
 - 170 to 190 days

Better synchronization occurs if boar exposure starts about three weeks before expected date of puberty!

What is the average age at puberty of gilts prior to start of heat-stress?

Average age, standard deviation and range in age at puberty of gilts is quite variable!

Study	No. gilts	Breed	Age at puberty			
			Avg	SD	Youngest	Oldest
1	244	LWx LR	180	23.8	135	276
2	481	SY	211	19.8	156	261
3	93	LRxY	173	26.3	138	240

Method of boar exposure influences puberty attainment of gilts

Method of boar exposure	Age (days)	Wt. (lb)	BF (in.)	Pub. (%)
Gilts in stalls	186.2 ^a	306 ^a	.68	85
Pen of gilts moved to boar pen	179.7 ^{ab}	273 ^b	.62	96
Boar moved to gilts housed in a pen	176.2 ^b	284 ^{ab}	.59	81

^{ab} (P < .05)

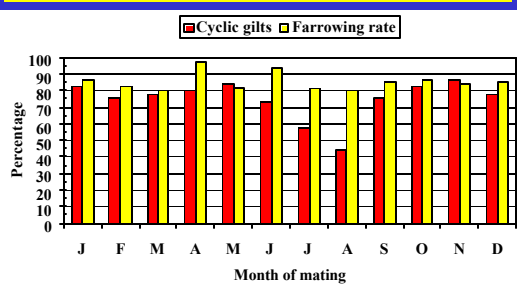
Patterson et al., 1999.

Breed gilts during the summer months that have reached puberty before the hot weather starts during the summer.

Breed the gilts to sterile boars to prevent the gilts from becoming non-cyclic.

Use a feeding program to prevent gilts from becoming too fat.

Effect of month mated on percentage of gilts cycling and farrowing rate



Vet Glasnik 37:297-302, 1983.

Effect of heat-stress on cyclic gilts

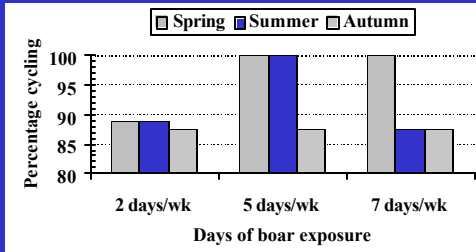
Country	♀F	Duration of heat	Comment
Thailand	95	10 h	42% abnormal 2 nd estrus
Australia	95	17 h	Normal 3 rd estrus

Conclusion:
Heat-stress affects younger gilts more than older gilts.

The Pig Journal 35:48-53, 1995
Proc. Australian Soc. Anim. Prod 13:393-396, 1980.

Effect of frequency of boar contact and season on percentage of gilts cycling

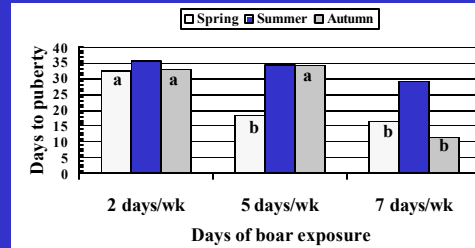
30 minutes of boar exposure from 175 to 235 days of age.



Anim. Reprod. Sci. 21:115-124, 1989.

Effect of frequency of boar contact and season on days to puberty of gilts

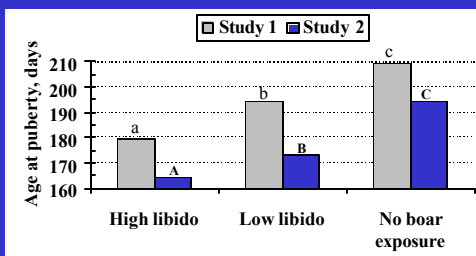
30 minutes of boar exposure from 175 to 235 days of age.



^{ab} Within season ($P < .05$)

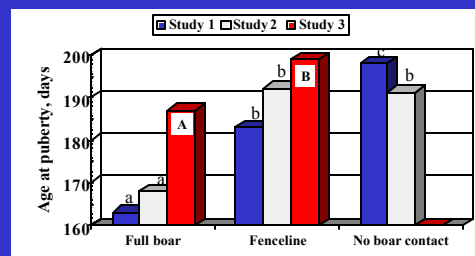
Anim. Reprod. Sci. 21:115-124, 1989.

Effect of boar libido on average age at puberty of gilts



^{a,b} ($P < .05$) ^{A,B,C} ($P < .06$)
^{a,b,c} ($P < .01$) ^{A & B vs C} ($P < .01$)
^{b,c} ($P < .05$)

Effect of full boar or fenceline contact on age at puberty of gilts

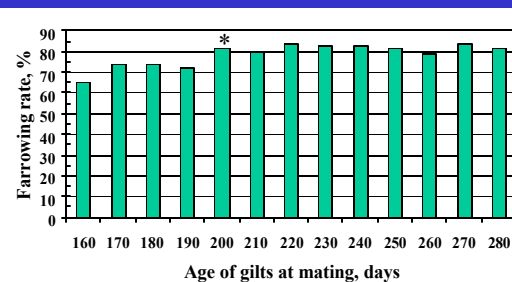


^{abc} ($P < .01$)
^{AB} ($P < .02$)

Suggested body condition, age and estrus of gilts at mating:

- Body condition
 - At least .6 inches of backfat
 - 250 to 280 pounds of body weight
- Age at mating
 - 200 to 250 days of age
- Estrus at mating
 - Second

Effect of age of gilts (PIC) at first service on farrowing rate (gilts cycled at least once before mating)



Effect of estrous number at first mating on number of piglets born live

Item	Estrous number at mating		
	First	Second	Third
Study 1 (3 litters)	30.9	32.9	31.6
Study 2 (3 litters)	29.1	29.3	28.6
Study 3 (4 litters)	37.8	39.1	38.8
Study 4 (5 litters)	51.6	52.6	50.5

Anim. Prod. 24:333-342, 1977; J. Anim. Sci. 74:138-150, 1996; Can. J. Anim. Sci. 70:483-492, 1990; 14th IPVS, p 586, 1999

Breeding gilts at >205 days of age (restricted feeding):

- Gilts are full fed a normal gilt development diet from weaning to 180 days of age
 - Gilts weigh 180 lbs at 130 to 140 days of age
- Gilts are fed 4 lbs per day of a restricted gilt diet from 180 lbs of body weight to 190 days of age
- Gilts are fed 6 lbs per day of a normal gestation diet from 190 days of age until bred (flushing effect).

Tokach at KSU

Breeding gilts at >205 days of age (full/restricted feeding):

- Gilts are full fed a normal development diet from weaning to 150 lbs of body weight
 - Gilts weigh 150 lbs at 110 to 120 days of age
- Gilts are full fed a gilt development diet with moderate protein levels (i.e. 11.8%) from 150 to 250 lbs of body weight
- Gilts are fed 4.5 lbs per day of normal gestation diet from 250 lbs body weight to 190 days of age
- Gilts are fed 6.0 lbs per day of normal gestation diet from 190 days of age until bred

Tokach at KSU

Feed intake pattern during gestation for gilts:

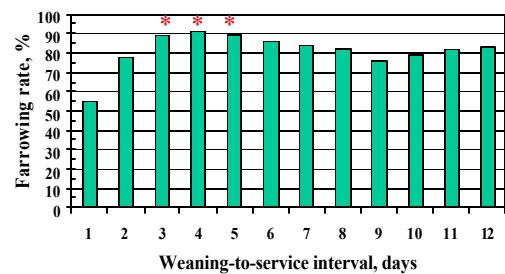
- Immediately after mating until Day 12
 - Feed 4 lbs per day
- Day 12 to Day 96 of gestation

Body wt. at mating	Lbs/day
230 to 250	6.0
250 to 270	5.5
270 to 290	5.0
290 to 310	4.5

Assumes a target weight of 450 lbs at farrowing;
Milo-soybean meal diet with no added fat Tokach at KSU

Ensure sows and gilts are adequately fed during lactation

Effect of weaning-to-service interval on farrowing rate



Feeding sows during lactation

- Feed intake during the first 7 to 10 days of lactation is critical.
 - Reproductive hormones are re-established
 - Weaning-to-estrus interval is reduced
 - Helps to increase the farrowing rate of early weaned sows

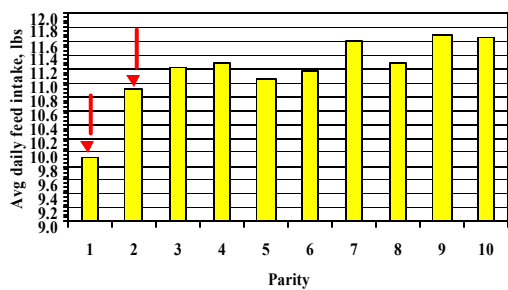
A lot of variation exists in average daily feed intake (lb) during a three-week lactation

	Bottom 10%	Average	Top 10%
Week 1	4.6	7.9	12.1
Week 2	9.2	13.4	17.6
Week 3	9.2	13.8	18.7
Average	7.9	11.4	15.2

11,700 sows

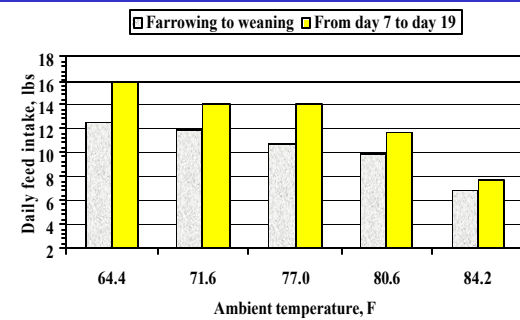
International Pigletter Vol 2 (2), 2000.

Lactation Feed Intake by Parity



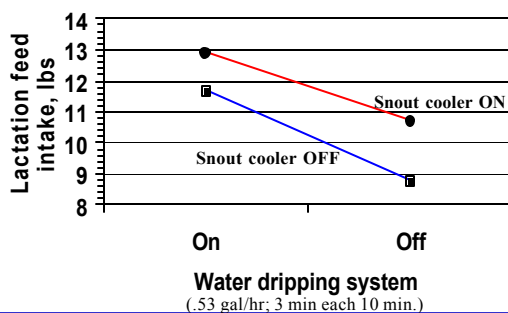
Koketsu, Y., G. D. Dial, J. E. Pettigrew, W. E. Marsh, and V. L. King. 1996. Characterization of feed intake patterns during lactation in commercial swine herds. *J. Anim. Sci.* 74:1202-1210.

Effect of ambient temperature on lactation feed intake



Quiniou, N., and J. Noblet. 1999. Influence of high ambient temperatures on performance of multiparous lactating sows. *J. Anim. Sci.* 77:2124-2134.

Effect of water dripping system and snout cooler on lactational feed intake of mixed parity sows



(.53 gal/hr; 3 min each 10 min.)

J. Anim. Sci. 66:885-891, 1988.

Feeding program for genetically lean "gilts" during lactation:

Day of lactation	Pounds of feed		
	AM	PM	Total/day
Day 1 (farrowed)	4	0	4
Day 2	6	0	6
Day 3	8	0	8
Day 4	10	0	10
Day 5	6	6	12
Day 6 & 7	7	7	14
Day 8 to weaning	8	8	16

Feeding program for genetically lean multiparous sows:

Day of lactation	Pounds of feed		
	AM	PM	Total/day
Day 1 (farrowed)	6	0	6
Day 2	8	0	8
Day 3	10	0	10
Day 4	12	0	12
Day 5	7	7	14
Day 6 & 7	8	8	16
Day 8	9	9	18
Day 9 to weaning	10	10	20

Kansas State University Feeding Strategy for Lactating Sows

Lbs of feed in feeder when feeding	Day of farrowing to Day 3 of lactation			
	Time of feeding			Daily total
	AM	Noon	PM	
Empty	4 lbs	0	4 lbs	8 lbs
< 2 lbs	0	0	2 lbs	2 lbs
> 2 lbs	0	0	0	0

Kansas State University Feeding Strategy for Lactating Sows

Lbs of feed in feeder when feeding	Day 3 of lactation to weaning			
	Time of feeding			Daily total
	AM	Noon	PM	
Empty	8 lbs	8 lbs	8 lbs	24 lbs
< 2 lbs	4 lbs	4 lbs	8 lbs	16 lbs
> 2 lbs	0	0	4 lbs	4 lbs

Ensure sows are adequately fed from weaning to estrus

Feeding Sows from weaning to mating

- Very thin sows (Body Condition Score: 1)
 - Full feed
- Thin sows (Body Condition Score: 2)
 - 5 to 6 lbs per day
- Normal sows (Body Condition Score: 3)
 - 4 to 4.5 lbs per day

Ration is based on a corn- or milo-soybean meal diet.

Ensure sows are adequately fed during the gestation phase

If condition scoring is used, the targeted score at farrowing should reflect the backfat thickness of the sow or gilt, and not her size and body shape.

- Location of P2 backfat thickness measurement
 - 2.5 inches off the midline at the last rib
- P2 backfat thickness at farrowing
 - .7 to .8 inches

Feeding “sows” during gestation

- Day 1 to Day 12 of gestation
 - 4 lbs per day
- Day 12 until reach Body Condition Score 3

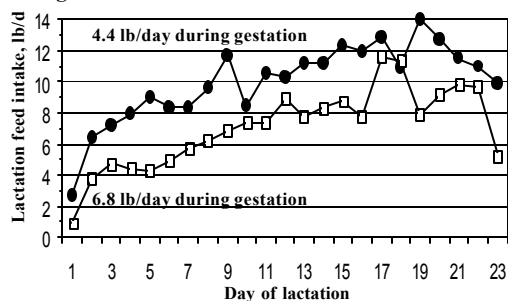
Body score	BF, in.	Lbs of feed
< 2.0	< 0.6	Full feed
2.0	0.6	6.0 to 6.5
2.5	0.65	4.5 to 5.0
3.0	0.7 to 0.8	4.0 to 4.5
>3.5	> 0.8	3.5 to 4.0

Feeding sows during gestation

- From Body Condition Score of 3 to Day 100 of gestation
 - 4.0 to 4.5 lbs (or amount to keep BCS 3)
- Day 100 to Day 112 of gestation
 - 6 to 8 lbs per day (rapid fetal growth)
- Day 112 to Farrowing
 - 4 to 5 lbs per day

Do not over-feed sows during the gestation phase because it lowers feed intake during the lactation phase!

Effect of gestation feed intake on *ad libitum* feed intake during lactation of first litter sows



Recent Advances in Swine Production & Health 5:57-63, 1995.

Influence of nutrition on weaning-to-estrus interval (First litter sows)

Feeding level		Weaning to estrus, days
Gestation	Lactation	
4.4 lb/day	Ad libitum	6.4 ^a
6.8 lb/day	Ad libitum	8.0 ^b

^{a,b} (P < .05)

Do not use caffeine to estimate motility of stored/cooled sperm cells!

Age of sperm, days	Without Caffeine	With caffeine	Difference
1 to 2	64%	78%	+14
3 to 4	53%	72%	+19
5 to 6	37%	62%	+25
7 to 8	23%	48%	+25

(BTS extender)

If fertility of boars is unknown, use mixed semen or mate sow to two different boars during the same estrus

- **It is difficult to identify a true difference in farrowing rate between boars, unless a large difference exists.**

Fecundity index for homospermic and heterospermic (mixed) semen

Pair	Homospermic		Mixed
	Boar One	Boar Two	One & Two
1	651	798	799
2	679	662	722
3	720	511	846
4	391	522	888
5	480	675	722

Fecundity index for homospermic and heterospermic (mixed) semen

Pair	Homospermic		Mixed
	Boar One	Boar Two	One & Two
6	429	365	492
7	423	367	773
8	850	573	959
9	676	400	481
10	970	792	864

Fecundity index for homospermic and heterospermic (mixed) semen

Pair	Homospermic		Mixed
	Boar One	Boar Two	One & Two
11	333	827	825
12	379	1130	679
13	330	1120	620
14	716	322	490
15	919	855	609
16	909	894	856