2018 PIC Boar Stud Panel

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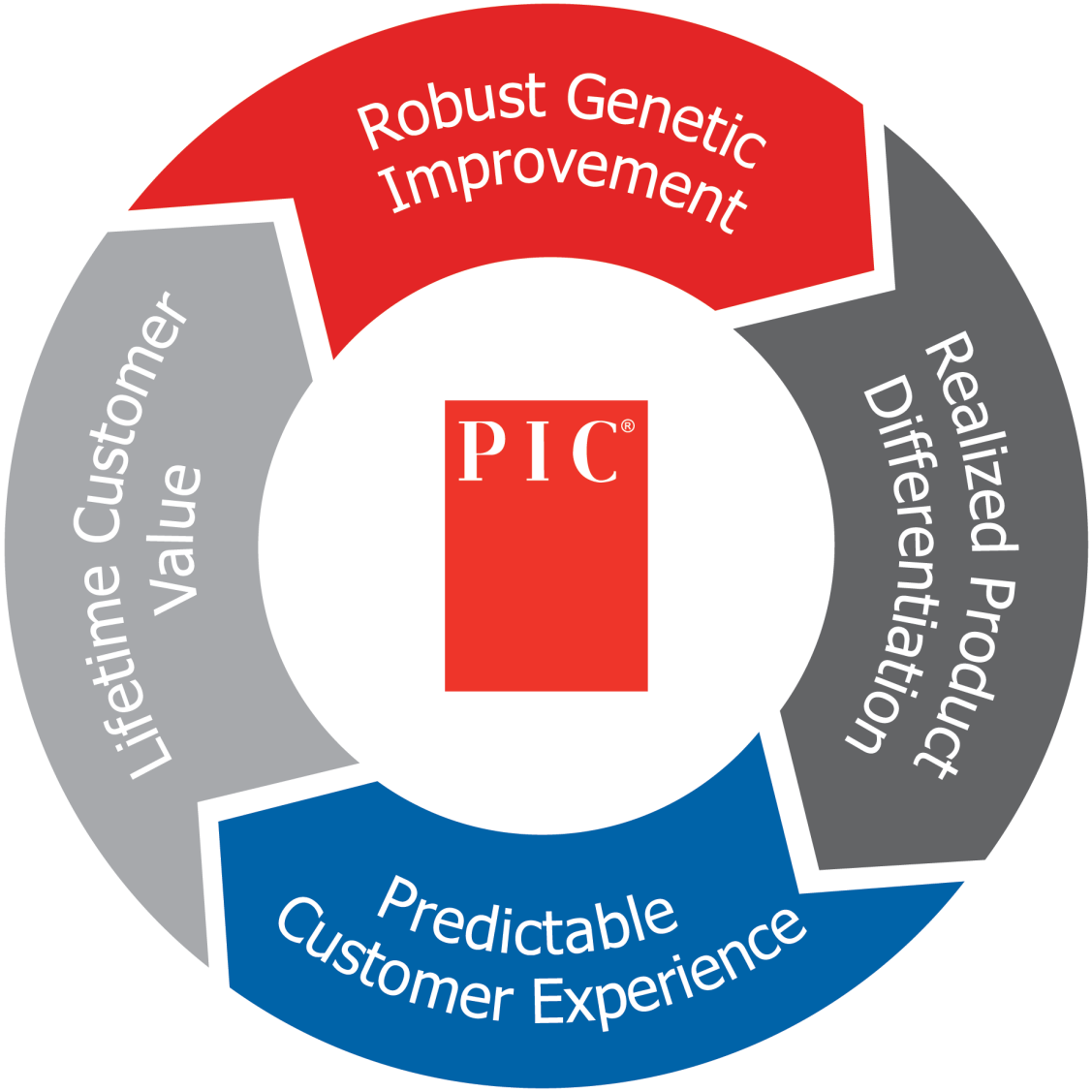
"Never Stop Improving"



Agenda

Timing	Session
8:00-8:30 am	Check-In and Continental Breakfast
8:30-8:40am	Welcome & Introduction of Theme
8:40-9:20am	Boar Handling
9:20-10:00am	Boar Training
10:00-10:15 am	Break
10:15-10:55am	Confidence of Measurements
10:55-11:30am	Hygiene
11:30-12:30pm	Lunch (*Universe Room*)
12:30-1:00 pm	Boar Stud Panel
1:00- 1:10pm	Break- Bring Q&A Cards to Check-In
1:10- 1:40pm	What Can PIC Do For You?
1:40pm-2:00pm	Question & Answer Session
2:00 pm	Meeting Adjourned

Boar Handling

Dr. Michael Kleve-Feld

PIC®

Outline

- Stress
- Semen collection hygiene
- Semen output
- Handling poor semen quality boars

Primary Goals Barn

Define your goals:

- Free from pathogenes
- High semen quality (normal, motile cells)
- High semen output
- Minimal number of other germs (hygiene)

- Fast and save semen collection

Definition of Stress

Stress

- Any environmental or physical pressure that elicits a response from an organism[1]

Acute Stress Examples

- Blood sampling from vena jugularis
- Treatment
- Short period of high temperature

Chronicle Stress Examples

- Continuous exposure to strong air chill
- Young boar relocated to stall beside old dominant boar
- Prolonged periods of elevated temperatures
- Slight lack of feed/energy

[1]Source: Enceclopedia Britannica 2017

Stress

Table 1: Seasonal changes in the "stress load" on boars in commercial studs in North Carolina and their association with production of ejaculates rejected due to poor quality
(Adapted from Flowers, 2015; Reprod. Dom. Anim. 50, Suppl. 2, 25-30).

	Winter[1]			Summer[2]		
Stud[4]	Acute stress	Chronic stress	Ejaculates rejected (%)[3]	Acute stress	Chronic stress	Ejaculates rejected (%)[3]
A	1	0	$6.7 \pm 1.0^{x,y*}$	3	1	21.4 ± 3.4^{x}
B	2	0	8.2 ± 1.3^{x}	1	1	10.7 ± 2.8^{y}
C	0	1	$2.4 \pm 0.9^{z*}$	3	1	18.8 ± 3.7^{x}
D	0	0	$4.5 \pm 1.1^{y,z*}$	5	1	35.4 ± 6.9^{z}

[1] December, January, February
[2] June, July, August
[3] Ejaculates rejected if motility or normal morphology was less than 70%
[4] means are from 2,000 ejaculates per stud per season
[x,y,z] means within the same column are different ($p < 0.05$)
[*] different from summer ($p < 0.05$)

- Stress piles up
- Acute on top of chronic stress most severe
- Target: Reduce manageable stress factors

Heat-Stress

- Temperatures above 73°F affect semen quality
- Effects seen 19-37 days after exposure
- Magnitude and duration of elevated temperature influence time until recovery
- Two effects:
  - Boar stress leads to dysfunctions in sperm maturation
  - Elevated testicular temperature lead to dysfunctions in spermatogenesis and sperm maturation. Tissue damage reported

Heat-Stress: What Can We Do?

- Customer example Mexico:
  - Increased max. ventilation rate from 275 -> 470 FPM
  - Doubled cool cell capacity
  - Difference ambient vs. barn temperature 11.7->15.3 F

Record high °C (°F)	39.5 (103.1)	39.5 (103.1)	42.0 (107.6)	43.0 (109.4)	43.0 (109.4)	41.5 (106.7)	40.0 (104)	43.0 (109.4)	40.0 (104)	39.0 (102.2)	39.0 (102.2)	39.5 (103.1)	43.0 (109.4)
Average high °C (°F)	30.8 (87.4)	31.5 (88.7)	34.0 (93.2)	35.6 (96.1)	36.3 (97.3)	35.3 (95.5)	35.0 (95)	34.9 (94.8)	34.2 (93.6)	32.7 (90.9)	31.5 (88.7)	30.6 (87.1)	33.5 (92.3)
Daily mean °C (°F)	24.0 (75.2)	24.4 (75.9)	26.3 (79.3)	27.9 (82.2)	29.0 (84.2)	28.5 (83.3)	28.2 (82.8)	28.1 (82.6)	27.9 (82.2)	26.8 (80.2)	25.4 (77.7)	24.0 (75.2)	26.7 (80.1)

-11.7°F	63.5	64.2	67.6	70.5	72.5	71.6	71.1	70.9	70.5	68.5	66	63.5
-15.3°F	59.9	60.6	64	66.9	68.9	68	67.5	67.3	66.9	64.9	62.4	59.9

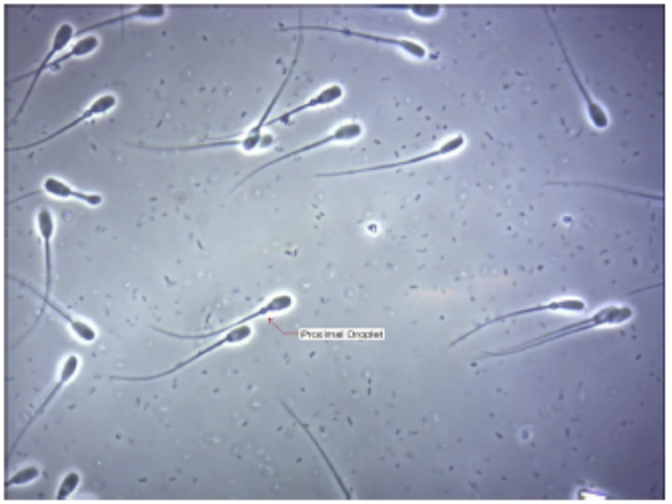
Heat-Stress: What Can We Do?

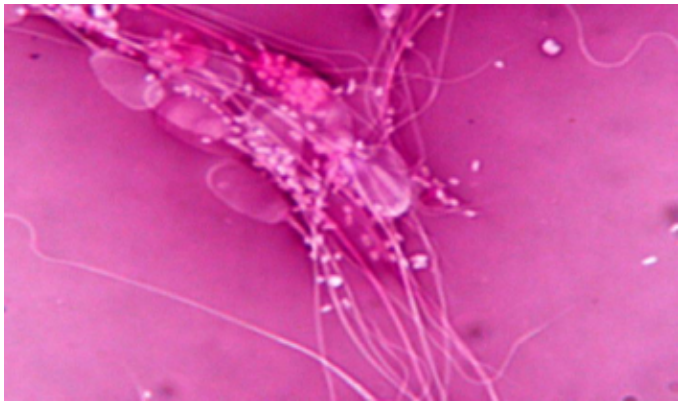
Avoid other stressors during warm period

- House heat sensitive animals close to cool cells
- Collect animals early morning (cooler)
- Feed less feed more often
- Proper water supply (Flow rate ≥0.26 G/min)
- Avoid boar transports during high summer or do overnight

Bacterial Contamination

- Lower sperm cell survival rate
- Reduced sperm motility (pH)
- Sperm cell agglutination/ clumping
- Reduced shelf life
- Discharge in the sow
- Reduced fertility





Around 15 – 30 % of semen doses are contaminated (Althouse 2008, Ubeda et al.

HACCPS – Critical Control Points

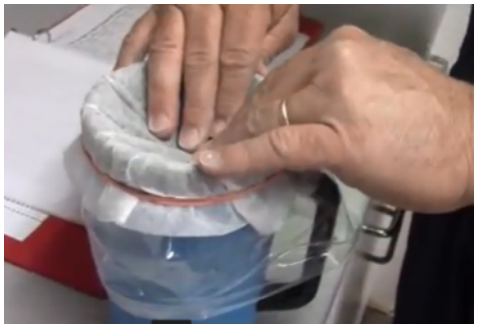
Table 3
Univariable odds ratios of boar studs and potential risk factors for ejaculates with >220 CFU mL^{-1} of aerobic mesophiles.

Factors	Category	*n*	>220 CFU mL^{-1}% (n)	Odds ratio	95% CI	*P*-value
Boar stud	A	53	47.2 (25)	3.0	1.3–7.1	0.0099
	B	55	54.5 (30)	4.1	1.8–9.5	0.0011
	C	53	22.6 (12)	1.0	NA	NA
	D	52	71.1 (37)	8.4	3.5–20.4	<0.0001
Boar hygiene	Clean	145	45.5 (66)	1.0	NA	NA
	Dirty	68	55.9 (38)	1.6	0.8–3.1	0.1469
Hygiene of preputial ostium	Clean	197	48.2 (95)	1.0	NA	NA
	Dirty	16	56.3 (09)	1.4	0.4–4.6	0.5711
Length of preputial hair	Short	160	45.0 (72)	1.0	NA	NA
	Long	53	60.4 (32)	1.9	0.9–3.9	0.0791
Hygiene of glove collection	Clean	198	46.5 (92)	1.0	NA	NA
	Dirty	15	80.0 (12)	4.8	0.9–18.9	0.0691
Inclination of semen container	Leaning	108	53.7 (58)	1.4	0.8–2.5	0.2811
	Not leaning	105	43.8 (46)	1.0	NA	NA
Preputial liquid trickling from the hand	Out of the container	163	41.1 (67)	1.0	NA	NA
	Into the container	50	74.0 (37)	4.0	1.8–8.7	0.0013
Penis escaping during semen collection	No	153	45.8 (70)	1.0	NA	NA
	Yes	60	56.7 (34)	1.6	0.8–3.2	0.1646
Size of preputial diverticulum	Small	111	46.8 (52)	1.0	NA	NA
	Large	102	51.0 (52)	1.1	0.6–2.0	0.7120
Interval between entry into the pen and mount (min)	0–2	54	55.6 (30)	1.7	0.7–4.3	0.2161
	3–6	112	49.1 (55)	1.4	0.6–3.0	0.3987
	>6	47	40.4 (19)	1.0	NA	NA
Duration of semen collection (min)	2–5	78	42.3 (33)	1.0	NA	NA
	6–7	70	42.9 (30)	1.0	0.5–2.0	0.9384
	>7	65	63.1 (41)	2.2	1.1–4.7	0.0350
Boar age (months)	8–18	100	41.0 (41)	1.0	NA	NA
	>18	113	55.7 (63)	1.9	0.9–4.0	0.0953

"Risk factors for bacterial contamination during boar semen collection"
A.M.G. Goldberg et al., 2013

Preparation Collection Cups

- In clean environment
- With clean or gloved hands
- If you have to make a dip in the filter, do this during preparation with clean/gloved hand; avoid damaging the filter



Collection Area

Warm up pens

- Additional stimulation
- Clean collection area
- Work flow

Benchmark: Semen collection (enter pen-dismount) ≤ 10

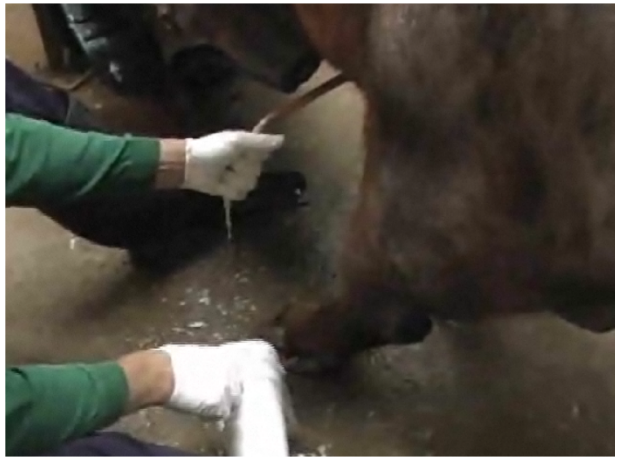
Collection Area

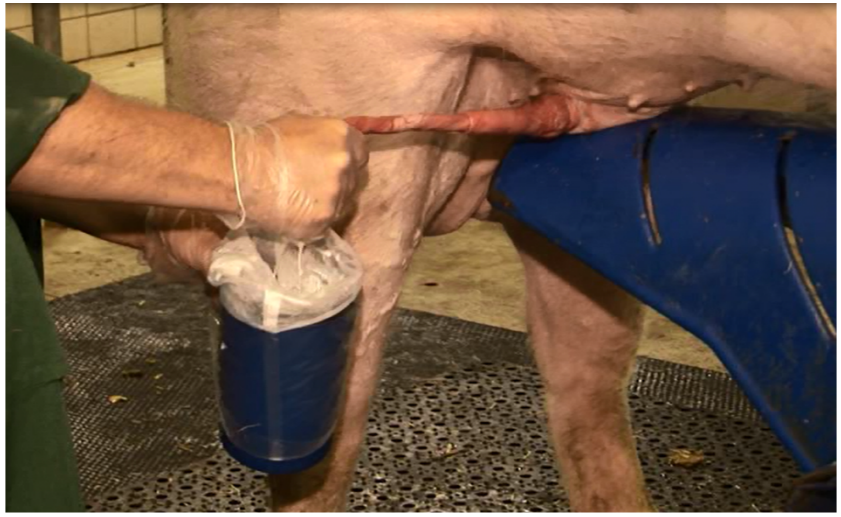
- Safe
- Easy to clean
- Separated from housing area
- No distraction
- Comfortable for boar
- …

Dummy

- Stainless steel – no coating
- Floor with good traction (avoid mats if possible)
- Clean daily; emphasis on bottom
- Disinfect min. 1x/week; finish with rinsing

Semen Collection





Bacterial Contamination

Animal Reproduction Science 120 (2010) 95–104

Contents lists available at ScienceDirect

Animal Reproduction Science

journal homepage: www.elsevier.com/locate/anireprosci

Bacterial contamination of boar semen affects the litter size

Luis O. Maroto Martín[a,b], Eduardo Cruz Muñoz[b], Françoise De Cupere[b], Edilbert Van Driessche[a], Dannele Echemendia-Blanco[a], José M. Machado Rodríguez[b], Sonia Beeckmans[a,*]

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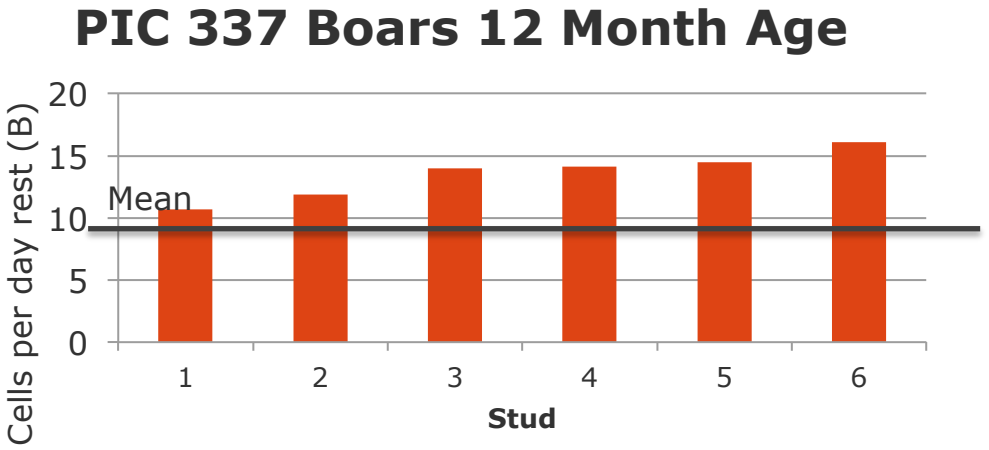
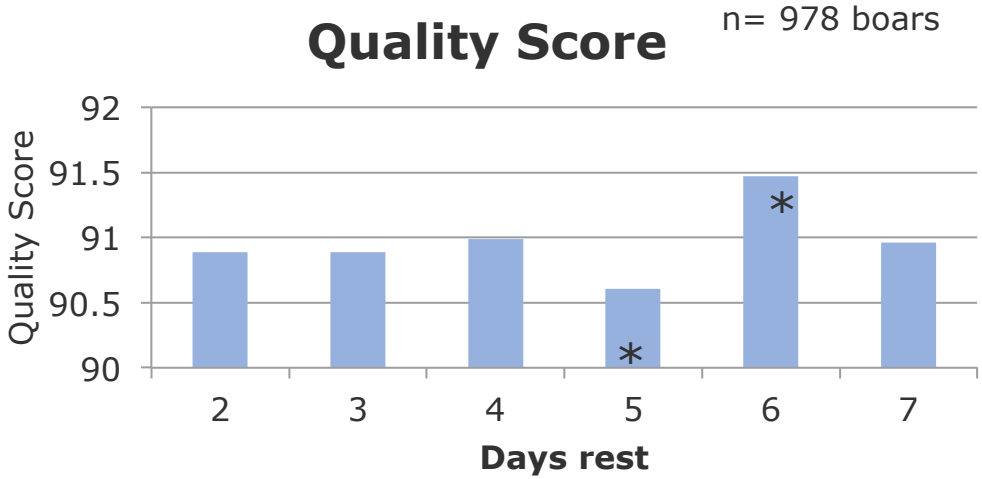
E.Coli (CFU/ml)	Mean litter size
$2{,}98 \times 10^3$	12,25
$3{,}17 \times 10^3$	11,91
$4{,}09 \times 10^3$	9,38
$5{,}10 \times 10^3$	8,9

Boar Semen Output

- Line/age effect
- Stimulation
- Collection frequency
- Environmental factors



Age in month	Collection Frequency
≤ 12	1x per week
> 12	3x every 2 weeks



11,792 ejaculates, 617 terminal boars, USA 2016.

Rule of thumb: Approx. 15B cells/day rest

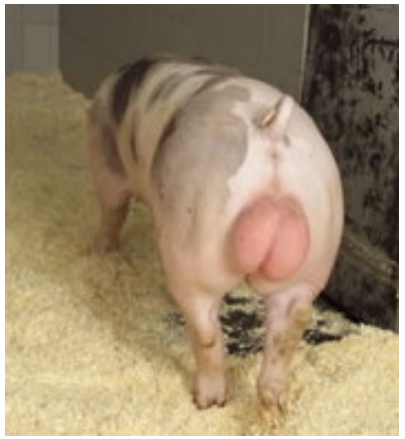
Handling Poor Semen Quality Boars

- Boars with 2 consecutive poor ejaculates get "Non working" status
- Separate collection day/time is beneficial
  - No need to collect those individuals during production
  - Avoid/minimize spread of bacteria
- 1x/wk collection/analysis schedule until recovered
- Final culling decision dependent on multiple factors
- Complete recovery ~8-12 weeks after "stress"

Benchmark: < 10% non productive boars

Checklist Poor Semen Quality Boars

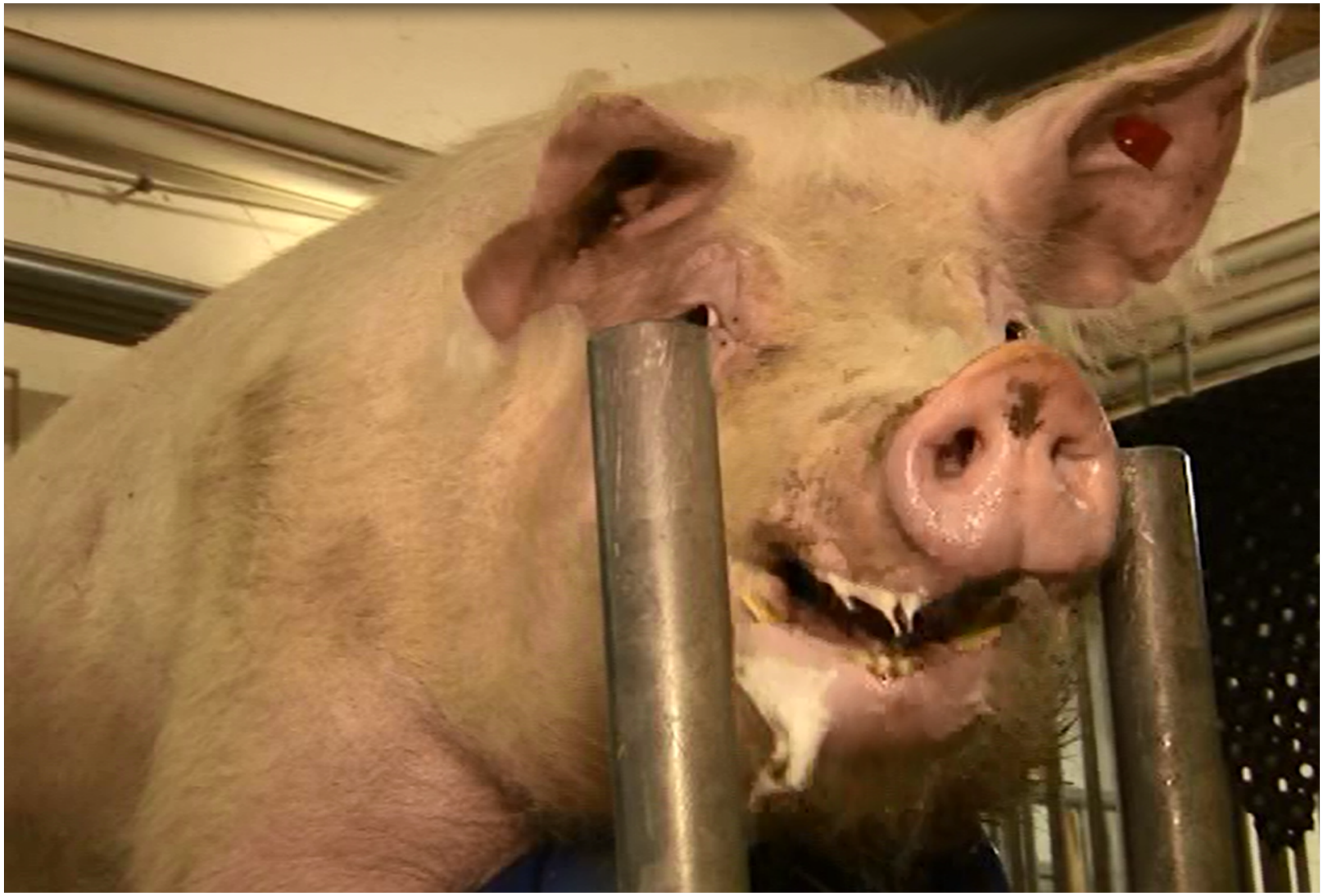
- Signs of sickness (cough, low activity, off feed) ?
- Leg problems, lameness ?
- Special treatments applied ?
- Size, shape of testis, epididymis?
  - Injuries
  - Symmetry
  - Filling/elasticity



Summary

- Avoid stress as far as possible
- Emphasis on hygiene during collection
- Proper stimulation to enhance semen output
- Separate collection schedule for poor semen quality boars

Thanks for Your Attention



Boar Training

Malcolm Turley

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The Goal

It’s All About

Boar Training

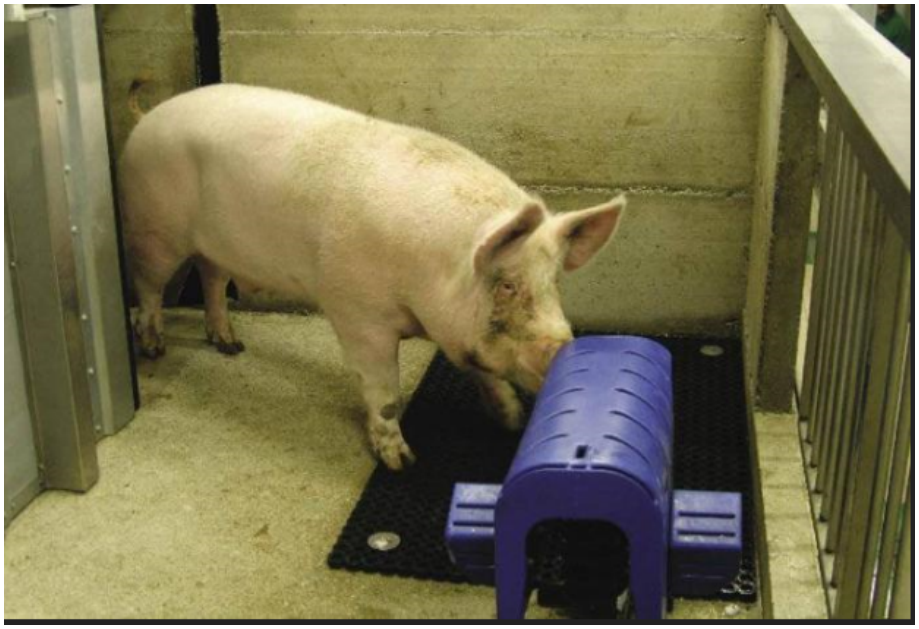
- What items do we need for training
- Number of people
- What type of people and characteristics
- Train in Isolation vs. Stud
- How many times does a boar have to jump to be considered “trained”?
- The process

When to Start Training?

- Start training boars after 1 wk of being delivered.

What Items Do I Need To Evaluate Before Training?

- Inspect AI Dummy- secure. Not wobbly.
- Good footing.



What Do I Need To Start Training?

- Visible Clock
- Syringes
- Lutylase
- Collection Gloves
- Log to keep record IDs of boars who jumped , 1st, 2nd, 3rd, weekly and record dates.
- TIME

People & Characteristics Needed

- People= 3 works best, 2 can do it.
- Patience of Job
- “Read” boars
- Determined
- Don’t like to lose

Training- Isolation vs. Stud

Isolation

- Focused/ few distractions
- Finding a boar to start the chain
- Cannot evaluate collection
- Less intimidating

Stud

- More distractions
- Many candidates available
- Collection analysis available
- Lots of chatter

What Is This Boar Thinking About?

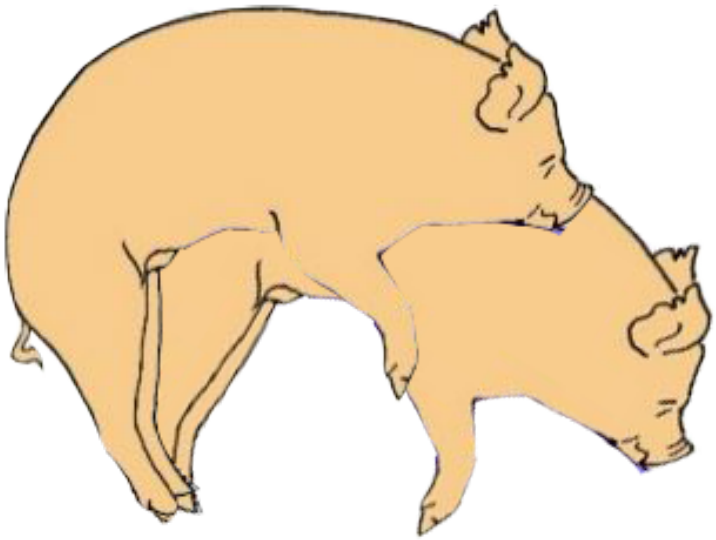
The Process

- **Day 1**
  - Find a boar that is being boisterous in the group, he is the boar to try to start the training with.
  - Give him 2cc of Lutalyse and put him in the warm up pen.
  - At the same time go ahead and give an 2nd boar 2cc Lutylase.
  - Normally boar #1 will jump the dummy- after he is on the dummy and ejaculating (locked out). Turn in boar #2.

The Process Cont'd

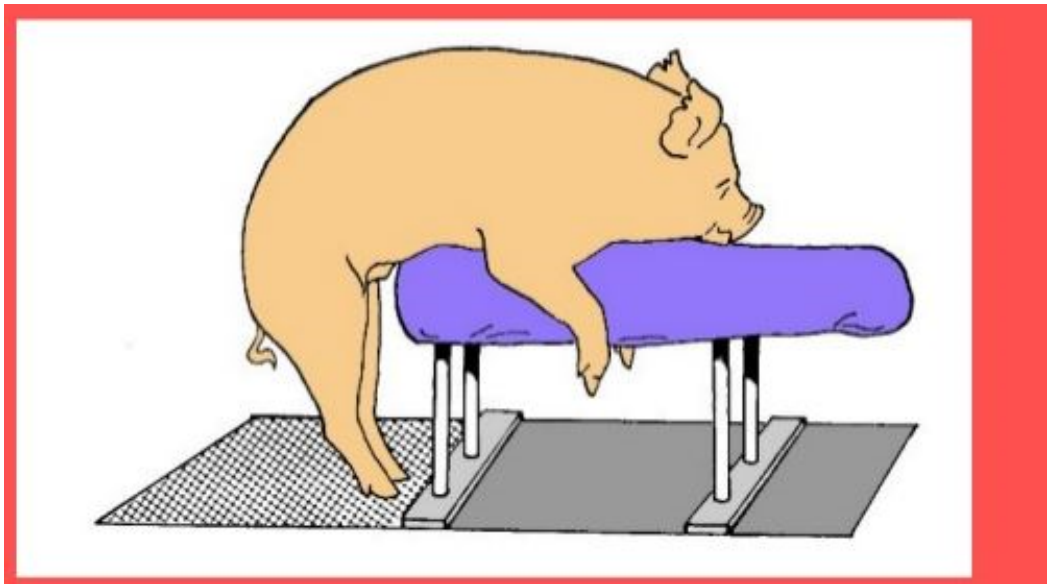
- Boar # 2 will sniff and normally try and mount boar # 1 .
- When boar # 2 jumps boar # 1, go ahead and extend out and get boar # 2 ejaculating.
- Slide off boar # 1 off the dummy and he goes back to his crate.
- Then boar # 2 will normally jump the dummy.
- Thinking 5 minutes ahead of step above, give boar # 3 2cc of Lutylase
- Keep the process going!

The Process



The Process

- **Day 2** = all boars that jumped the dummy yesterday get fully collected by themselves today!
- Give all boars 1cc Lutylase – wait for response then turn them in and collect fully.



The Process

- **Day 3**- Rest time.

The Process

- **Day 4-** Fully collect all the boars that were collected day 2 Only give 1cc of Lutalyse if you have to.

Example Training Log

Group name:

Delivery date:

Boar ID	Training Date	Technician	Outcome	Volume	Total cells	Motility	Morphology	Prostagalandin	Comments
19001	Sept 1 2017	MF	No interest	-	-	-	-	Yes	Stopped after 5 min.
19001	Sept 2 2017	MF	Jump only	-	-	-	-	Yes	
19001	Sept 3 2017	MF	Collection	80ml	-	-	-	Yes	Full ejaculation
19001	Sept 4 2017	MF	Collection	70ml	-	-	-	No	
19001	Sept 6 2017	MF	Collection	150ml	65B	85%	75%	No	

How Many Times Before I Call The Boar "Trained"?

When he is on a weekly collection schedule

Expectations

- Less than 3% non trainable boars per shipment.
- Have 90%+ boars trained after 4 weeks.
- Reaction time (enter collection pen – jump interval) shorter than 5 minutes.

Summary

- To instill “good” habits
- Identify the right people
- Make time to train
- Training area in good working condition
- Patience

If It Was Only This Easy!

Break

Confidence of Measurements

Hanneke Feitsma,
Global GTC QA manager

PIC®

Monitoring Semen Quality

- Goal:
  - Assure and improve quality semen dose

- How:
  - Assess
  - Evaluate
  - Report
  - Improve

  ……..the performance

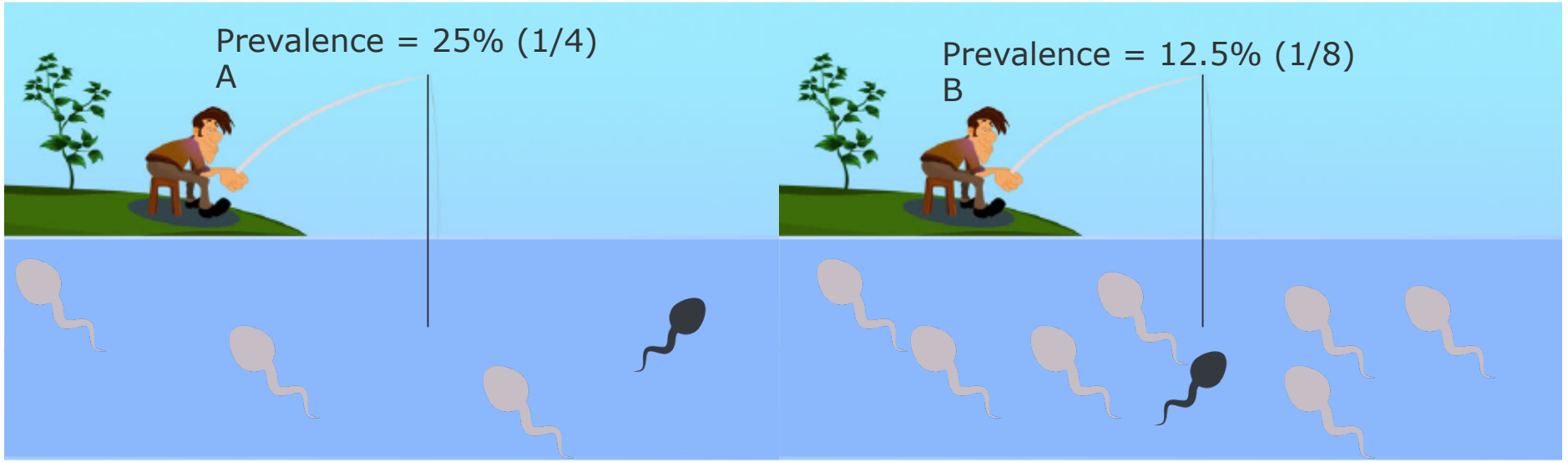
Semen Quality Standard

- Thresholds for:
  - Viable cells per dose (2.75-3.0 Billion); ±10% maximum variation
  - % Normal cells (>70%); >95%
  - % Motile cells (>80% collection / >70% expiration); > 95%
  - Bacterial contamination (no growth)> 95%

Prevalence

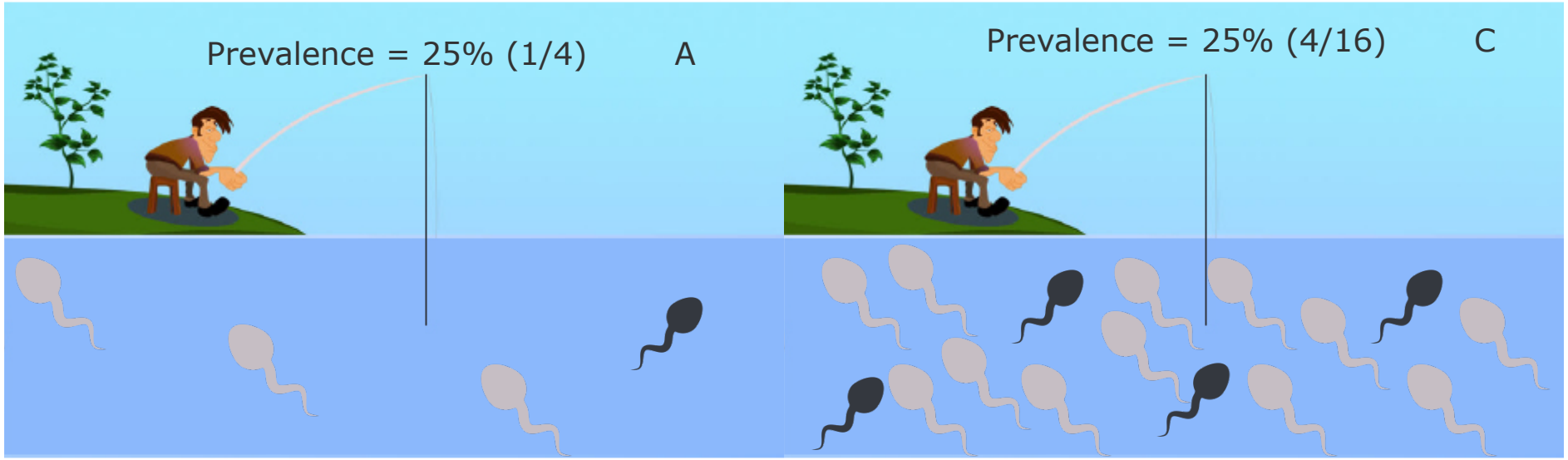
- How many "red sperm" are in the population?

- The lower the prevalence, the more often the fisherman has to throw his fishing pole to catch red sperm!



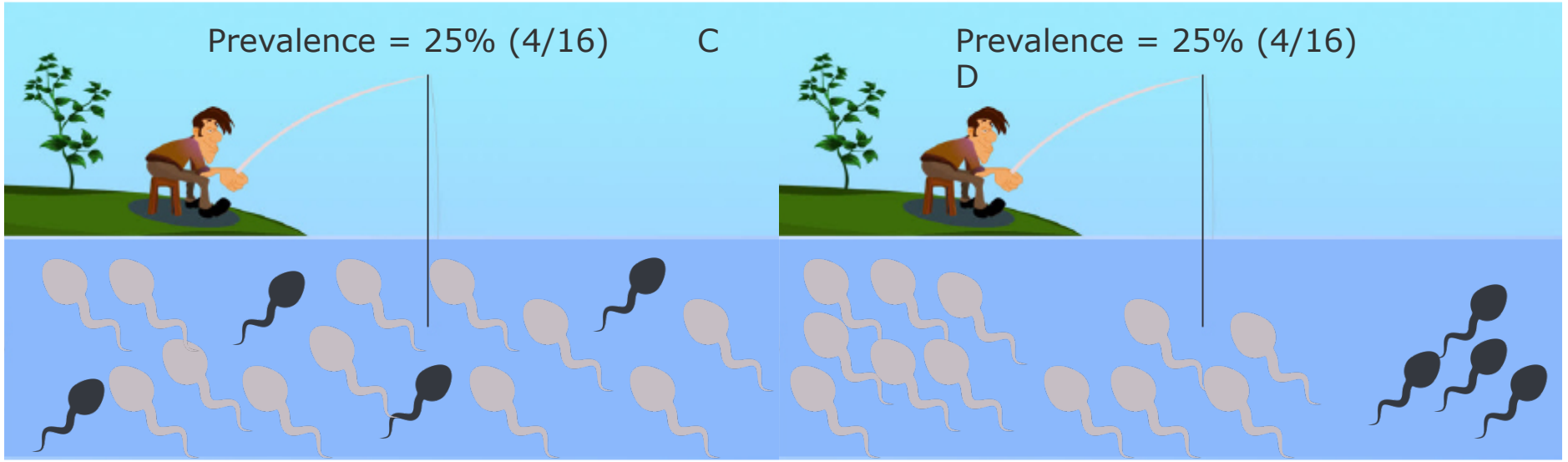
Population Size

- The larger the population the less often the fisherman has to throw his fishing pole to catch red sperm (same prevalence)

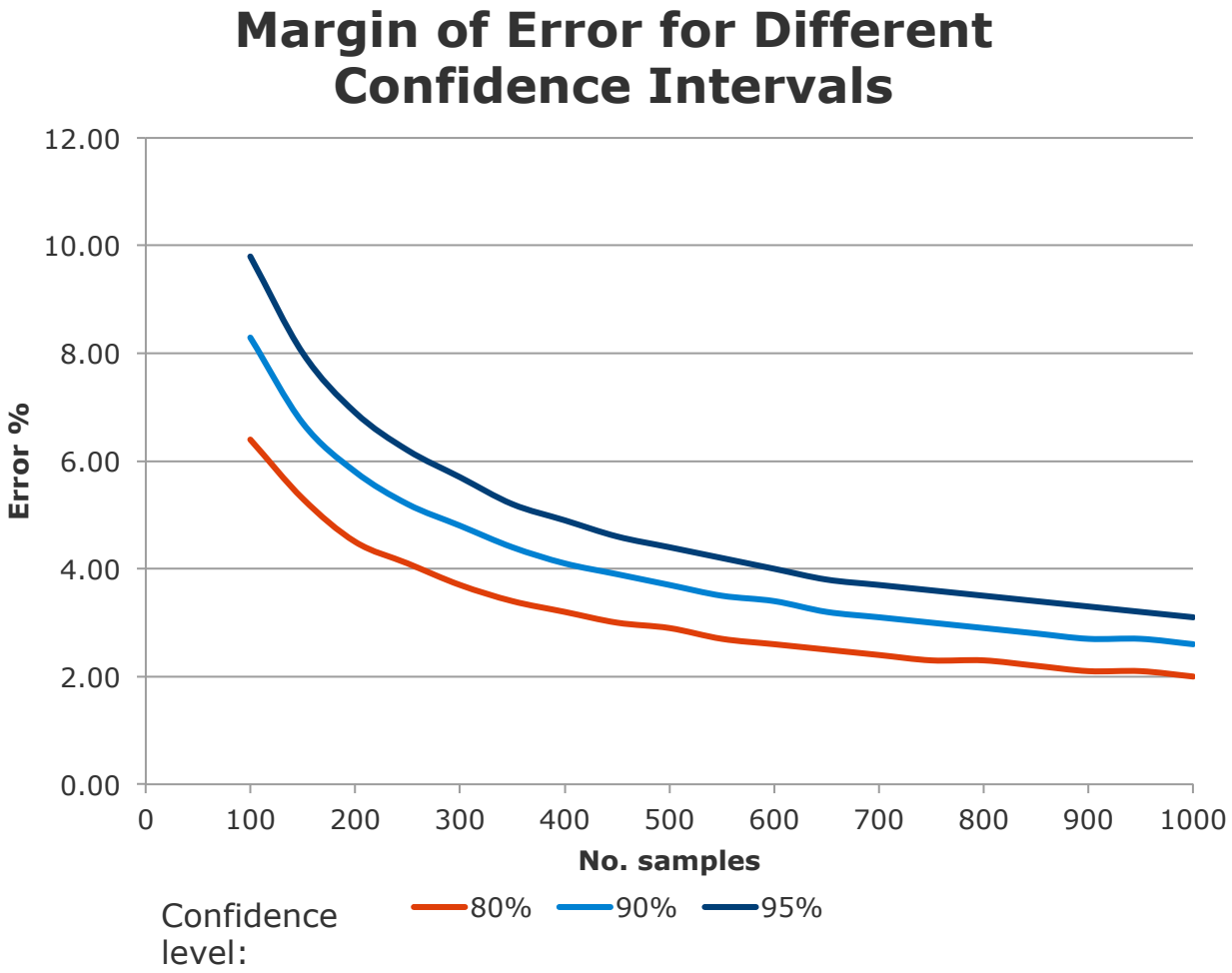


Distribution

- If the sperm cells are unevenly distributed in the pond, in order to catch red sperm, the fisherman has to determine what is the best spot to throw his fishing pole



Confidence Interval And Error



- More samples > lower error > outcome more reliable

Representative Number of Samples

	Confidence level			
Confidence level →	95%	99%	95%	99%
Prevalence →	10.0%	10.0%	5.0%	5.0%
Population size ↓				
20	15	18	19	20
50	22	29	34	41
100	25	35	44	59
150	26	38	48	67
200	27	39	51	72
250	27	40	52	75
300	27	41	53	77
350	27	41	54	79
400	27	41	54	80
450	28	42	55	81
500	28	42	55	82
600	28	42	56	83
700	28	42	56	85
800	28	43	56	85
1,000	28	43	57	86
2,000	28	43	58	88
3,000	28	43	58	88
4,000	28	44	58	89

Representative Number of Samples

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Confidence level →	95%	99%	95%	99%
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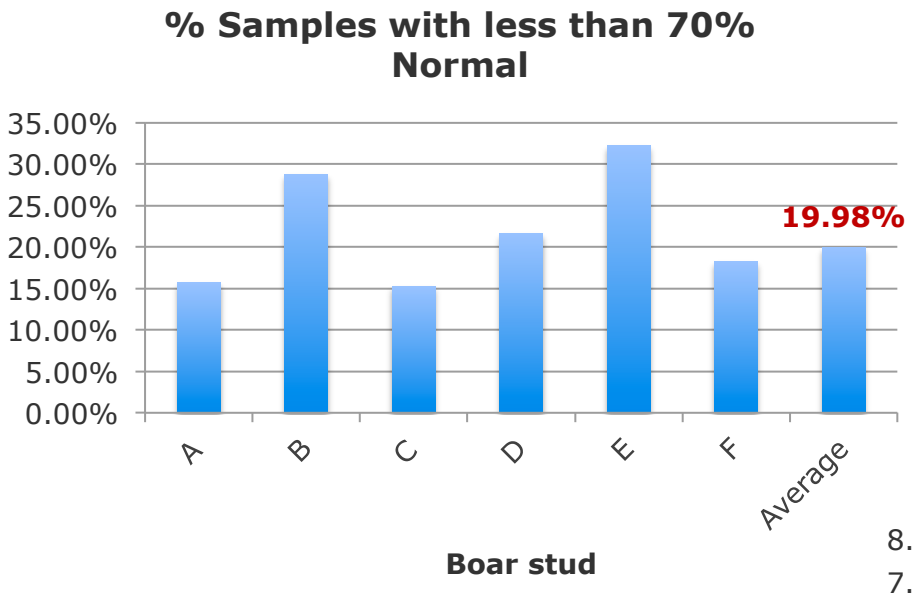
300	27	41	53	77
350	27	41	54	79
400	27	41	54	80
450	28	42	55	81
500	28	42	55	82
600	28	42	56	83
700	28	42	56	85
800	28	43	56	85
1,000	28	43	57	86
2,000	28	43	58	88
3,000	28	43	58	88
4,000	28	44	58	89

Current Monitor NAM Owned

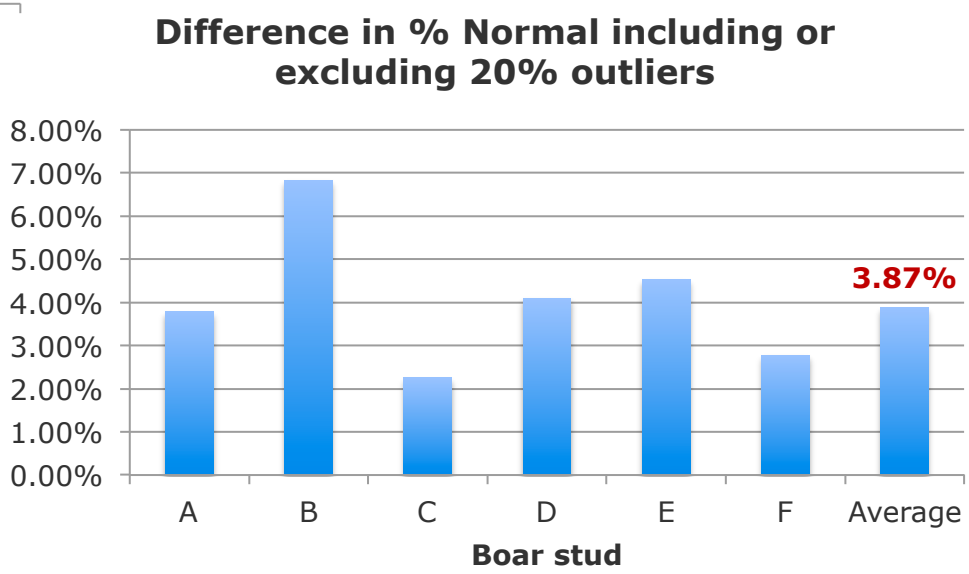
- No. samples (currently)
  - 12 semen samples/week:
    - 6 last week, busy days
    - 6 this week, busy days
  - Water and extender samples several batches
- Tests:
  - Motility (total, progressive)
  - Morphology (detailed)
  - No. total cells per dose
  - Microbiology (identification and susceptibility)
- Future:
  - Increase no. samples from 12 > 25/week
  - Motility loss per 24 hrs

Why Is Monitoring Important?

% Normal cells/dose (>70%)



Source: Monitor results



Source: Monitor results

Cost - Benefit

Morphology: effect of non compliance (calculated over all doses)	
Ejaculates <70% Normal sperm cells:	**20.00%**
Difference in average % Normal cells/dose	**5.00%**
Effect on FR -5% Normal cells (%)	**-0.50%**
Effect on LS -5% Normal cells (pigs)	**-0.10**

Monitor cost		
# semen samples/week		25
cost per semen sample	$	50
# water + extender samples/week		6
cost per water + extender sample	$	20
transport cost	$	100
semen monitoring cost/year	**$**	**76,000**

Boar stud	Reference-50	50	100	250	500
# doses/year	62,000	62,000	125,000	312,000	624,000
# sows ins/year	26,600	26,600	53,100	132,800	265,500
FR	87.00%	**86.50%**	**86.50%**	**86.50%**	**86.50%**
# sows farrowed/year	23,100	23,000	45,900	114,800	229,700
LS	14.50	**14.40**	**14.40**	**14.40**	**14.40**
# piglets/year	334,950	331,200	660,960	1,653,120	3,307,680
Opportunity loss ($ 43/pig)	**$ -**	**$ 161,250**	**$ 384,420**	**$ 930,090**	**$ 1,798,260**

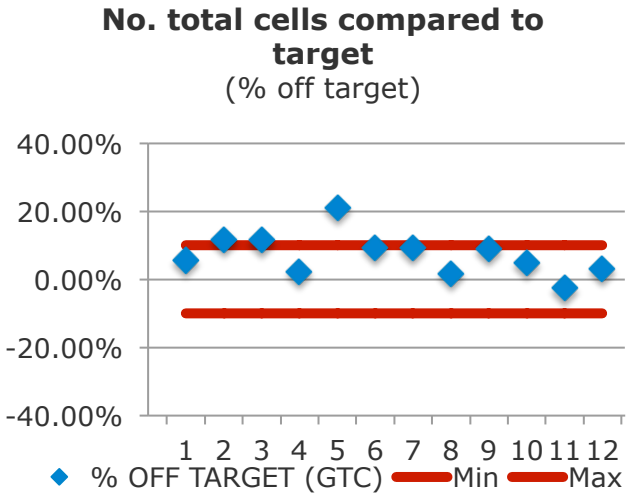
Examples- What We Can Learn From Monitoring

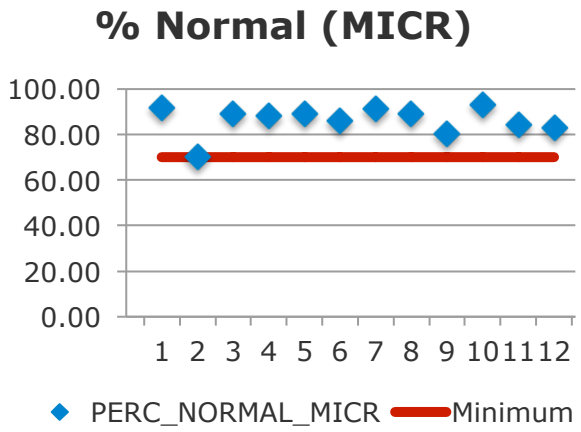
Jamie Hundley

PIC®

Examples

- Jamie Hundley will now present some practical examples





Four Areas Of Focus That Help Improve Product Quality

1. Focus on proper dilution of samples for evaluation

2. Check dose concentration compared to targets weekly

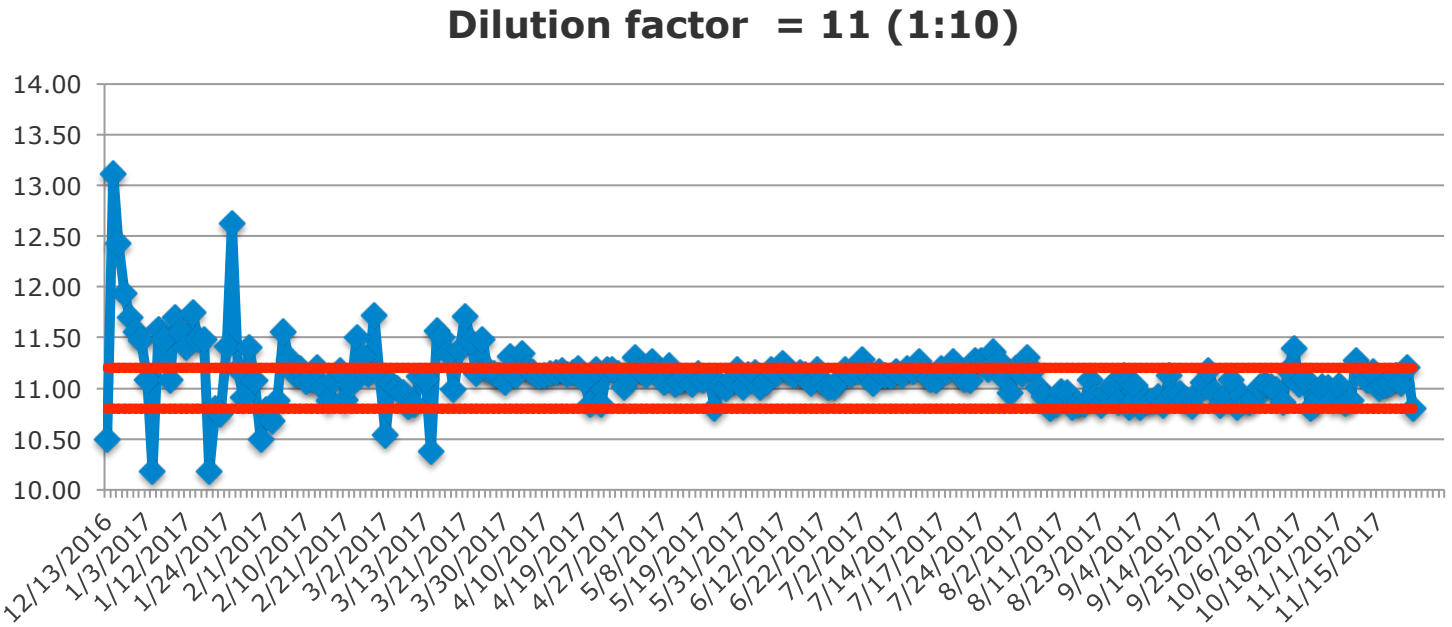
3. Lab staff training to make sure we are catching the morphology defects we should see with CASA

4. Set the cutoff for morphology in CASA high enough to allow for missed abnormalities

Importance of Validating Dispensing Volumes

Dilution before concentration measurement:

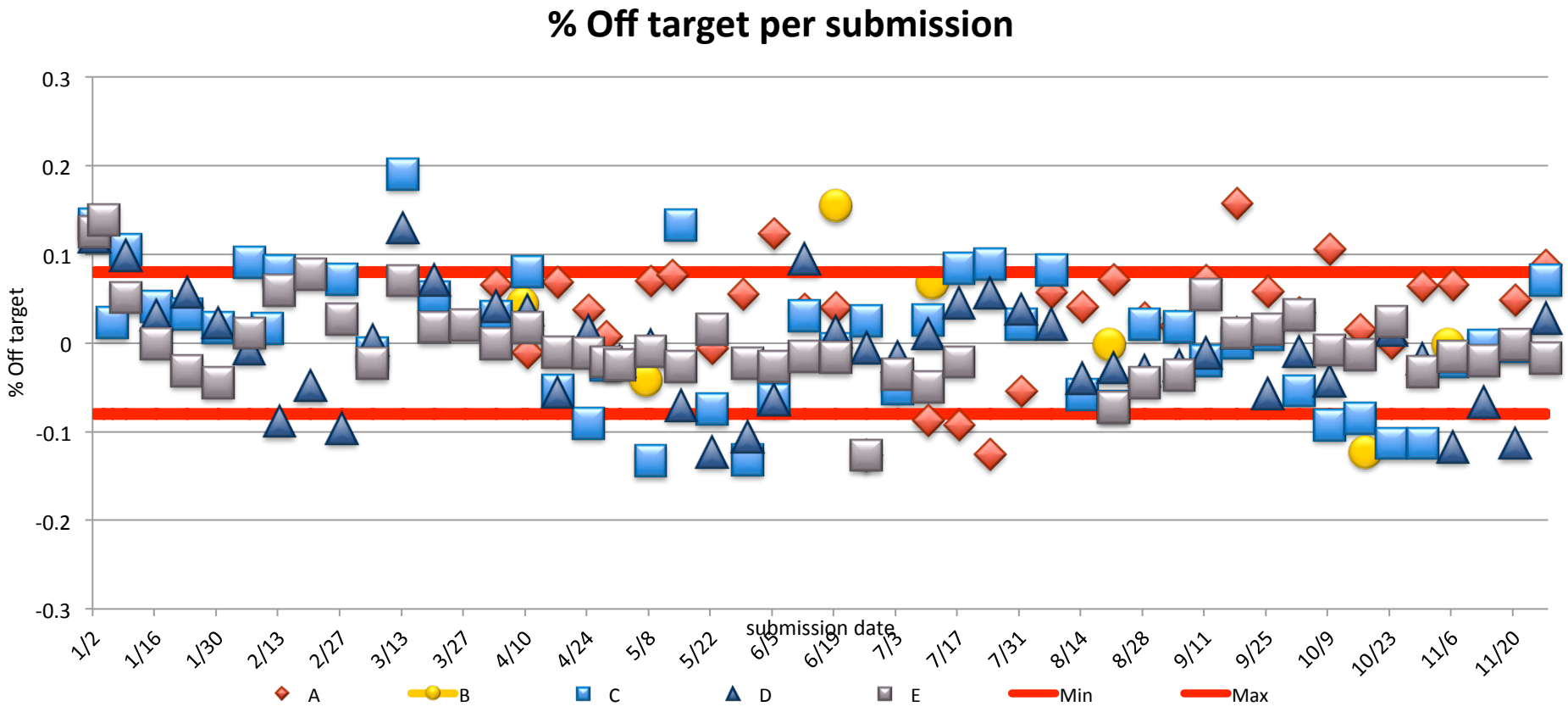
- We doubled the volumes (↓ random error)
- We followed instructions in the manual concerning service/ maintenance
- We checked dilution factor every day before production and followed up when problems were found



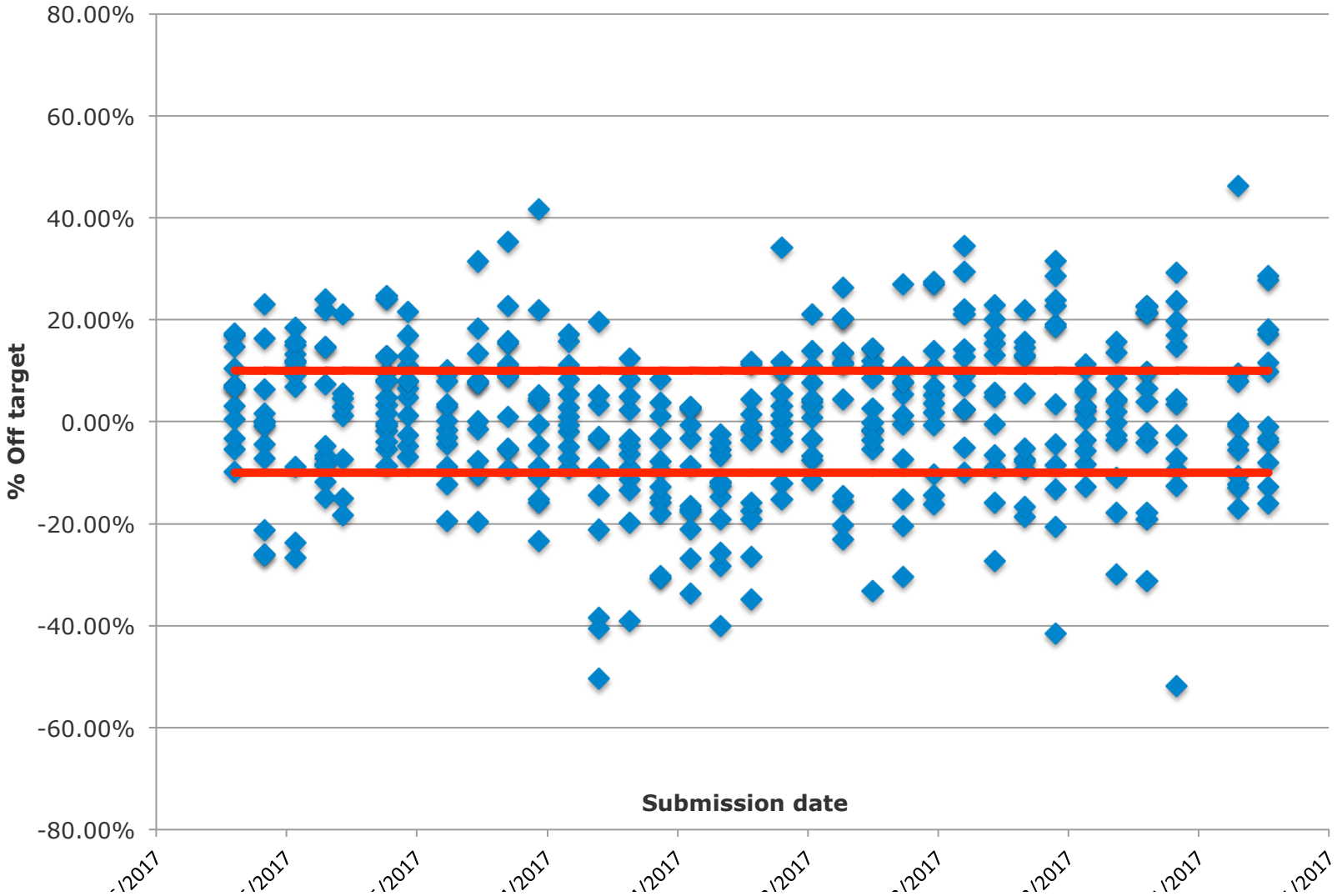
Weekly Concentration Checks

- We are testing doses from the two largest production days each week
- We look at:
  - Average cells per dose compared to target for all doses submitted (± 8% target)
  - Variation in individual doses compared to target with goal of > 95% of samples within 15% of target
- We are able to evaluate differences by boar stud and learn from each other

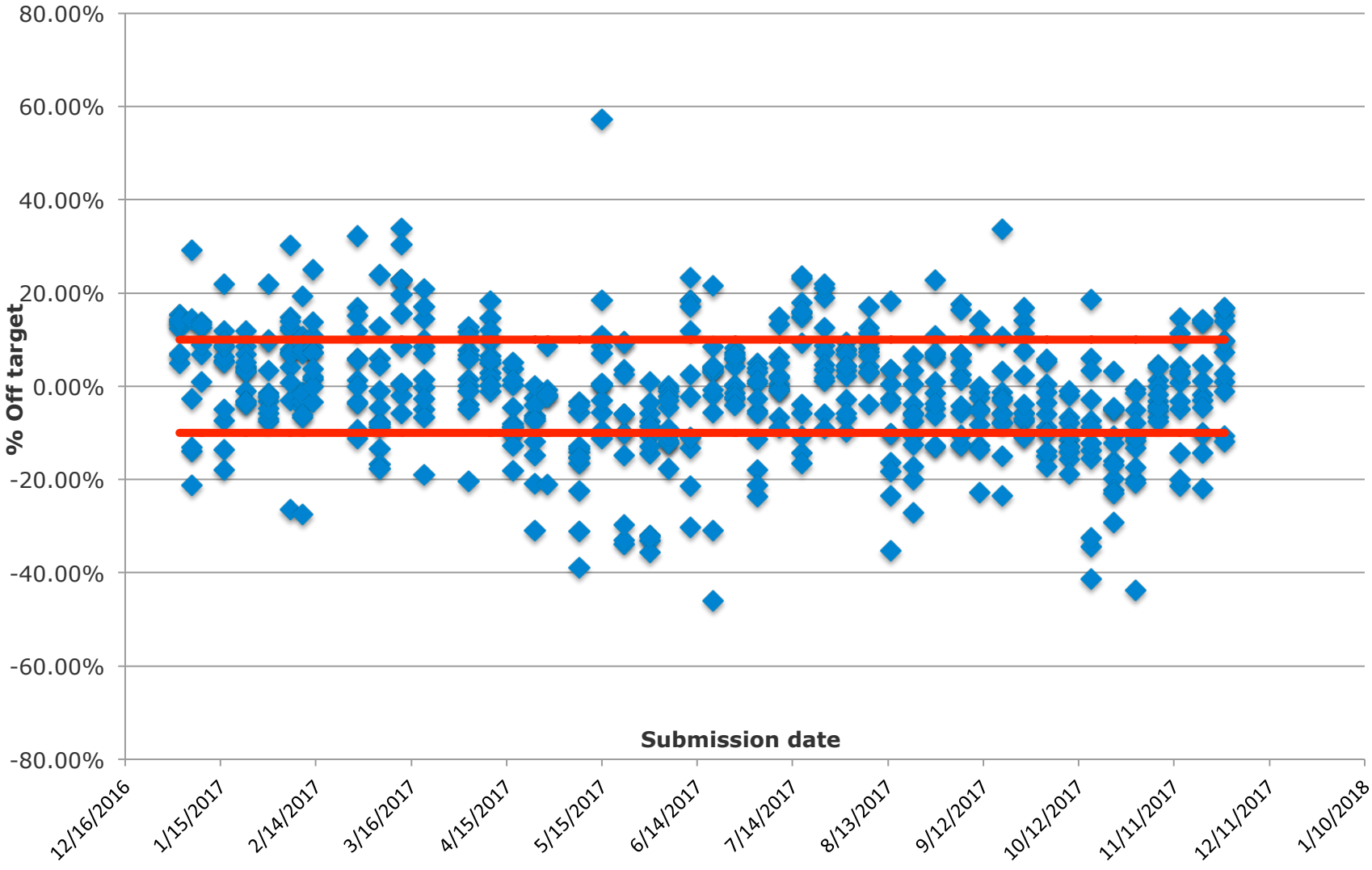
Cells Per Dose Compared To Target Average Per Submission - 5 Studs



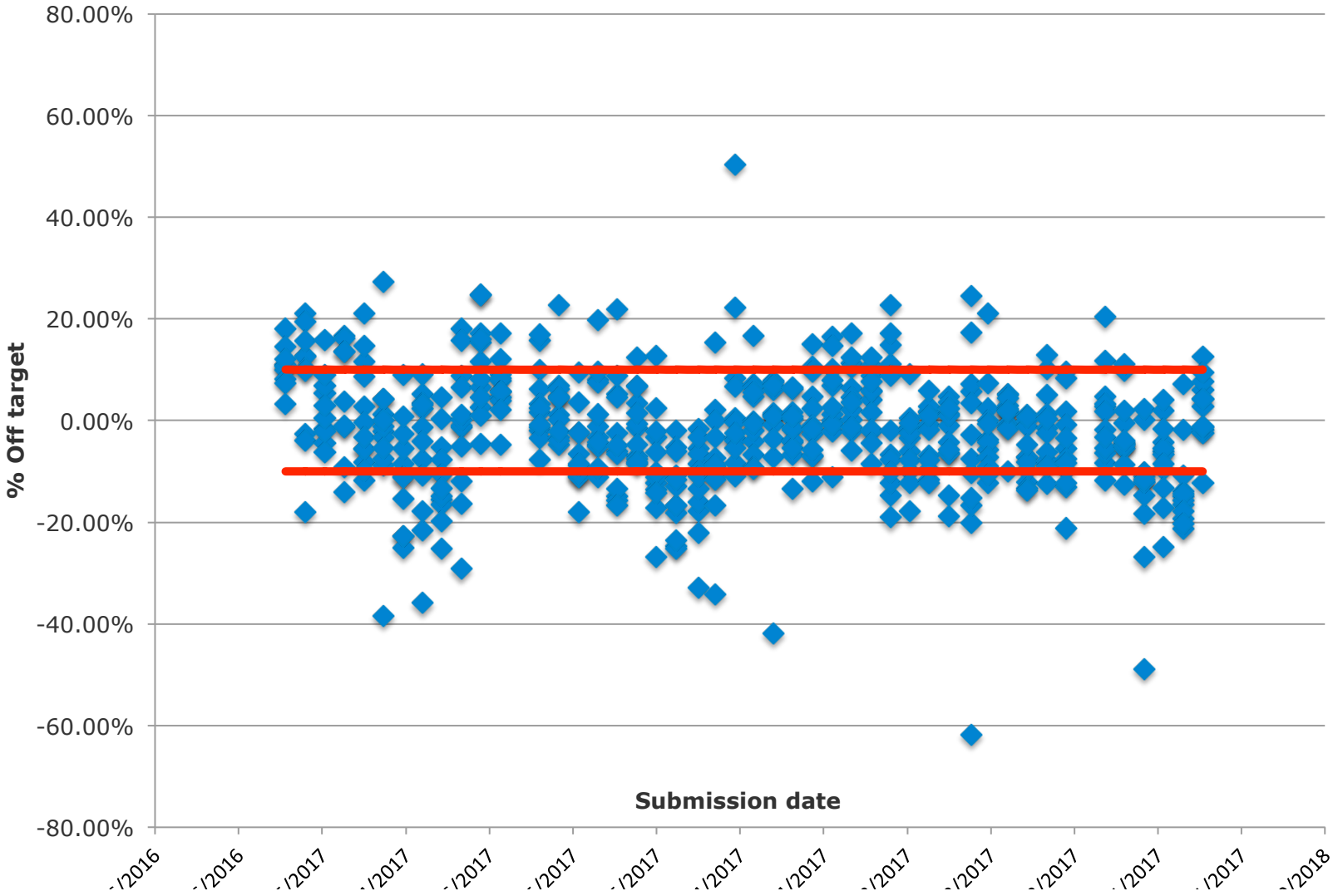
Stud 1 – Individual Doses Compared To Target



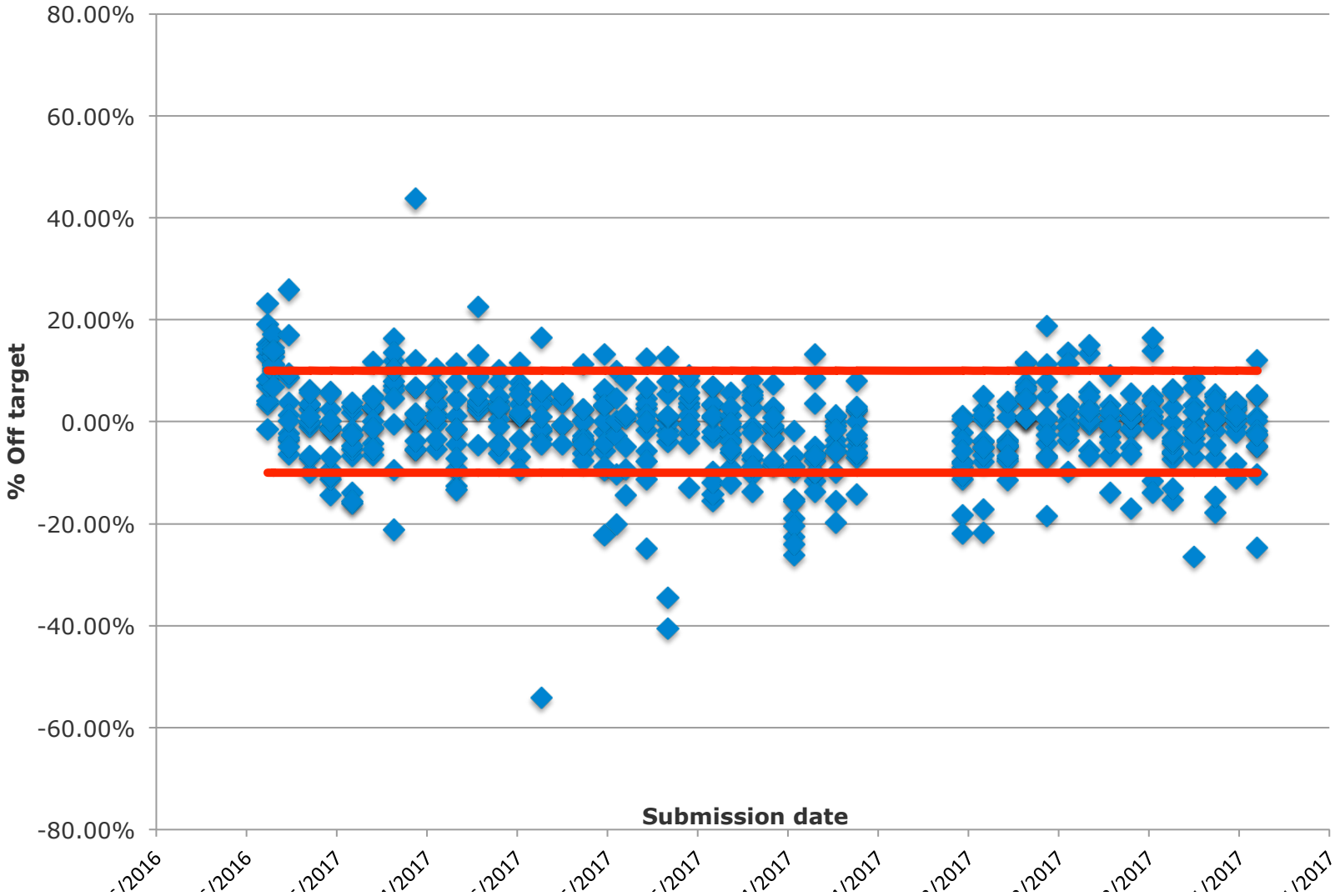
Stud 2 – Individual Doses Compared To Target



Stud 3 – Individual Doses Compared To Target

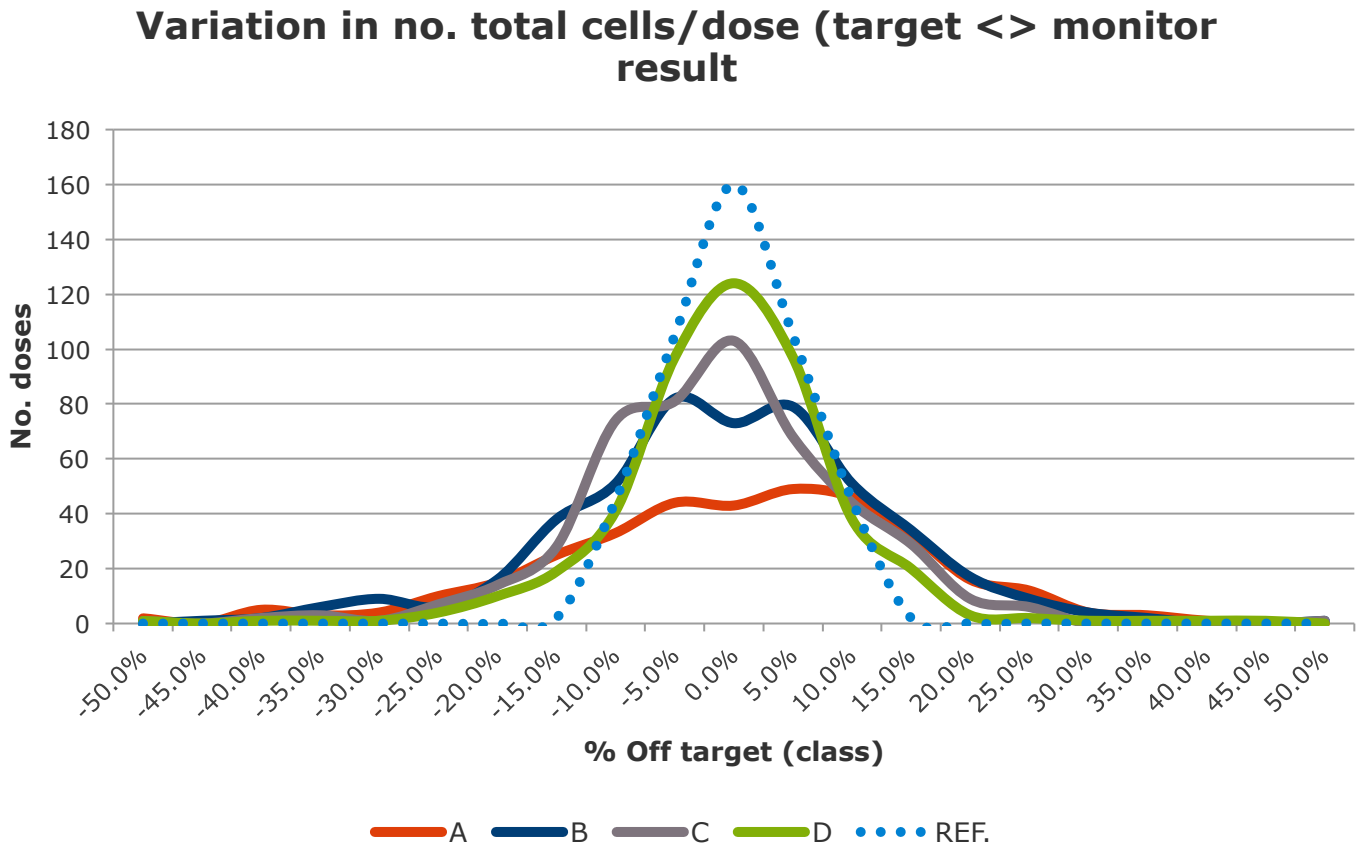


Stud 4 – Individual Doses Compared To Target



What We Learned Already

Variation in no. cells per dose (compared to target) is too large:



Morphology

- At line speed we miss some defects
  - Training for employees doing evaluation
  - Have staff look at archived images for samples that are under 70% normal at the 3rd party lab
  - Work with the vendor of the CASA system if the clarity isn't what it should be (proximal droplets can be hard to see)
- Fatigue can affect accuracy on large production days where one technician does the evaluation
- Evaluate differences by boar stud and learn from each other

Morphology Continued

1. Count defect on all cells and not just motile cells

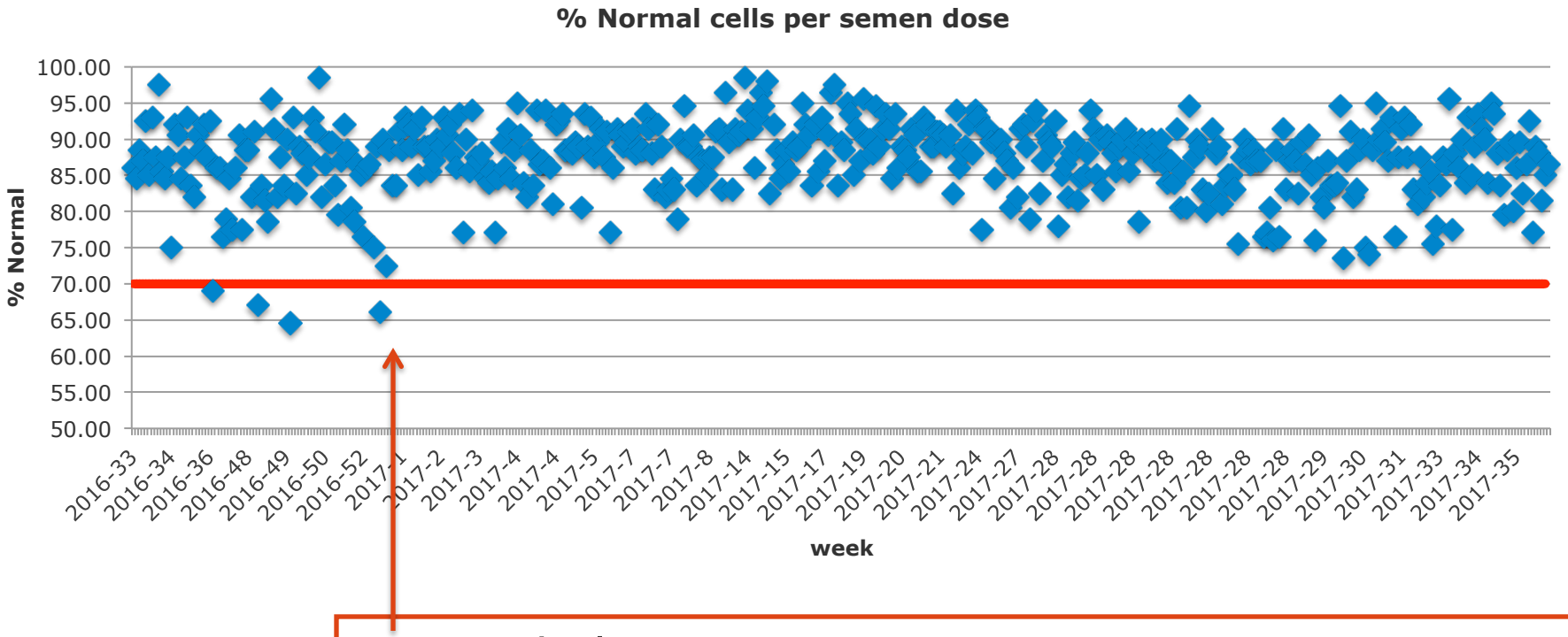
2. Set the cutoff for morphology at >= 80% normal knowing we are going to miss about 10% of defects on average with a CASA system compared to detailed morphology

- We won't pick up cells with damaged acrosomes with CASA

- We will likely miss some proximal droplets with CASA that can be picked up easier with stained samples for detailed morphology

What We Learned Already

No. abnormal cells often underestimated
(CASA vs full morphology)



- Morphology training
- Adjusting cut-off value 80% normal (CASA auto-morphology)

Questions?

Lunch

Hygiene in Semen Processing

Dr. Michael Kleve-Feld

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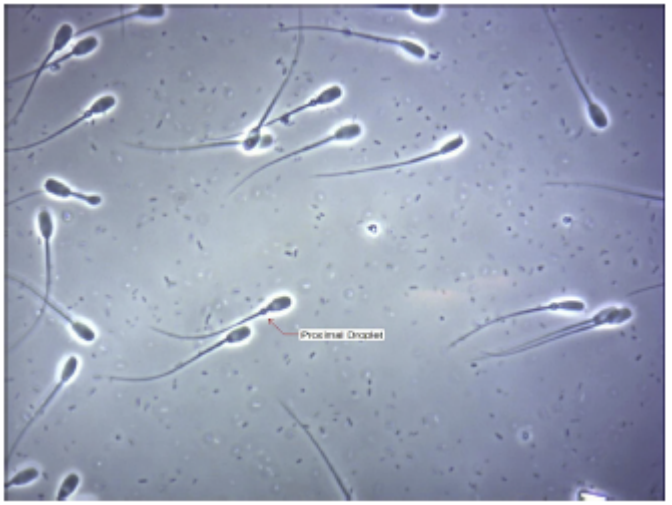
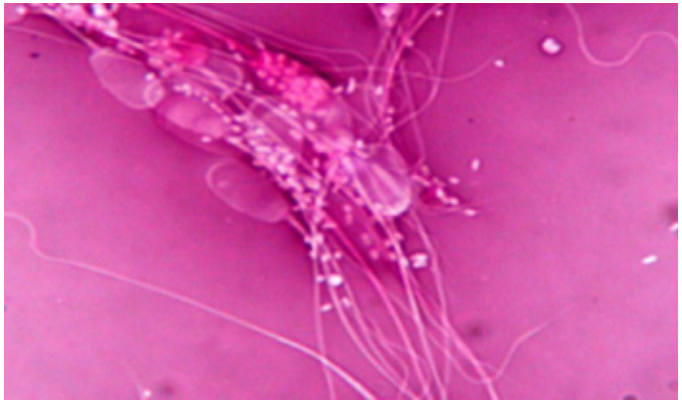
Outline

- Relevance
- Summarized Barn Actions
- HACCP + Examples
- Cleaning And Disinfection
- Summary

Bacterial contamination

- Lower sperm cell survival rate
- Reduced sperm motility (pH)
- Sperm cell agglutination/ clumping
- Reduced shelf life
- Discharge in the sow
- Reduced fertility





Around 15 – 30 % of semen doses are contaminated (Althouse 2008, Ubeda et al.

Bacterial Growth Dynamics

- Within 3 hours 1 bacteria multiplies to ~500*
- Within 3 hours 10 bacteria multiply to ~1,000,000,000*

*Example of E.coli under favorable growing conditions with 20min generation interval

Risk Assessment

Where to expect problematic bacterial contamination ???

Schulze et al., 2015*:

- Bacterial contamination in 24 German/Austrian AI studs
- 4.5 % similarity of bacteria detected in barn vs. lab

*Analysis of hygienic critical control points in boar semen production. Theriogenology 83 (2015) 430–437.

Barn Actions In A Nutshell

- Keep animal housing area dry + clean
- Keep animals clean (incl. trim preputial hair)
- Use of warm up pens (evacuate prepuce there)
- Thorough cleaning/disinfection of collection area
- Clean storage of all supplies for collection
- Emphasis on proper collection procedure

HACCPS – Critical Control Points

Table 4
The results of permutation tests for differences between score distributions per hygienic critical control points (HCCP) in two subsequent audits (1 and 2) in 21 artificial insemination boar studs.

HCCP	Audit	Frequency of score						Total	P value (simulation)	99% Confidence limits for P value		Number of studs		
		1	2	3	4	5	6			Lower	Upper	Improved	Unchanged	Worsened
Heating cabinets	1	0	1	2	5	9	1	18	0.0388	0.0338	0.0437	9	5	3
	2	0	4	4	5	4	0	17						
Ejaculate transfer	1	0	5	3	5	3	1	20	0.8871	0.8789	0.8953	7	4	9
	2	1	2	6	8	3	1	21						
Extenders	1	14	2	4	0	1	0	21	0.4990	0.4861	0.5119	3	16	2
	2	17	0	3	1	0	0	21						
Inner face of dilution tank lids	1	12	4	0	1	4	0	21	0.5955	0.5828	0.6082	6	13	2
	2	16	0	1	0	4	0	21						
Dyes	1	10	0	2	1	1	0	14	0.1234	0.1149	0.1319	4	10	0
	2	13	1	0	0	0	0	14						
Manual operating elements	1	0	2	6	9	3	1	21	0.0002	0	0.0006	16	4	1
	2	4	10	4	2	1	0	21						
Laboratory surfaces	1	6	3	5	4	2	1	21	0.5599	0.5471	0.5727	8	7	6
	2	6	2	9	4	0	0	21						
Ultrapure water treatment plants	1	15	1	4	0	1	0	21	0.4243	0.4115	0.4370	4	14	3
	2	18	0	2	1	0	0	21						
Sinks or drains	1	1	3	4	4	5	4	21	0.4071	0.3944	0.4197	11	2	8
	2	3	3	3	7	2	3	21						

Valuation code: $\leq 10^1$ CFU/mL or 1 CFU/cm^2 = 1, $\leq 10^2$ CFU/mL or 5 CFU/cm^2 = 2, $\leq 10^3$ CFU/mL or 45 CFU/cm^2 = 3, $\leq 10^4$ CFU/mL or 80 CFU/cm^2 = 4, $\leq 10^5$ CFU/mL or 100 CFU/cm^2 = 5, and $>10^5$ CFU/mL or 100 CFU/cm^2 = 6.
Abbreviation: CFU, colony-forming units.

"Analysis of hygienic critical control points in boar semen production"
M. Schulze et al., 2015

Hygiene Risk

- Transition dirty-clean area
- Warm temperature + humidity
- Water and extender in general
- Surfaces in touch with water, semen, extender
- “Hard to clean” areas

Heating Cabinets

- Warming of collection cups
- Situation: Temperature + barn bacteria
- Risk: Growing bacteria in cup/bag/filter cross contaminating collected ejaculates

- Avoid use of warming cabinets if not needed
- Clean and disinfect on regular basis
- Only place clean cups in cabinet

Pass Trough Window

heated

lab; grow

ejaculate

asy to

Extender Vat

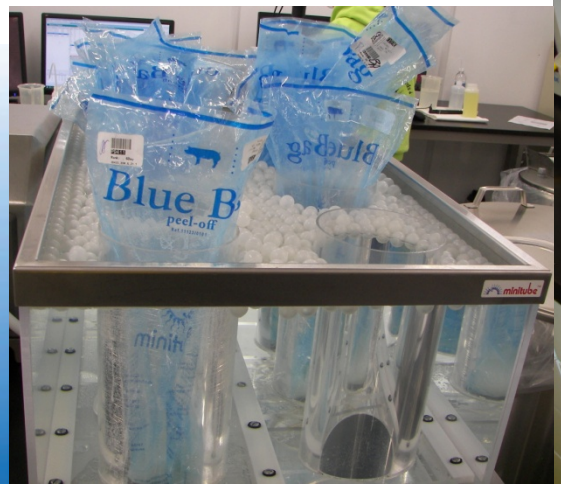
- Humidity, temperature, direct extender contact
- Risk: bacterial growth and extender contamination

- Use vat liners if possible
- Keep lid closed
- Daily cleaning and disinfection
- Mixing only with sterile tools
- Wrap vat liner around hose

Water Bath

- Keep extender, semen for pooling on temperature
- Humidity; temperature
- Risks: grow and spread bacteria; cross contamination

- Avoid water bath; use “dry water bath” or warming plates as possible
- Emphasis on regular cleaning and disinfection



"Direct Contact Material"

- Material/supplies in direct touch with extender/ ejaculate (pitchers, hoses,…)
- Risk: Frequent and/or big surface exposure; high probability of cross-contaminating semen

- Use disposables as far as possible
- Regular cleaning and disinfection/sterilization schedule

Semen Filling

- Transfer extended semen in tubes/blisters
- Risks: Cross contamination of ejaculates trc hoses; contaminated tubes
- Change hoses after every batch
- Sterilize hoses after every use
- Store hoses and semen tubes dry and clear

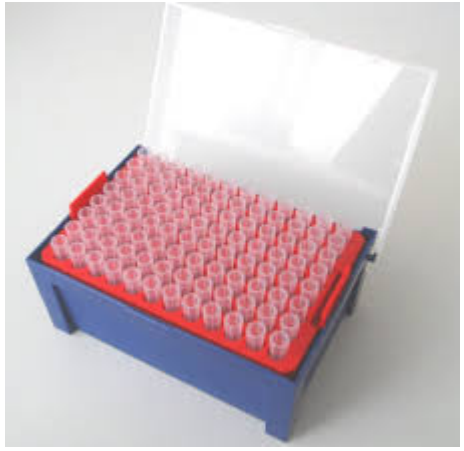
Sinks and Drains

- For cleaning purposes
- Risk: Hard to clean; humidity; optimum bacterial reservoir
- No drains if possible
- No extender/ejaculate disposal in sinks!
- Separate wet kitchen for cleaning to visit after production
- Regular disinfection of sinks/drains

It´s in your hands

- Hands as major vector for bacteria
- Risk: contamination by touching things in touch with semen

- Wash and disinfect hands prior entering barn/lab
- Do not directly touch material in touch with semen



Water

- Major ingredient of every semen dose
- Risk: Biofilm building, challenging to clean
- Use clean source water
- Use of micro-filters (0.1/0.2 micron)
- UV light exposure close to tap point
- ≥4x/yr sanitation according to manufacturers input
- Regular replacement of filters/UV-light-source
- Keep tap point/hose clean
- Flush water in the hose/pipes before pouring into vat

Cleaning and Disinfection

1. Remove organic material
2. Clean with detergent (soaking)
3. Scrub surface to detach organic matter
4. Rinse to remove detergent, grease, proteins
5. **Dry**
6. Disinfect or sterilize
7. Clean/disinfect or replace materials after each usage

Attention to proper use of detergent/disinfectant

Cleaning/Disinfection Schedule

Where	What	Daily	2x weekly	Weekly	Monthly	Quaterly	Procedure no.	Product	who
Laboratory	Floor-sweep-mop			X					professional
Laboratory	Anti fatigue mats			X					professional
Laboratory	Ceiling-Walls rotational (1 part every week)-vents - door				X				professional
Laboratory	Pass through windows: ceiling walls bottom and windows (except barn side)			X					professional
Laboratory	Reception window		X						Barn staff
Laboratory	Countertops + aisle		X						lab staff
Laboratory	Cabinet doors and drawer fronts			X					professional
Laboratory	Cabinets inside						X		Lab-staff
Laboratory	Specific lab equipment-machines-materials		X						Lab staff
	- Autodiluter		X						Lab staff
	- Microscope		X						Lab staff
	- Scales		X						Lab staff
	- Autodispensers		X						Lab staff
	- SPS-11		X						Lab staff
	- Conductivity meter		X						Lab staff
	- Heat sterilizer				X				Lab staff
	- 100 liter extender vats		X						Lab staff
	- Extender vat scales/underneath					2X			Lab staff
	- Manual Sealer		X						Lab staff
	- Dish washer				X				Lab staff
	- MOFA storage cabinet				X				Lab staff
	- Refrigerator				X				Lab staff
Laboratory	Underneath equipment and machines (describe in procedure)				X				Lab staff
Laboratory	Office type equipment-machines (computer/keyboard/telephone/copier)			X					professional
Laboratory	Stools/chairs			X					professional
Laboratory	Glass and plastic ware / pitchers / lids (non disposables)		X						lab staff
Laboratory	Sinks		X						Lab staff
Laboratory	Trash cans (small)		X	X					Lab staff
Laboratory	Clean and disinfect racks			X		X			Lab staff
Laboratory	Clean and disinfect carts				X	X			professional
Other rooms	Cool room			X					professional
Other rooms	Shipping room			X					professional
Other rooms	RO-water production system-room (floor and whatever is realistic to clean)			X					professional
Other rooms	Hallway from lab towards the break room			X					professional
Other rooms	Showers				X				professional
Other rooms	Rest rooms				X				professional
Other rooms	Break room				3X				professional
Other rooms	Entry hall-bench (dirty side)					X			staff
Other rooms	Clean Break room Refrigerator					X			staff
Other rooms	RO-water production system					X			Water professional

Monitoring System

- Define testing scheme (what/when/how/)
- Define max. limits and intervention
- Control of critical points (Preventive)
  - Internal or external (plating counts)
  - Water/Extender
  - Hoses, material in touch with semen
  - Surfaces, pass trough,…
- End product control (Reactive)
  - Normally external
  - Sampling of final semen dose

Summary

- Bacterial contamination as major threat
- Define and control HACCPs
- Focus on humid, warm, tough to clean areas
- Develop cleaning+disinfection and monitoring plan
- **Target: 0 bacteria found in semen doses by end of shelf-life**

Panel

Break

What PIC Can Do For You

Dr. Michael Kleve-Feld

NEVER STOP IMPROVING

PIC®

Outline

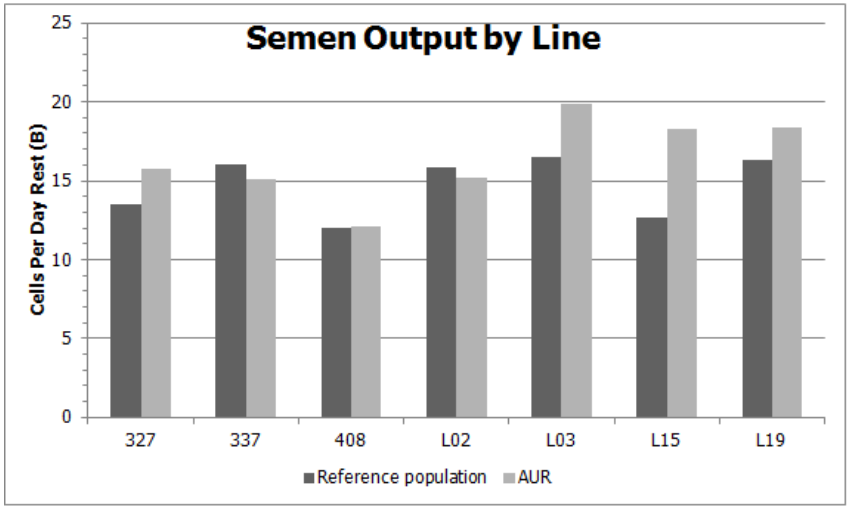
- Semen EBVs
- Benchmarking
- Manual and Protocols
- Technical Services

Semen EBVs

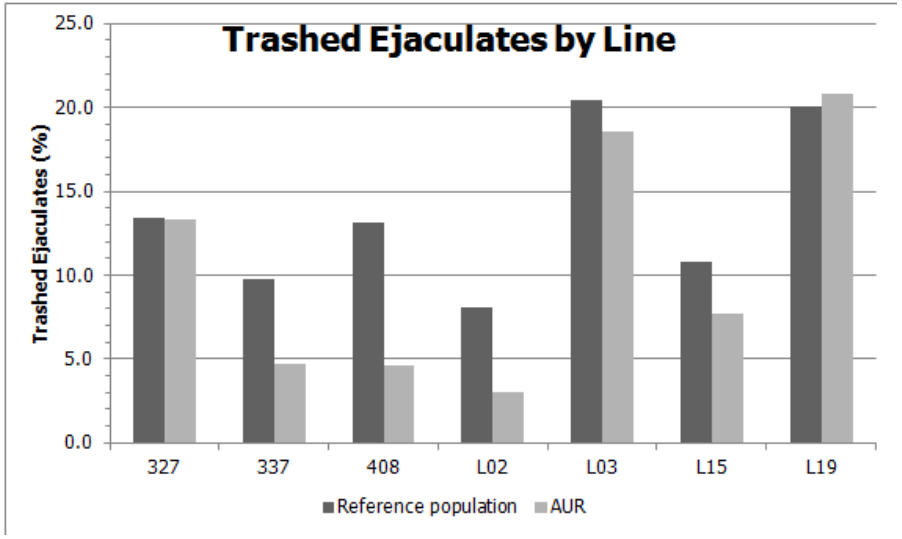
- Collection of semen quality data from multiple studs mainly in America and Europe
- Includes semen output, motility and morphology
- Data used for implementation in global selection objectives for all pure line boars
- Heritability low to moderate
  - Motility 0.07-0.18
  - Morphology 0.13-0.29

Boar Stud League List

- Benchmarking option for PIC studs
- Comparison against reference population
- Semen output and quality parameters
- Currently 21 contributing studs (~10,000 boars)



Compares your population with reference population at same age



New Boar Stud Manual

Special features:

- More details/instructions
- Reference tables
- Extended QA/QC section
- QR codes to supporting material

Technical Services

Service offer:

- Production visits
- Staff training sessions
- Trouble shooting
- Support QA/QC program setup
- Customized technical material

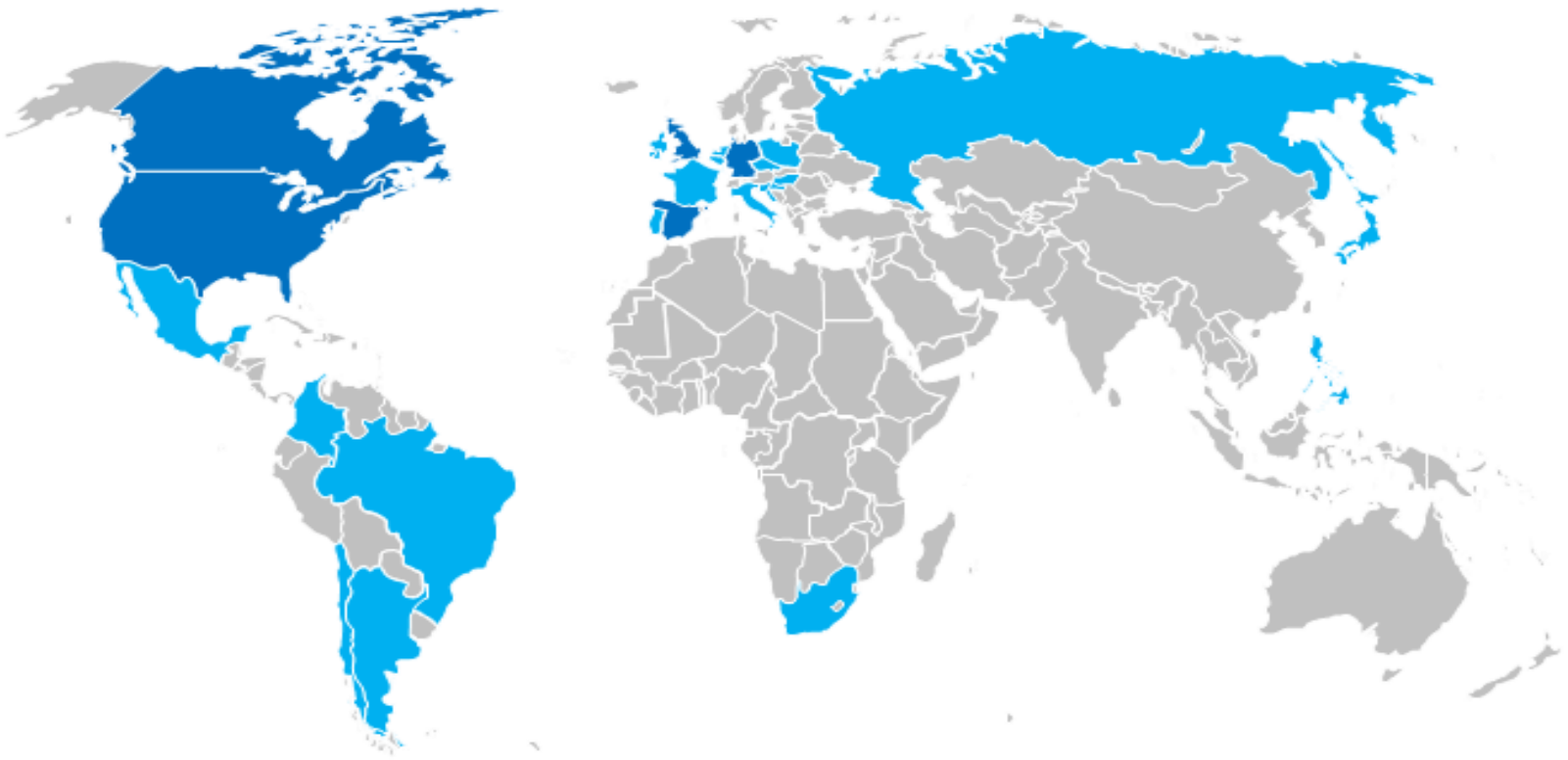
Sow Services

PIC®

Overview

- PIC GTS Reproduction team
- Supporting our customers
- Information and Materials
- PICpro100
- System review
- Take Home Messages

PIC GTS Reproduction Team



Demographics

12 people; 8 nationalities;
6 languages

Depth & Breadth

Global reach: 20+ countries

1.2m sows and 15k boars in stud

Supporting Our Customers

- **Strong ties to regions & teams**
  - Global experts helping to support regional initiatives, bigger projects and develop new information
  - Strong local support in all regions
  - General management recomedations
  - Alignment and interaction with other PIC teams

- **General goal** – Help our customers to succeed with product differentiation at commercial farms
  - Improving productivity and profitability
  - Support SC and Multipliers

Operational Structure

- **Repro innovation** - Find/evaluate/ prove anything that can be considered cutting edge.
  - Testicular ultrasound project run by German research entity.

- **Sow strategies** – Look for strategies to make our customers' sow farms more competitive.
  - Management improvement with solid foundation.

- **Process improvement**
  - Drop costly/inefficient processes after evaluation.
  - Uniformity/consistency of the message.
  - Interaction with other teams.
  - Systematize attendance to industry events.

Supporting Our Customers: Our Approach

- **Direct:**
  - Individual: Farm visits.
  - Team: System reviews.

- **Indirect:**
  - Materials and tool development.
  - Remote review: PICpro100; performance data.
  - Larger audiences: Road Shows & Boot Camps.
  - Professional conferences.
  - Allied industry events.
  - Interaction with research entities.

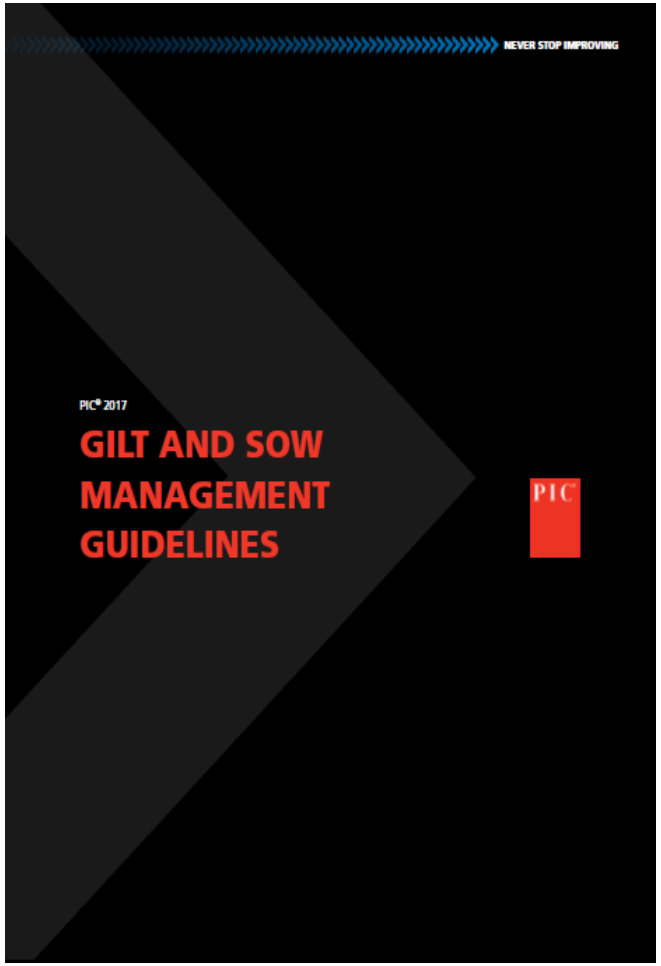
Supporting Our Customers: What We Do

- **Specific areas of expertise:**
  - Gilt management.
  - Stockings.
  - AI strategies.
  - PWM control.
  - Boar studs review and management
  - Group housing.
  - Batch farrowing.
  - Cost review.
  - General process improvement.

Information and Materials

- **Focus on the basics first** – *"Mints on the pillow don't mean a lot if the bed is not made".*
- **Revisiting PWM control** – Information to be shared soon:
  - Drying agents (ppt).
  - Heat mats (ppt).
  - Feeding lactating sows (AASV 2018 and poster).
  - Practicalities of delivering colostrum (ppt).
- **Sow longevity** – Information being updated and launched at the NA roadshow

Sow Management Guidelines



- **Audience**
  - Global customers and PIC people.
  - User focused: Short texts and made information easy to be found.
- **Available** – At www.pic.com.
- **Versions** - English (Imperial & metrics) and Spanish.
- **Future updates** - Will be made on individual sections.

PICpro100 Quick Facts

- **A PIC tool** – An algorithm that qualifies production processes in sow farms through scores
  - 4 areas: GDU, B&G, Farrowing and Throughput
  - Based on 23 questions
  - The higher the score, the closer to our gold standard practices (r^2=0.74 with PSY)

- **Goals**
  - DIY model: Customer provide answers.
  - Focus: Identify areas of opportunity, leaving us more time to spend on interventions/solutions.
  - Non-specialists
  - Do not provide solutions

PICpro100 Outcome

Global Technical Services

PICpro100 – Happy Pig
September-2017

Introduction

PICpro100 is an algorithm developed by PIC that assigns a score to 23 production practices most associated with high sow herd performance, by comparing them against accepted management practices.

Score explanation

- ≥ 80: The execution of the management strategies has put this input close to what is considered the best in class.
- 70 to 79: This input requires some fine tuning in management.
- 60 to 69: Key areas need to be reviewed to improve.
- < 60: A close review of the input is needed to better understand where the limitations are and how to overcome those limitations.
- NA: not applicable.
- Out of range: entered value is above or below logical range.

Average score by area

GDU	95	B&G	89	FW	95	THROUGHPUT	55	Composite Score	80

Detailed scores

		Management Practices	Your Score	Region Score	Global Score
GDU	1	Number of gilts mated per week (average for the last 13 weeks)	100	60	66
	2	Average daily feed usage 3 weeks prior to first breeding (lb/gilt/day)	100	83	86
	3	Lifetime average daily gain (lb/day from birth to first breeding)	80	76	78
	4	Average annual replacement rate (%)	100	89	89
BREEDING	5	Sows bred within 7 days after weaning (%)	100	84	82
	6	Time between movements to service (min). If no movement, answer is "0"	100	92	91
	7	Average feed usage during WSI (lb/sow/day)	100	83	89
	8	Annual gestation feed usage per sow (lb/sow/year) (do not include feed used in open gilt pool)	70	46	45
	9	Females moved during breeding process (in-between services), and/or within 24 hours after last service, and/or 5 to 28 days after last service (% of the total breeds of the month/week)	70	92	93
	10	Semen deliveries per week (number of days)	100	92	94
	11	Semen storage temperature out of range (<16C/61F or >18C/64F) during last 4 weeks (% of total readings). Answer 100% if you don't record at all.	80	89	83
	12	Percentage of services with considerable semen backflow (%)	100	93	90
	13	Use of 2+ boars in a row while breeding, YES/NO (conventional AI only). Answer NA if Not Applicable	NA	64	48
	14	Percentage of sows with inner rod passage success (%) (PCAI only). Answer NA if Not Applicable	100	74	58
	15	Fall-out rate from conception to farrowing (%)	70	59	63

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		Management Practices	Your Score	Region Score	Global Score
FW	16	Sows monitored while staff is on farm (%)	100	80	86
	17	Percentage of litters dried off while the staff is on farm (%)	100	54	66
	18	Annual lactation feed usage per sow (lb/sow/year)	80	22	27
	19	Piglet conversion (%)	100	65	72
THROUGHPUT	20	Average number of breeding per week or batch (#)	100	81	86
	21	Total number of weeks or batches achieving breeding target (#)	40	60	72
	22	Average number of weaned pigs per week or batch (#)	80	47	48
	23	Average number of sows farrowed per week or batch (#)	0	70	75

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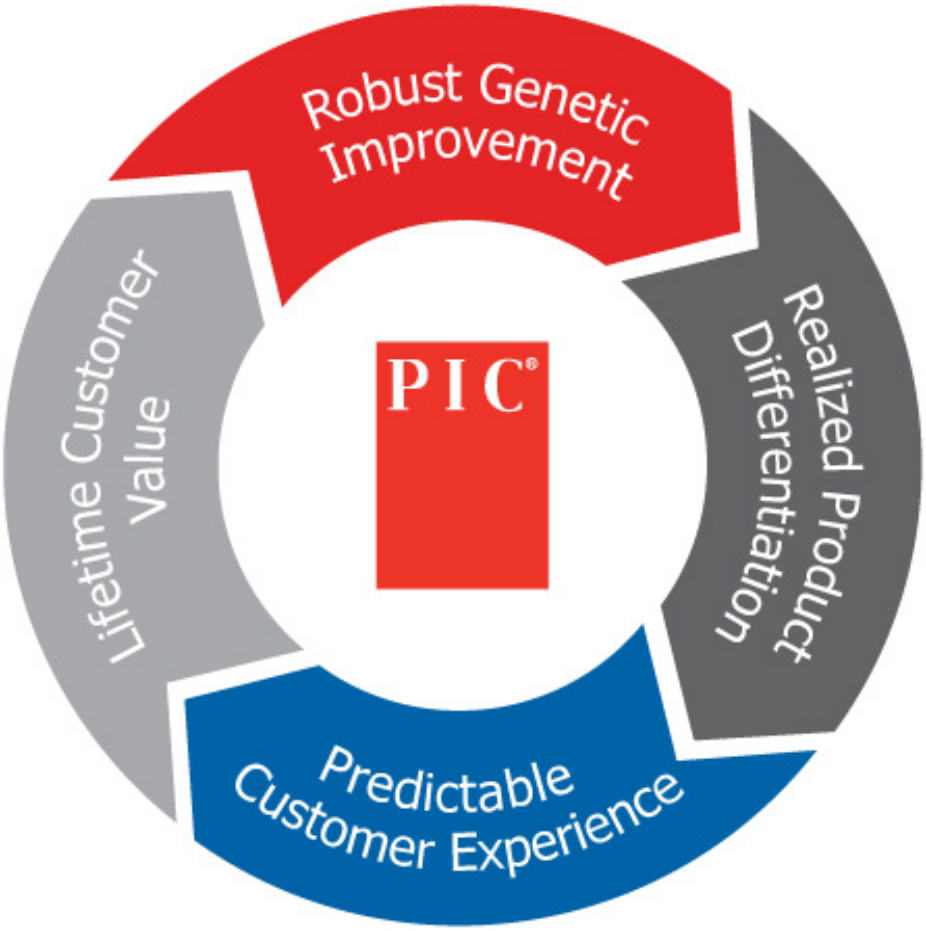

“Thank you”

Q&A

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