
Sponsors

University of Minnesota

College of Veterinary Medicine

College of Agricultural, Food and Environmental Sciences

Extension Service

Swine Center

Editors

W. Christopher Scruton

Stephen Claas

Layout

David Brown

Cover Design

Ruth Cronje, and Jan Swanson;

based on the original design by Dr. Robert Dunlop

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, or sexual orientation.

Empowering staff to achieve excellence through objective goal setting, benchmarking, and records

Doug MacDougald, DVM
MacDougald and Morris, Wellesley, Ontario

Introduction

This paper will review some of the tools we have used over the last two years to more effectively present information to staff, managers, production advisors, and owners.

Our goals have been to achieve the following:

- Build teams
- Involve the entire team in problem solving
- Involve the team in setting achievable targets
- Lower staff turnover
- Intervene early but not unnecessarily
- Use objective and accurate data to make decisions and avoid subjective opinions
- Maintain data integrity

The tools we've used include:

- A series of production graphs (see below) with the technical explanation of the format (see below)
- An example benchmarking format (see below)
- Weekly production meeting format
- Standard Operating Procedure Manual

Production graphs

(See following pages)

Technical explanations

Decisions

The first six production graphs show "response parameters." These can be used to make immediate decisions and changes.

Served/week: This graph shows the number of services per week relative to target and upper and lower interference levels. The goal is to have most of the service points within the interference lines and the $CV < 5\%$.

Detection rate of reproductive failures: This is depicted in the second production graph. This is based on the last

five weeks of completed farrowings and the number of reproduction failures detected in the four to eight week period post-service. A reasonable and achievable target is greater than 70%. For example, if 122 sows farrow out of 171 sows served, there were 49 reproductive failures. The percent of the 49 failures that were detected in the four to eight week period post-service is the detection rate. For example, if 36 failures were detected in the four to eight week period, the detection rate would be $36/49$ or 73%. (See **Table 1.**)

Projected farrowing rate (Proj FR): The percent failures detected on the modified farrowing rate report is (lagged four weeks and run for a five week period) / the detection rate. This is lagged four weeks to get past the regular return interval and is run for five weeks to get the majority of the pregnancy checks and irregular returns. For example, 28 (19.3%) of the 145 sows served were detected open in the report period. $(19.3\% / \text{detection rate } 73\%) = 26\%$ failure rate. The weekly Projected FR is tracked on the Projected FR graph. (See **Table 2.**)

Farrowing rate to target (FR-T): The projected farrowing rate as a percent of FR target. For example, if your target FR is 85% and the Proj FR is 80%, then your FR-T is $80/85$ or 94%.

Services to target (Serv-T): The cumulative number of services for the 12 week period shown on the served/week graph reflected as a percent of target. For example, if target services/week are 10, then for 12 weeks the target is 120 services. Therefore, if in the 12 week period shown on the graph you had 110 services, your Serv-T would be $110/120$ or 92%.

Conception failure: This is the number of failures by 24 days post service. This is an early indicator of changing reproductive performance primarily due to conception failure of sows having regular return to estrus between 18 and 24 days post-service. (See **Table 3.**)

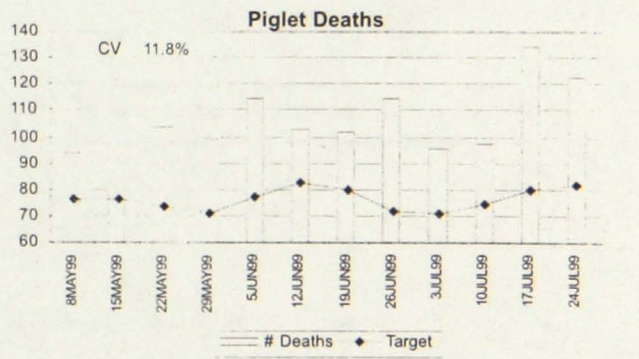
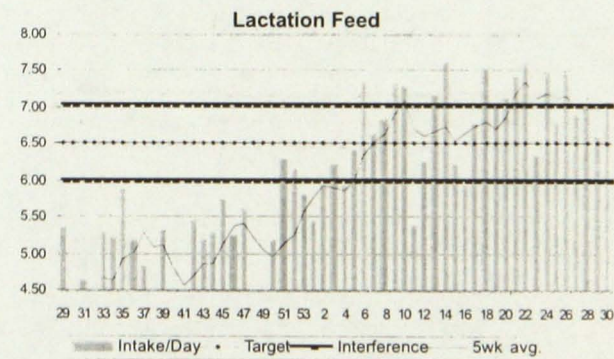
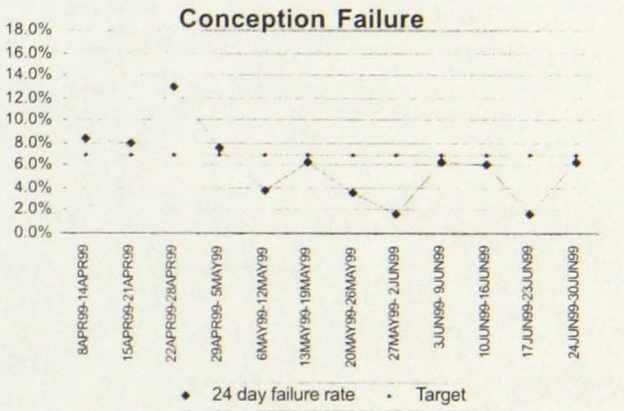
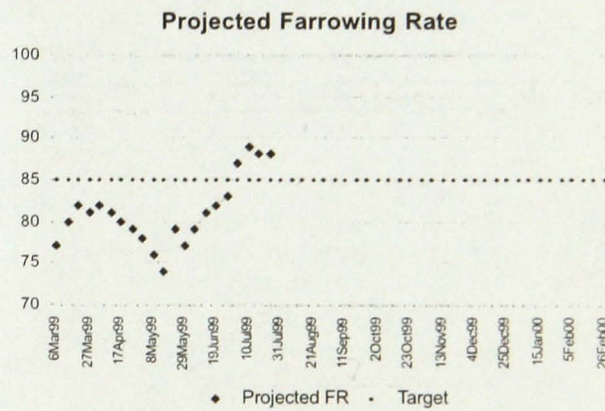
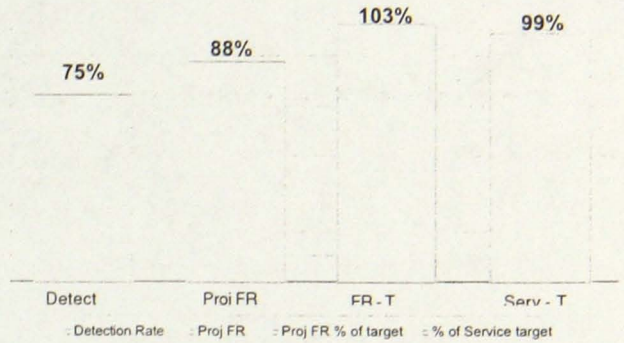
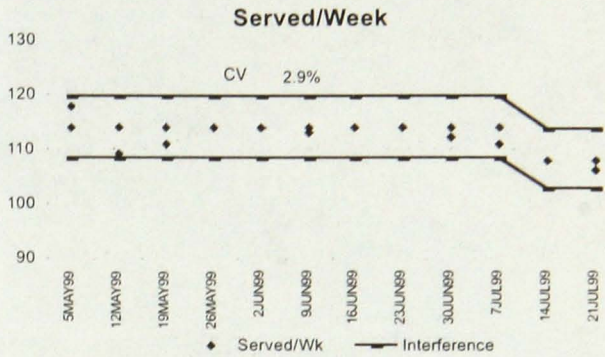
Piglet deaths: The number of recorded piglet deaths in the week.

Lactation feed intake: This is shown on a continual 52 week period with a five week rolling average. The five week average is the key line to look at. Variation in calculated intake may occur week over week due to inven-

Production graphs

Decisions

Week 29



7/26/99

*based on a current detection rate of previous detection rate

75.0% 7/26/99

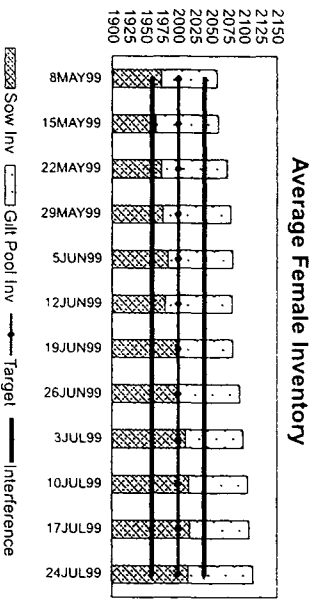
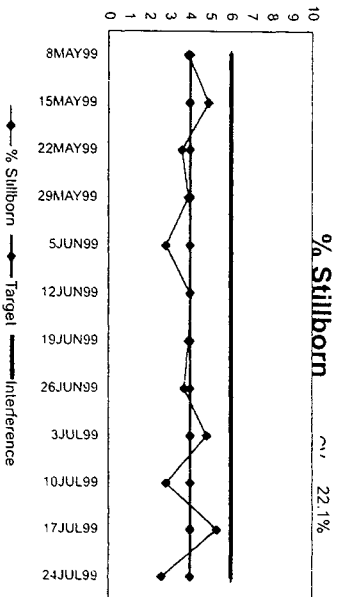
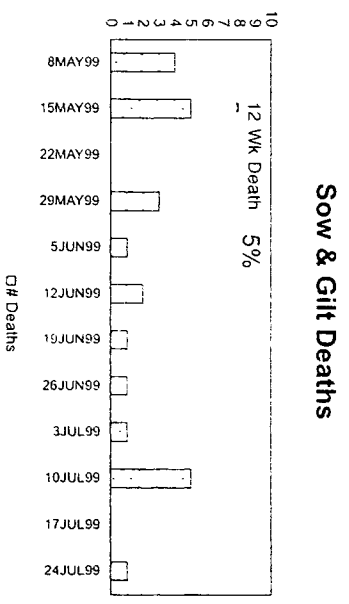
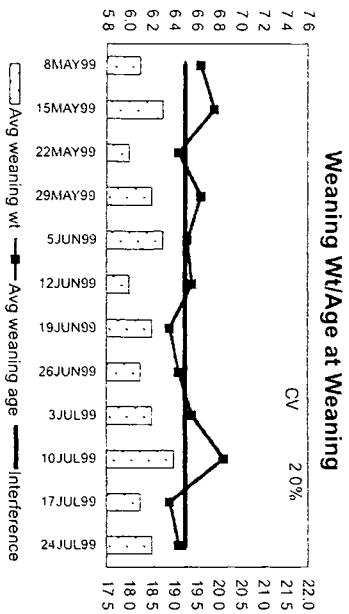
75.8% 28/6/99

65.6% 10/4/99

Production graphs

Decisions - 2

Week 29



Week 29

Example Results

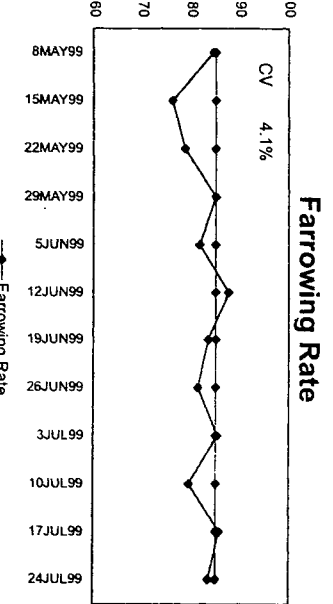
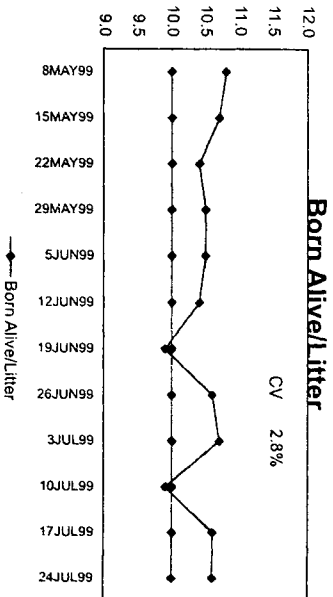
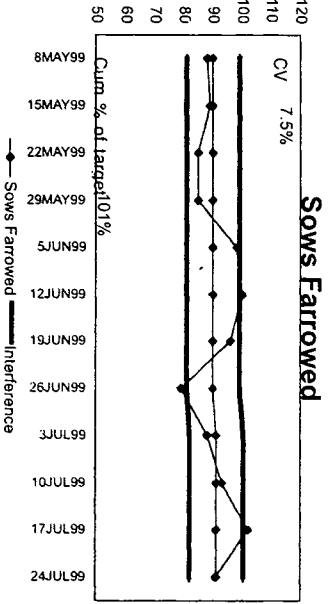
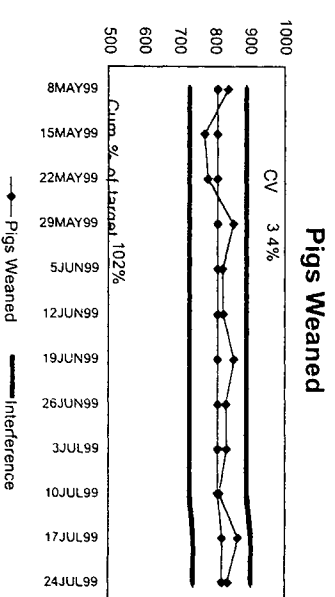


Table 1

SERVICE DATES	S	TARGET = 40		WEEK SOWS PRESUMED PREGNANT																	F	FARROW RATE	EXPECTED FARROW DATES
		LONG/SHORT	L/S CUMUL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+				
25OCT98-31OCT98	35	-5	-5	35	35	34	33	29	27	27	27	27	27	27	27	27	27	27	26	26	74.3	17FEB99-23FEB99	
1NOV98- /NOV98	30	-10	15	30	30	29	27	23	23	23	23	23	23	23	23	23	23	23	23	23	76.7	24FEB99- 2MAR99	
8NOV98-14NOV98	37	-3	-18	37	37	37	33	26	24	24	22	22	21	21	21	20	20	20	20	20	54.1	3MAR99- 9MAR99	
15NOV98-21NOV98	33	-7	-25	33	33	31	29	28	28	28	28	28	28	28	28	28	28	28	28	27	81.8	10MAR99-16MAR99	
22NOV98-28NOV98	36	-4	-29	36	36	35	33	30	29	28	27	27	27	26	26	26	26	26	26	26	72.2	17MAR99-23MAR99	
Totals	171	-29	-29																		122	71.3	

$(33+28+24+23+27) = 135$ still pregnant or = 36 failures

To find the Detection Rate of Reproductive Failures

171 - 135 = 36 Failures detected in the 4-8 week period post service
 171 - 122 = 49 Failures in Total

Detection Rate = $36/49 = 73\%$ of Reproductive Failures are detected by the end of the 8 weeks post service.

Table 2

SERVICE DATES	S	TARGET = 40		WEEK SOWS PRESUMED PREGNANT																	F	FARROW RATE	EXPECTED FARROW DATES
		LONG/SHORT	L/S CUMUL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+				
24JAN99-30JAN99	32	-8	-8	32	32	31	25	24	24	24												19MAY99-25MAY99	
31JAN99- 6FEB99	32	-8	-16	32	32	31	29	28	28	28												26MAY99- 1JUN99	
7FEB99-13FEB99	26	-14	-30	26	26	25	22	20	20													2JUN99- 8JUN99	
14FEB99-20FEB99	28	-12	-42	28	28	27	24	24														9JUN99-15JUN99	
21FEB99-27FEB99	27	-13	-55	27	27	26	24															16JUN99-22JUN99	
Totals	145	-55	-55																			19MAY99-25MAY99	

$0 + 0 + 5 + 16 + 7 + 0 + 0 = 28$
 28 failures at the end of the 4-8 week post service period

Percent repeats = number of failures/total number of sows served
 $= 28/145 = 19.3\%$

Parity, PERCENT	No Svcs	Pct Svc	Cnt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	Pct	NPD %
Parity 0	59	40.7	16	0	0	31	56	12	0	0	0	0	0	0	0	0	0	0	0	27.1	53.1
Parity 1	23	15.9	3	0	0	0	66	33	0	0	0	0	0	0	0	0	0	0	0	13.0	11.0
Parity 2	25	17.2	5	0	0	0	60	40	0	0	0	0	0	0	0	0	0	0	0	20.0	19.4
Parity 3	15	10.3	7	0	0	0	33	66	0	0	0	0	0	0	0	0	0	0	0	20.0	12.9
Parity 4	12	8.3	0																	0.0	0.0
Parity 5+	11	7.6	1	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	9.1	3.5
TOTAL	145	100.0	28	0	0	17	57	25	0	0	0	0	0	0	0	0	0	0	0	19.3	100.0

Projected failure rate = percent repeats/detection rate
 $= 19.3/73$
 $= 26\%$ Failure Rate

Projected Farrowing Rate = $100\% - \text{projected failure rate}$
 $= 100\% - 26\%$
 $= 74\%$ Projected Farrowing Rate

tory measurements, but as long as the five week average remains within the interference levels, you are on the right track.

Weaning weight/age at weaning: This shows the average piglet weaning weight and the corresponding age at weaning.

Sow & gilt deaths: This is the number of sow and gilt deaths recorded in the week. The 12 week death rate is

the annualized number of deaths in the 12 week period shown on the graph.

% Stillborn: This is the percent of total pigs born that were stillborn.

Sow inventory: This tracks average female inventory over the 12 week period.

Table 3

SERVICE DATES	S	TARGET = 40		10	17	24 days post service												FARROW RATE	EXPECTED FARROW DATES
		LONG/SHORT	L/S CUMUL			DAYS	SOWS PRESUMED PREGNANT	32	38	45	54	71	78	85	92	105	106+		
20DEC98-26DEC98	36	4	-4	36	36	34	31	30	30	30	30	30	30	30	30	30	30	14APR99-20APR99	
27DEC98- 2JAN99	29	11	15	29	28	27	23	22	22	22	22	22	22	22	22	22	22	21APR99-27APR99	
3JAN99- 9JAN99	31	-9	24	31	31	27	22	22	22	20	19	19	19	19	19	19	28APR99- 4MAY99		
10JAN99-16JAN99	44	4	20	44	44	43	40	39	38	38	38	38	38	38	38	38	5MAY99-11MAY99		
17JAN99-23JAN99	32	8	-28	32	32	32	31	30	30	30	30	30	30	30	30	30	12MAY99-18MAY99		
24JAN99-30JAN99	32	8	36	32	32	30	24	24	24	24	24	24	24	24	24	24	19MAY99-25MAY99		
31JAN99- 6FEB99	32	8	44	32	32	31	29	28	28	28	28	28	28	28	28	28	26MAY99 1JUN99		
7FEB99-13FEB99	26	14	58	26	26	22	21	20	20	20	20	20	20	20	20	20	2JUN99- 8JUN99		
14FEB99-20FEB99	28	12	70	28	28	24	24	24	24	24	24	24	24	24	24	24	9JUN99-15JUN99		
21FEB99-27FEB99	27	13	83	27	27	26	21	21	21	21	21	21	21	21	21	21	16JUN99-22JUN99		
28FEB99- 6MAR99	42	2	-81	41	41	37	34	34	34	34	34	34	34	34	34	34	23JUN99-29JUN99		
7MAR99-13MAR99	39	1	82	39	39	34	34	34	34	34	34	34	34	34	34	34	30JUN99- 6JUL99		
Totals	398	82	-82																

Conception Failure = $100 - (\text{Number of sows still pregnant at 24 days post service} / \text{number of services in week})$
 = $100 - (34/39) = 13\%$

Results

The “result” parameters are shown in the last four production graphs.

Pigs weaned: This is the number of pigs weaned in the week and the cumulative percent of target for the 12 weeks shown on the graph. Note that part weans are not included in this number until the sow is weaned.

Sows farrowed: This is the number of sows farrowed in the week. The cumulative percent of target for the 12 weeks shown on the graph is also reflected.

Farrowing rate: This is the actual FR% of sows farrowing in each of the last 12 weeks.

Born alive/litter: This is the average number of pigs born alive per litter in the week.

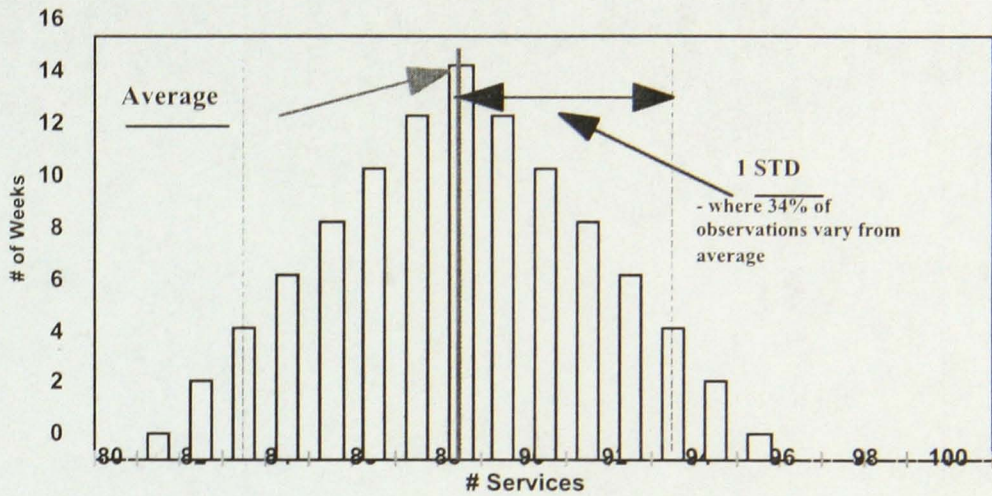
Interference levels: These are the upper and lower limits between which weekly results should track. Two consecutive weeks outside the interference levels should trigger action.

Coefficient of variation (CV): This is the measure of variability over the interval. The aim is for consistency in production; therefore, the target CV is less than 5% for services and less than 10% for other parameters (subject to change). See **Figure 1**. The example looks at the number of services per week with the average over a specific time at 88 and a STD of 5. Therefore, 34% of the services per week range ± 5 from the average or range from 83 to 93. STD works best with data that is normally distributed on either side of the average.

Example benchmarking format

(See second following page)

Figure 1. Standard Deviation Example



Coefficient of Variation (CV) is $STD \div Mean$. Therefore, $CV = 5 \div 88 = 5.7\%$.



COMPARATIVE ANALYSIS

2nd Quarter 1999

	1	2	3	4	5
Placement 1st Quarter 1999	3	2	5	6	1
Placement 4th Quarter 1998	1	4	6	5	2
Placement 3rd Quarter 1998	1	5	3	6	2
Placement 2nd Quarter 1998	3	4	2	1	8
Placement 1st Quarter 1998	7	2	4	1	3
Placement 4th Quarter 1997	10	1	2	3	6
Placement 3rd Quarter 1997	9	2	1	3	4
Placement 2nd Quarter 1997	5	4	1	2	6
Placement 1st Quarter 1997	2	3	1	4	6

REPRODUCTION

SOW HERD SIZE	1083	647	870	375	698
ENTRY-1st SERVICE	28	35	23	25	30
% BRED BY 7 DAYS	92	88	92	88	93
WEAN - 1ST SERVICE	5.6	6.5	5.5	6.1	5.4
FARROWING RATE	85	71	83	77	81
BORN ALIVE/LITTER	11.2	10.8	10.8	10.9	10.4
STILLBORN/LITTER	0.7	0.5	0.5	0.9	0.7
MUMMIES/LITTER	0.3	0.2	0.3	0.1	0.4
L/MF/Y	2.52	2.47	2.57	2.46	2.47
WEANED/SOW	9.8	9.6	9.1	9.4	9.2
PWM %	12.6	11.1	16.2	11.9	10.8
WEANING AGE	15.3	14.4	15.4	15.0	14.6
WEANING WEIGHT	5.2	5.1	5.1	5.0	5.0
ADJ 21 DAY WEIGHT	52	61	54	47	54
P/MF/Y	24.7	23.8	23.3	23.1	22.8
PIGS/CRATE/YR	153	179	151	155	133
LITTERS/CRATE/YR	15.6	18.5	17.1	16.1	14.2
CRATE DOWNTIME	8.1	5.3	5.9	7.7	11.1
SOW CULLING RATE	33	27	36	47	39
SOW DEATH RATE	6.3	3.1	8.3	10.7	8.0
PIGS WEANED/LIFETIME FEMALE	39*	52*	48	42	56*
NPD'S/PARITY	14	23	15	19	19
CV - Services - %	4.4	9.1	9.8	25.7	14.5
CV - Weaned - %	9.9	21.9	10.5	12.7	21.2
% Target Weaned	109	107	91	102	94
% Number Ones	91.7		96.1		92.8

quarter highs

*does not meet requirement of < 10% inventory change over three years