What is up with increasing

Female Death Loss?

What are you going to do about it?

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Presentation: 8-24-2017

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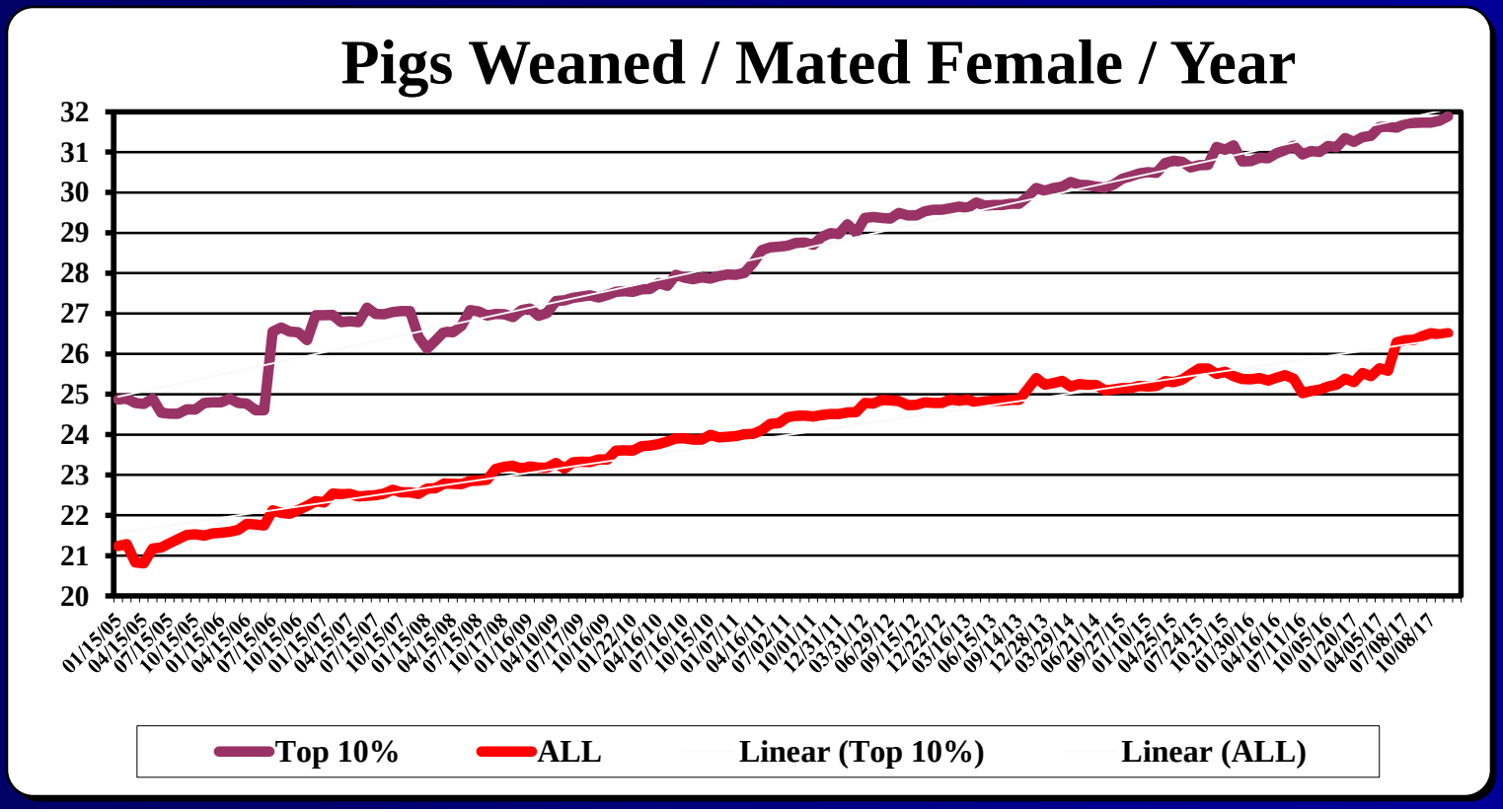
What type data makes up the SMS data base?

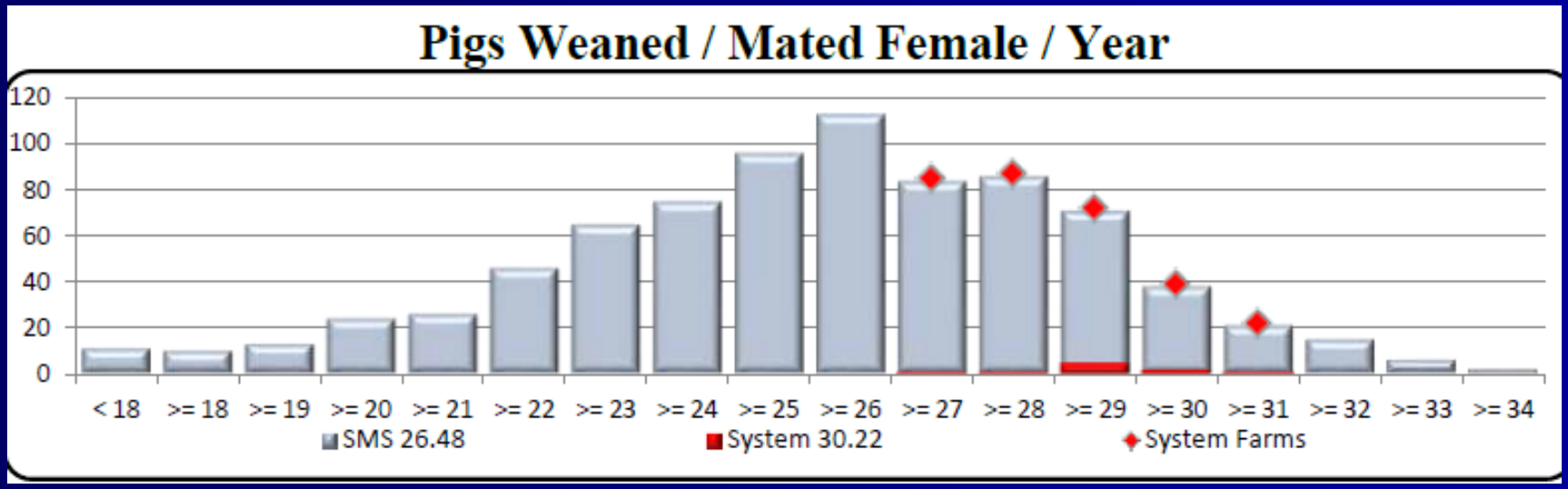
- Data from most major Genetic Companies
- Farms in US and Canada (China and Philippines)
- Stared in 2005
- Farms size 125 to 11,000+ sows
- 900+ Farms with 1.6+ million sows (average 1,700+ sows)
- Mostly independent pork producers
- 11+ different Genetic companies
- 6 Genetic Companies with 50+ farms

13 Year Trend line In the SMS Data Set

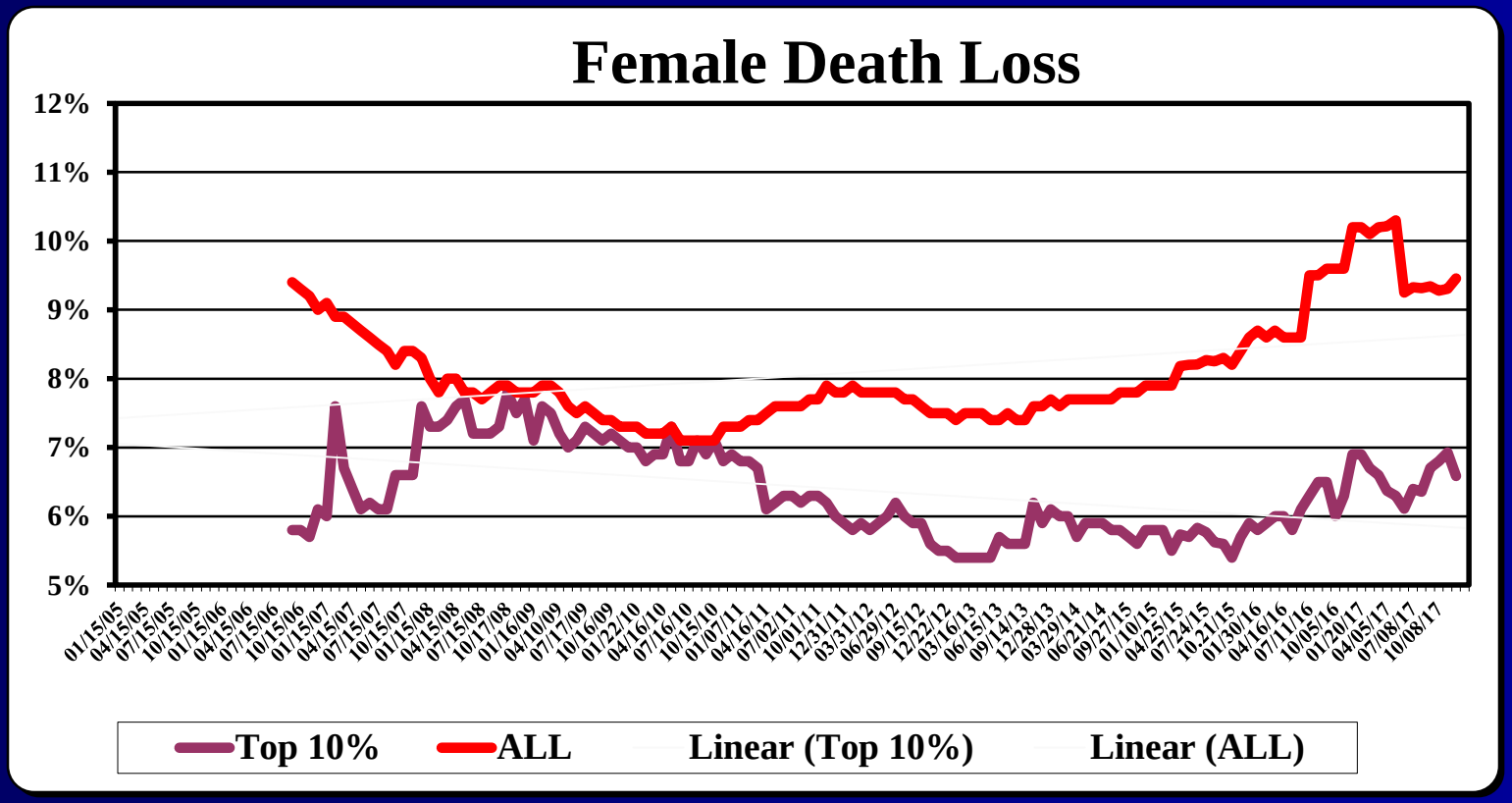


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Diff
10%	24.72	25.67	26.92	26.77	27.33	27.80	28.60	29.29	30.12	30.47	30.77	31.25	31.73	+7.01
All	21.28	21.92	22.52	22.94	23.33	23.84	24.31	24.75	25.26	25.21	25.40	25.33	26.44	+5.16

Distribution of SMS data Base

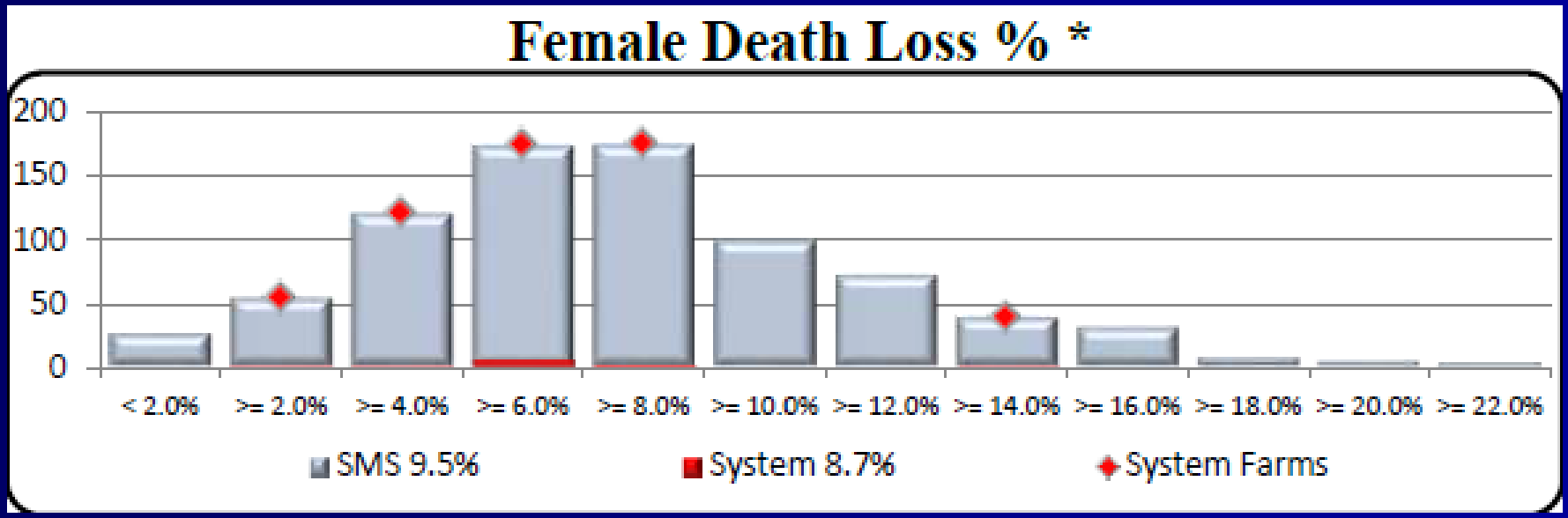


13 Year Trend line In the SMS Data Set



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Diff
10%	NA	5.9%	6.6%	7.4%	7.2%	6.9%	6.3%	5.8%	6.1%	5.8%	5.9%	7.0%	6.8	-0.90
All	NA	9.2%	8.6%	7.9%	7.6%	7.2%	7.6%	7.7%	7.6%	7.9%	8.6%	10.2	9.4	+0.2

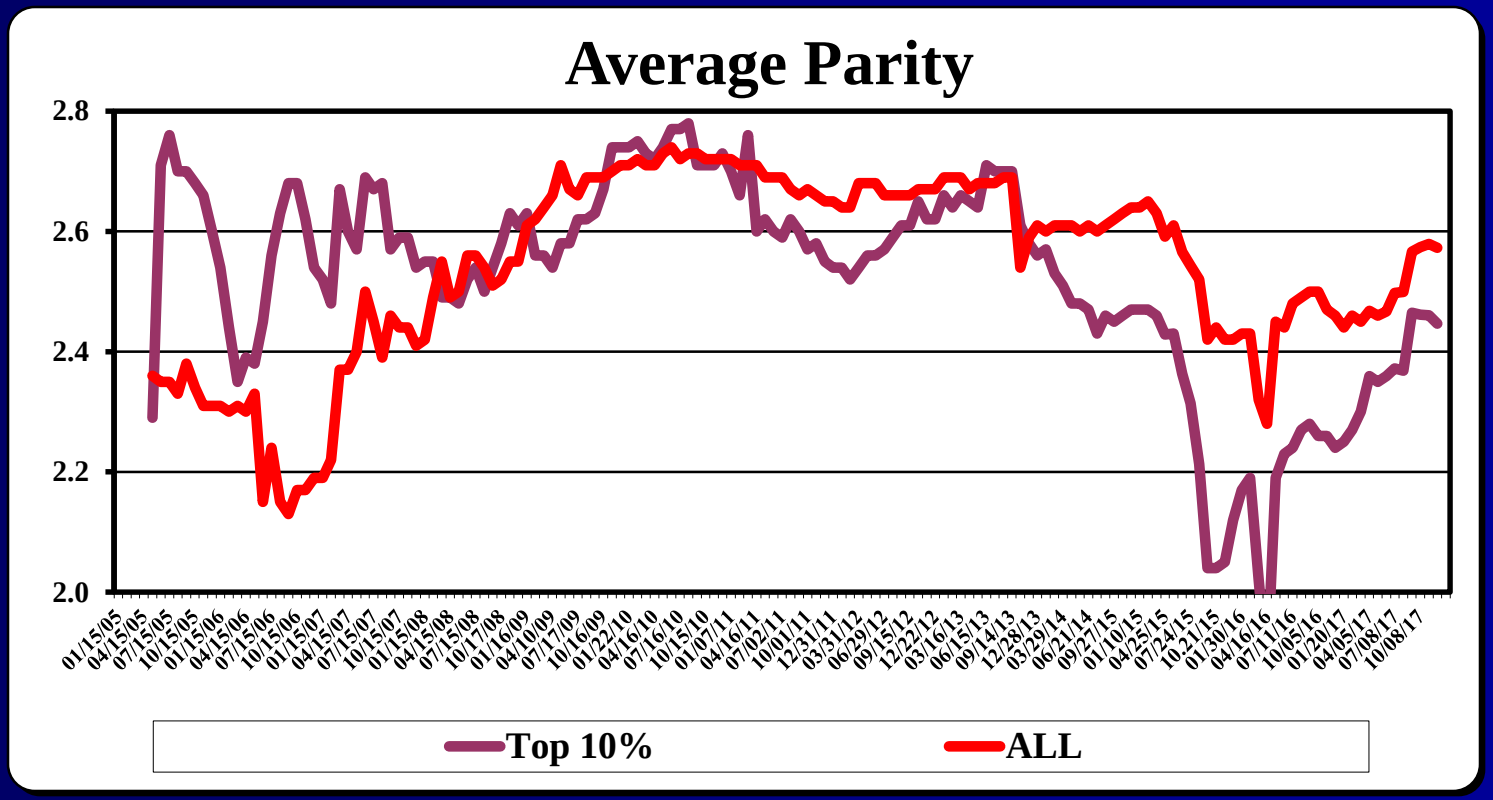
52 Weeks Distribution in SMS Data Set



- 23% of sows farms had female death loss of 12+%

- For each 1% change in females death loss pigs weaned per mated female changes by 0.25 pigs. Example: 4% = 1 pig per sow

13 Year Trend line In the SMS Data Set

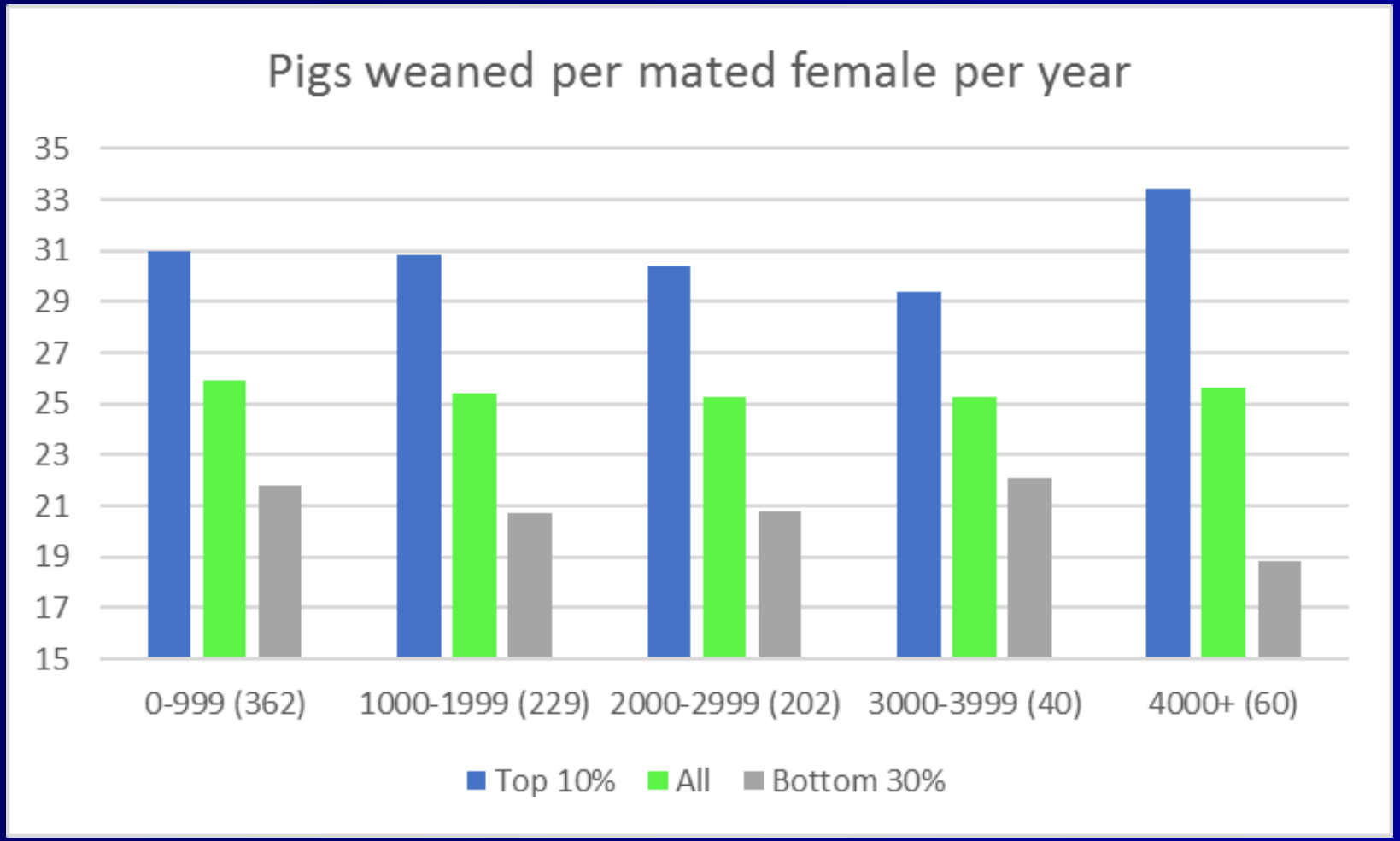


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Diff
10%	2.64	2.52	2.60	2.54	2.62	2.74	2.61	2.58	2.57	2.48	2.40	2.25	2.46	-0.18
All	2.34	2.23	2.39	2.52	2.67	2.72	2.68	2.66	2.60	2.64	2.60	2.44	2.56	+0.2

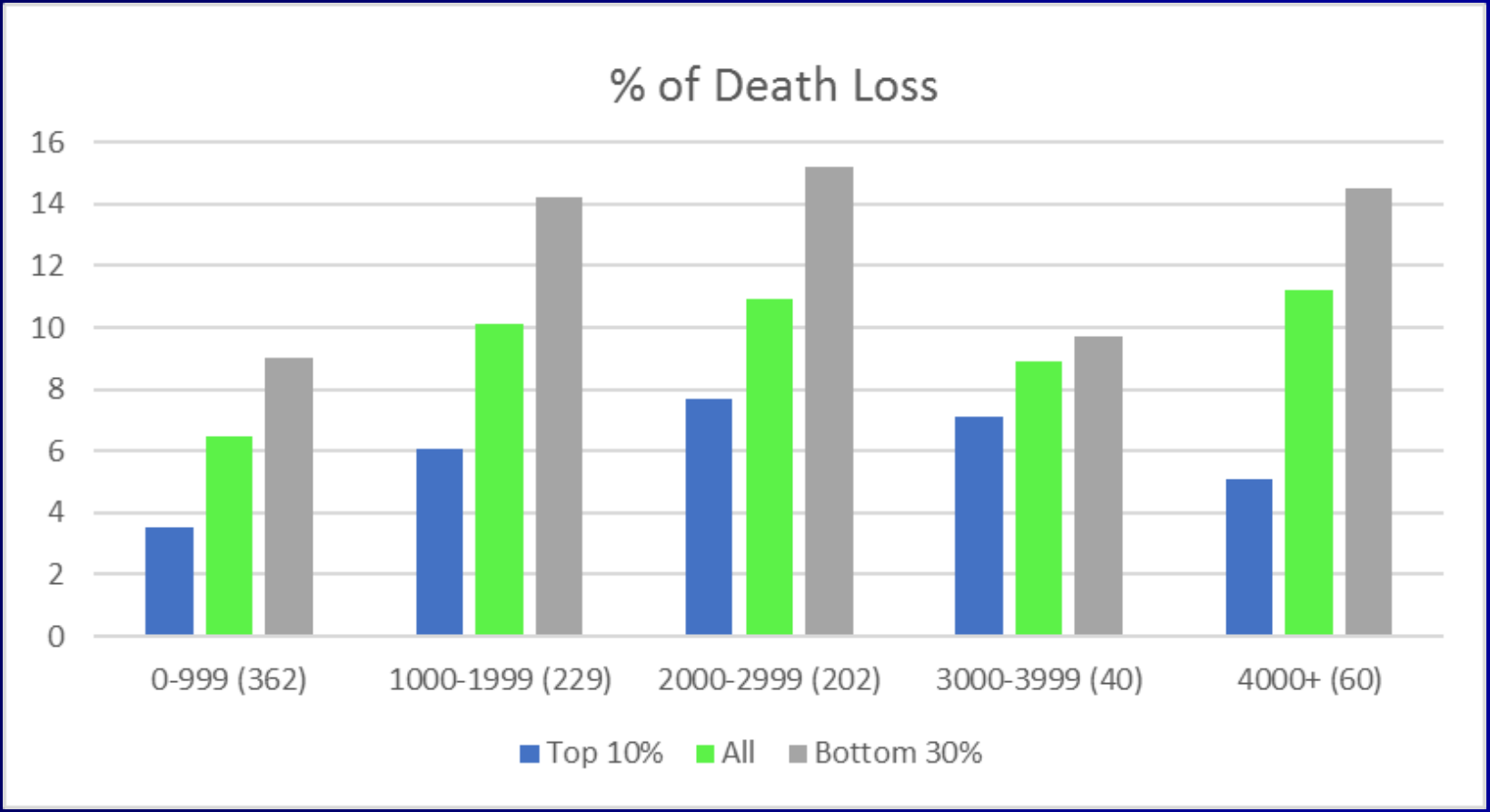
Breakout of SMS Data Set by Size of Farm: data from 804 farms with 1,473,762 mated females-ending 2017

Farm Size	No. farms	No. Sows	PW/MF/Yr			Female Culls %			Female Deaths %		
			10%	All	30%	10%	All	30%	10%	All	30%
0-999	295	167,692	31.2	26.0	22.0	63.0	44.8	41.8	6.4	8.0	8.9
1000-1999	204	276,440	31.0	26.0	22.1	48.1	46.7	50.0	6.0	8.9	11.1
2000-2999	186	472.382	30.8	25.9	22.1	48.6	46.7	42.4	7.3	9.9	12.7
3000-3999	47	155,779	29.9	26.4	23.8	45.3	44.6	47.2	7.3	9.5	12.1
4000+	62	350,531	33.3	28.0	23.6	63.6	48.6	46.3	4.8	9.8	11.8

Breakout of SMS Data by Size of Farm-804 farms



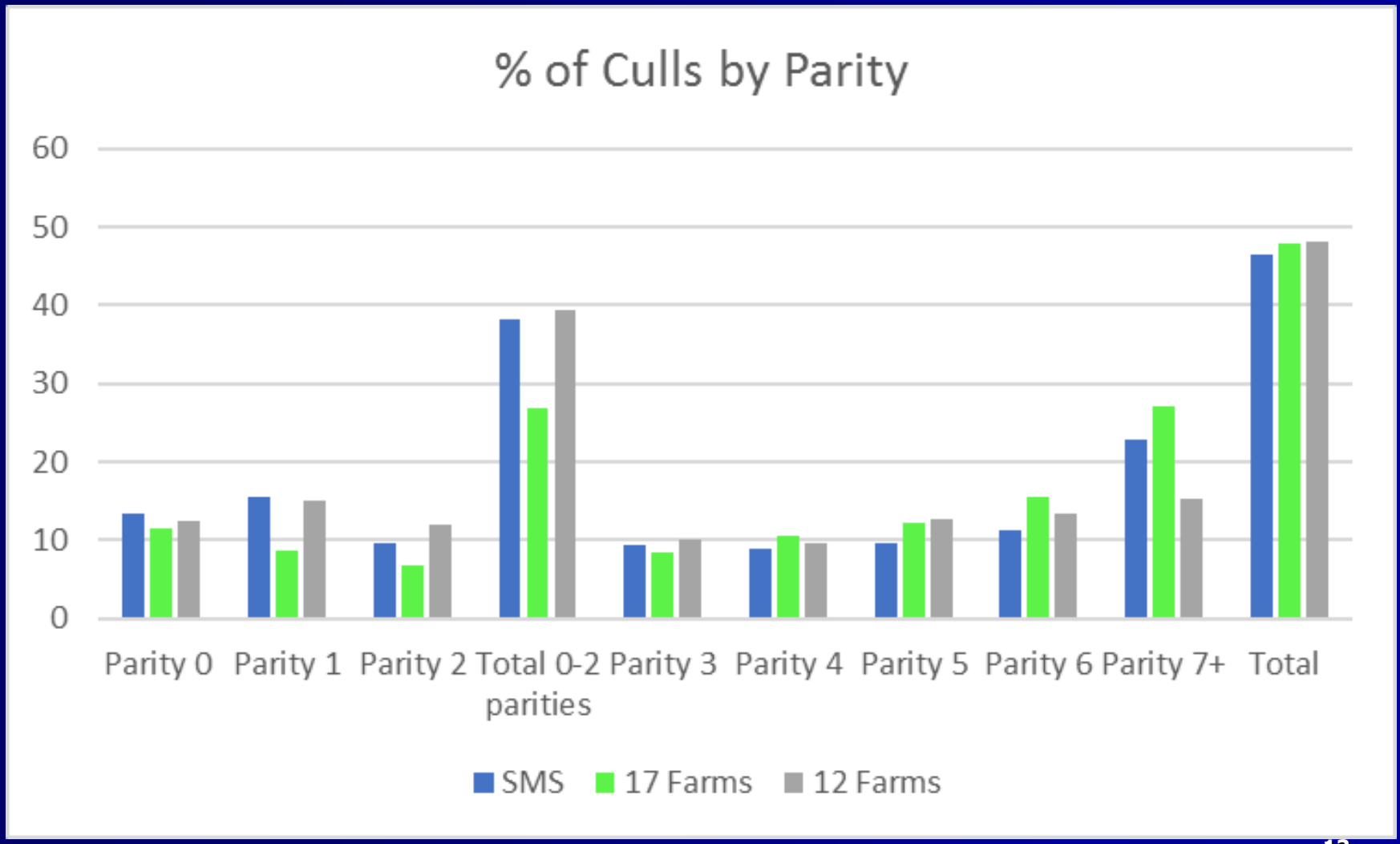
Breakout of SMS Data by Size of Farm-804 farms



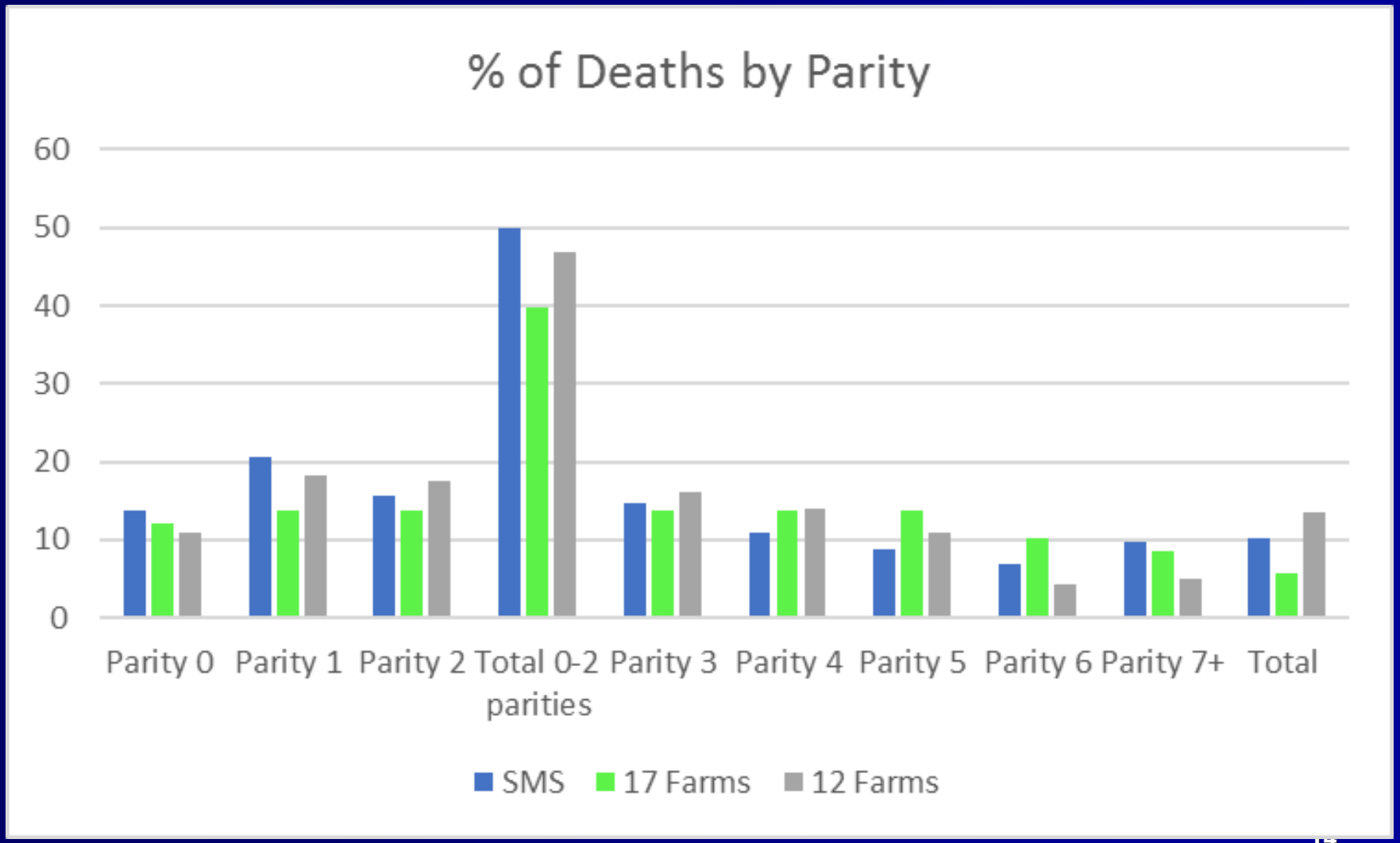
Culling and Death loss % by Parity -

	Parity 0	Parity 1	Parity 2	Total 3 parity	Parity 3	Parity 4	Parity 5	Parity 6	Parity 7+	Total
SMS-culls-893 farms	13.3	15.5	9.5	38.3	9.3	8.8	9.7	11.2	22.8	46.4
17 individual farms-cull	11.5	8.6	6.7	26.8	8.4	10.5	12.1	15.5	27.2	47.8
12 farms in system-cull	12.5	15.0	11.9	39.4	10.0	9.6	12.7	13.3	15.2	48.1
SMS-deaths-893 farms	13.7	20.6	15.7	50.0	14.7	10.8	8.8	6.9	9.8	10.2
17 individual farms-deaths	12.1	13.8	13.8	39.7	13.8	13.8	13.8	10.3	8.6	5.8
12 farms in system-deaths	11.0	18.3	17.6	46.9	16.1	13.9	11.0	4.4	5.1	13.6

Culling and Death loss % by Parity



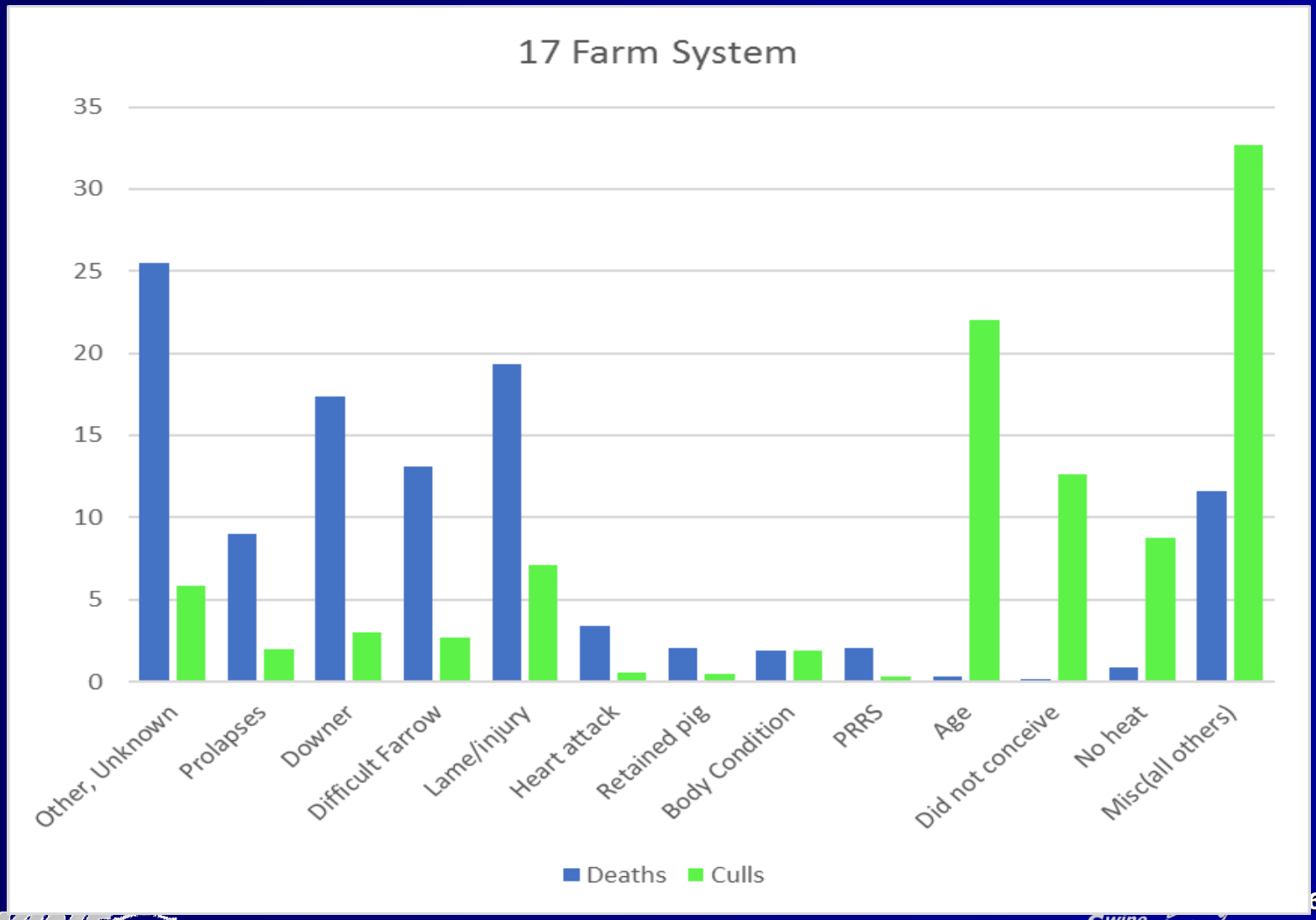
Culling and Death loss % by Parity



Breakout of SMS Data-3 years 17 farms

Reason-Individual farms	Deaths-55 reasons 8275 hd.		Destroyed-33 reasons 1660 hd.		Combined Total-9935 hd.		Culls-65 reasons 48,675 hd.		Total-58,610 hd.
	#	%	#	%	#	%	#	%	%
Other, Unknown	2411	29.1	119	7.17	2530	25.5	911	1.87	5.87
Prolapses	717	8.66	175	10.5	892	8.98	248	0.50	1.95
Downer	1258	15.2	466	30.1	1724	17.4	32	0.07	3.00
Difficult Farrow	1253	15.1	47	2.83	1300	13.1	271	0.56	2.68
Lame/injury	625	7.55	655	39.5	1280	19.3	2896	5.95	7.12
Heart attack	341	4.12	-	0.00	341	3.43	4	0.01	0.59
Retained pig	196	2.37	10	0.60	206	2.07	92	0.19	0.51
Body Condition	117	1.41	72	4.34	189	1.90	910	1.87	1.88
PRRS	167	2.02	35	2.10	202	2.03	1	0.01	0.35
Age	27	0.33	3	0.18	30	0.30	12875	26.5	22.0
Did not conceive	10	0.12	4	0.24	14	0.14	7399	15.2	12.6
No heat	84	1.00	-	0.00	84	0.85	5041	10.4	8.74
Misc(all others)	1080	13.1	74	4.46	1154	11.6	17995	36.9	32.7

Breakout of SMS Data-3 years 17 farms



Industry needs to Standardize Death Loss and Culling Reasons

- How can the industry work together if there is such a large variation in reasons?
- One system had 189 different reasons for Culling and Deaths

No heat	Age	Difficult farrowing	Retained pigs	Abortion	Repeat service
Did not conceive	Discharge	Lame/Injury	Udder trauma	Poor milker	Disease
Body condition	Downer	Mastitis/ metritis	Ulcers	Low wean	Unknown
Low born live	Prolapse	Off feed	Unsound	Not in pig/PCN	Other

REMOVAL REASONS

Disease/Health

Discharge (C)
Downer (E)
Disease (C,D,E)
Mastits/Metritis (C)

Reproduction

No Heat (C)
Not in Pig/ Preg Check Neg (C)
Abortion (C)
Repeat Service (C)
Vaginal/Uterine Prolapse (D, E)
Rectal/Anal Prolapse (D, E)
Difficult Farrowing (C, D, E)

Performance

Age (C)
Low Total Born (C)
Retained Pig (C,D,E)
Low Weaned (C)
Poor Milker (C)

Intestinal

Ulcer (C,D,E)
Off Feed (C)

Locomotion

Unsound (C)
Lame/Injured (C,D,E)

Other

Transfer (C)
Other (C,D,E)
Trauma (C,D,E)

Reason type: C= cull, D= Death, E= Euthanized

Type	Reason	Definition
Any	Difficult/ Prolonged Farrowing	A sow that struggles with the farrowing process, may have multiple stillborns or just require a lot of assistance.
Any	Disease	An animal that is culled or died because of a disease, including but not limited to PRRS, Flu, and PEDv.
Any	Lame/Injured	An animal that is visibly lame or has been injured causing difficulty in moving
Any	Rectal/ Anal Prolapse	A female that has either a rectal or anal prolapse.
Any	Retained Pig	A sow that retained a pig after farrowing the litter and later passes it.
Any	Trauma/Injury	An animal that has suffered an injury or trauma and needs to be removed from the herd but doesn't affect soundness
Any	Ulcer	An animal that has an ulcer, signs include pale skin, not eating, vomiting, and passing digested blood.
Any	Unknown	An animal that is removed from the herd for an unknown reason.
Any	Vaginal/Uterine Prolapse	A female that has either a vaginal or uterine prolapse.
Cull	Abortion	A female that pregnancy checks positive but loses her litter prior to 112 days bred that is not the result of a PRRS break.
Cull	Age	A P6+ sow that is culled because of age but not because of performance or soundness.
Cull	Discharge	A female that has discharge from the vulva due to infection
Cull	Low Total Born	A sow that has either a low total born litter or a history of low total born.
Cull	Low Weaned	A sow that weans a low number of pigs
Cull	Mastitis/Metritis	A sow with infection of the mammary glands (mastitis) or the uterus (metritis), the two are often present together.
Cull	No Heat	A female that doesn't display standing heat
Cull	Not in Pig/ PCN	A female that pregnancy checks negative or is found open in gestation but not in standing heat
Cull	Off Feed	An animal that is not eating but isn't lame, injured or diseased.
Cull	Poor Milker	A sow that doesn't milk a litter well, not just because of one poor quality pig.
Cull	Repeat Service	A female the returns to estrus after an unsuccessful mating and is removed from the herd due to that.
Cull	Transfer	An animal that is removed from the unit and moved to another unit.
Cull	Unsound	An animal that isn't lame or injured but is likely to become so if not culled.
Death or Euthanized	Downer	A female that is unable to get up and is not in good enough condition to make a cull truck but isn't lame

Summary for what the data says?

- No standardization of reasons for female removals so hard to analyze and compare farms
- Top 10% of farms by size have lower female death loss
- Sow farms 2000-3999 have higher female culling and death loss
- Data shows higher deaths and culls for younger parity females (0-2)
- A high % of females culls and deaths are unknown
- Industry seeing increase in prolapses
- Data showing increase in females being culled and euthanized do to feet and leg injury and structural unsoundness

What is the National Pork Board doing?

- July 2017: Chris Hostetler Director of Animal Science announced Animal Science Committee directed $800,000 to Focus on System – wide mortality including loss of sows prior to farrowing
- Committee formed called: Pig Loss Mitigation
- Members: Jeremy Pittman, Steve Kitt, John Deen, Mark Fitzsimmons, Gene Gourley, Kent Stalder, Kent Schwartz, Valerie Duttlinger, and Jer Geiger
- Purpose of group:

  -Identify specific components of pig mortality that need to/can be addressed by research

  -Develop researchable questions/research priorities around those components

  -first project: Pelvic Organ Prolapse-Iowa state

Sow Prolapse Syndrome

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DSM Pork Nexus May 18th, 2017 Raleigh, North Carolina

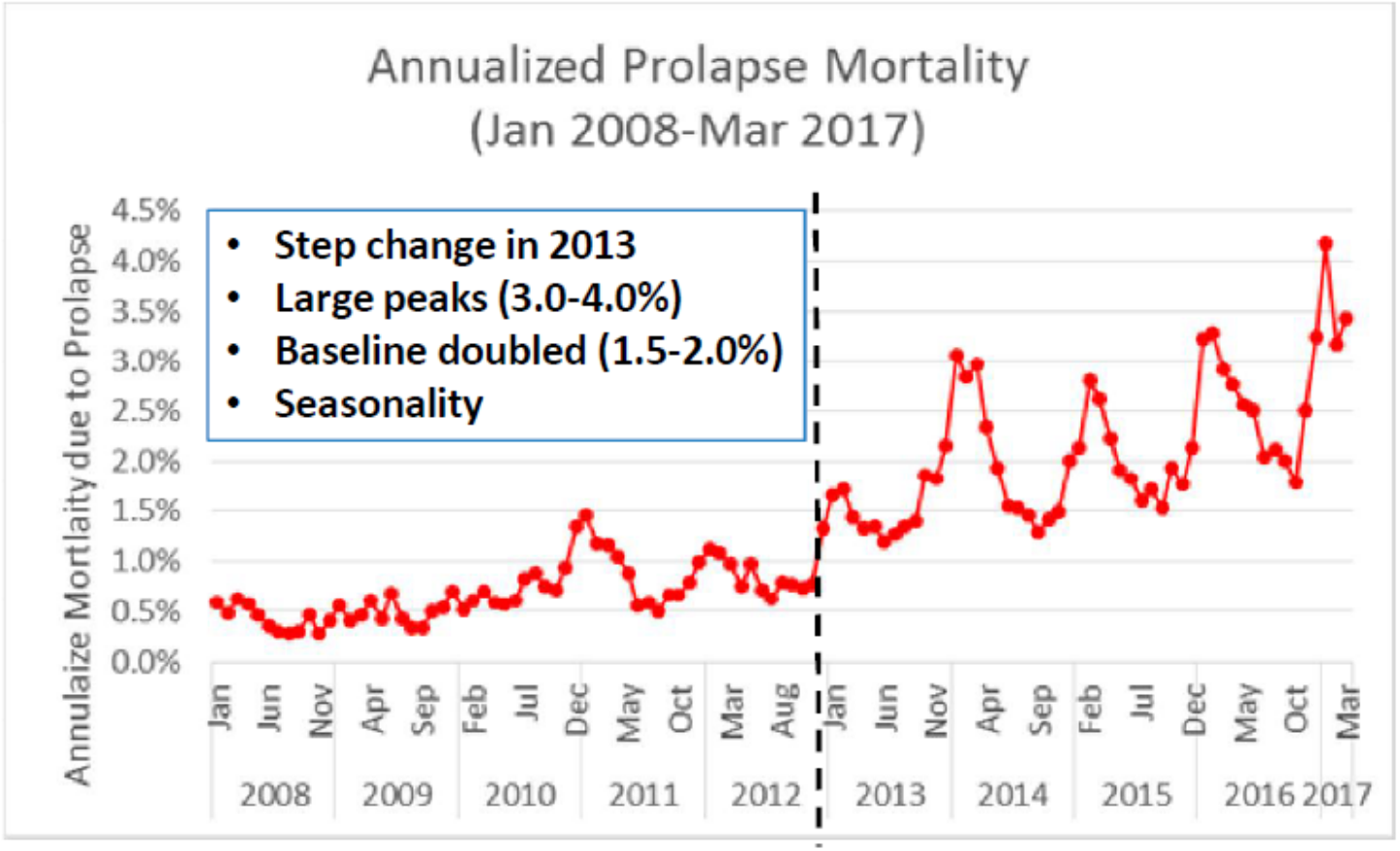
Jeremy Pitman, DVM Smithfield North Division

Data Analysis - Mining

- North Region = ~105,000 inventoried sows on 36 farms
- Data Extraction: PigKnows Record System
- Sow Removal Records from Jan 1st, 2008 – March 31st, 2017
- Filtered for Death, Destroyed and Culled with Removal Reason Given
- 523,525 individual complete sow records
- 15,178 (2.90%) Prolapses (Rectal, Uterine, Vaginal)
- Prolapses calculated as annualized rate, similar to sow mortality

DSM Pork Nexus May 18th, 2017 Raleigh, North Carolina

Jeremy Pitman, DVM Smithfield North Division



DSM Pork Nexus May 18th, 2017 Raleigh, North Carolina

Reasons for Prolapse

- Mycotoxins in feed: (Zearalenone) are you testing corn, etc.
- Hypocalcaemia: dysfunction in calcium metabolism, dietary calcium levels, or calcium-phosphorous imbalance
- Abdominal issues: intake in lactation, grid size, alternative ingredients, etc.
- High-density diets: high in starch and lysine
- Vitamin deficiency: lower levels of vitamin E, or vitamin D are associated with weakness of the pelvic floor muscles
- Genetics: seem more in the pure bred lines

Reasons for Prolapse (continued)

- Constipation: lack of water and low fiber diets
- Parity: may be more in older sows that have lost muscle tone in uterus
- Housing: may be associated to sows in crate gestation?
- Oxytocin and assisted farrowing: over use of Oxytocin-sleeving
- Tail docking: cutting tails to short on replacement gilts which weakens/damages anal sphincter
- Larger litters: larger litter taking longer to farrow or larger pigs at birth

Mycotoxins a World Wide Problem!

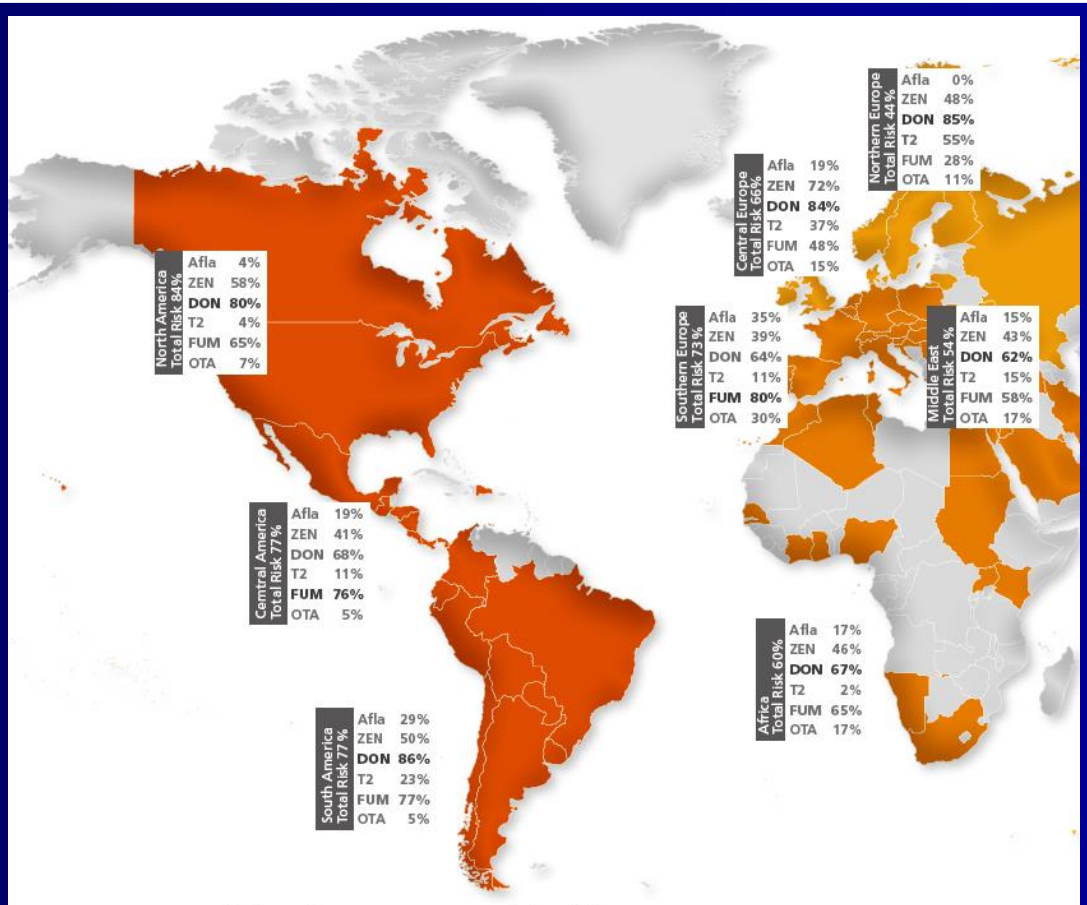


Figure 1. *Global map of mycotoxin occurrence and risk in different regions.*

Legend

- Moderate risk: 0-25% of samples above risk threshold
- High risk: 26-50% of samples above risk threshold
- Severe risk: 51-75% of samples above risk threshold
- Extreme risk: 76-100% of samples above risk threshold
- No samples tested

Maximum Tolerable Level of Mycotoxins Commonly Found in Swine Feeds*		
Mycotoxin	**Maximum tolerable level**	**Comments**
Aflatoxins (B1, B2, G1, G2)	**<20 ppb** for human use, dairy feed , feed for immature animals **<100 ppb** for breeding swine	**Carcinogenic.** Immunosuppressant. Acute signs: anorexia, depression, ataxia, epistasis. Chronic signs: **reduced feed efficiency,** reduced milk production, icterus, and decreased appetite.
Zearalenone	**<1 ppm** for younger growing pigs **<2 ppm** for breeding herd **<3 ppm** for finishing pigs and younger and older boars	**Estrogenic effects. Swollen vulvas, vaginal or rectal prolapses in prepubertal gilts. Enlarged uterus, swollen or twisted uterus**, shrunken ovaries. In boars, testes atrophy, enlarged mammary glands, decreased fertility.
Deoxynivalenol (Vomitoxin)	**<5 ppm** on grain and grain by-products. DON contaminated feedstuffs should not exceed 20% of the diet **(<1 ppm** in complete feeds)	Reduction in feed consumption and weight gain are inversely proportional to concentration of DON. **High concentrations cause feed refusal and vomiting.**
T-2 toxin	**<1 ppm**	**Potent immunosuppressive agent** that directly affects immune cells and modifies immune response as a consequence of other tissue damage. Frequent defecation, vomiting, weight loss and feed refusal.
Fumonisin	Not established **< 5 ppm** (extrapolated from horse data)	Carcinogenic in laboratory tests using rat. Associated with **pulmonary edema in pigs**
Ochratoxin	**< 200 ppb** has been associated with kidney damage in swine	Ochratoxin A is most common and potent. Reduction in growth, **feed efficiency, increasing mortality, liver and kidney damage**
Ergot	**< 200 ppb**	Vertigo, staggers, convulsions, temporary posterior paralysis, eventual death. Decreased peripheral blood supply. Reduced growth, tail loss, reduced reproductive efficiency of sows

*Feedstuffs Reference Issue (1987)

Table 1. Maximum Tolerable Level of Mycotoxins Commonly Found in Swine Feeds as Established by US Food and Drug Administration

Mycotoxin	Class	Maximum Tolerable Level
Aflatoxins (B1, B2, G1, G2)	Breeding	100 ppb
	Nursery	200 ppb
	Growing	Not Determined
	Finishing	20 ppm
Zearalenone	Breeding	2 ppm
	Nursery	1 ppm
	Growing	1 ppm
	Finishing	3 ppm
Deoxynivalenol (vomitoxin)	All Classes	1 ppm
Fumonisin	All classes	10 ppm

What does the corn you are feeding looking like in the field?

Cleaning Corn to reduce Mycotoxin Content: NHF 9-4-17

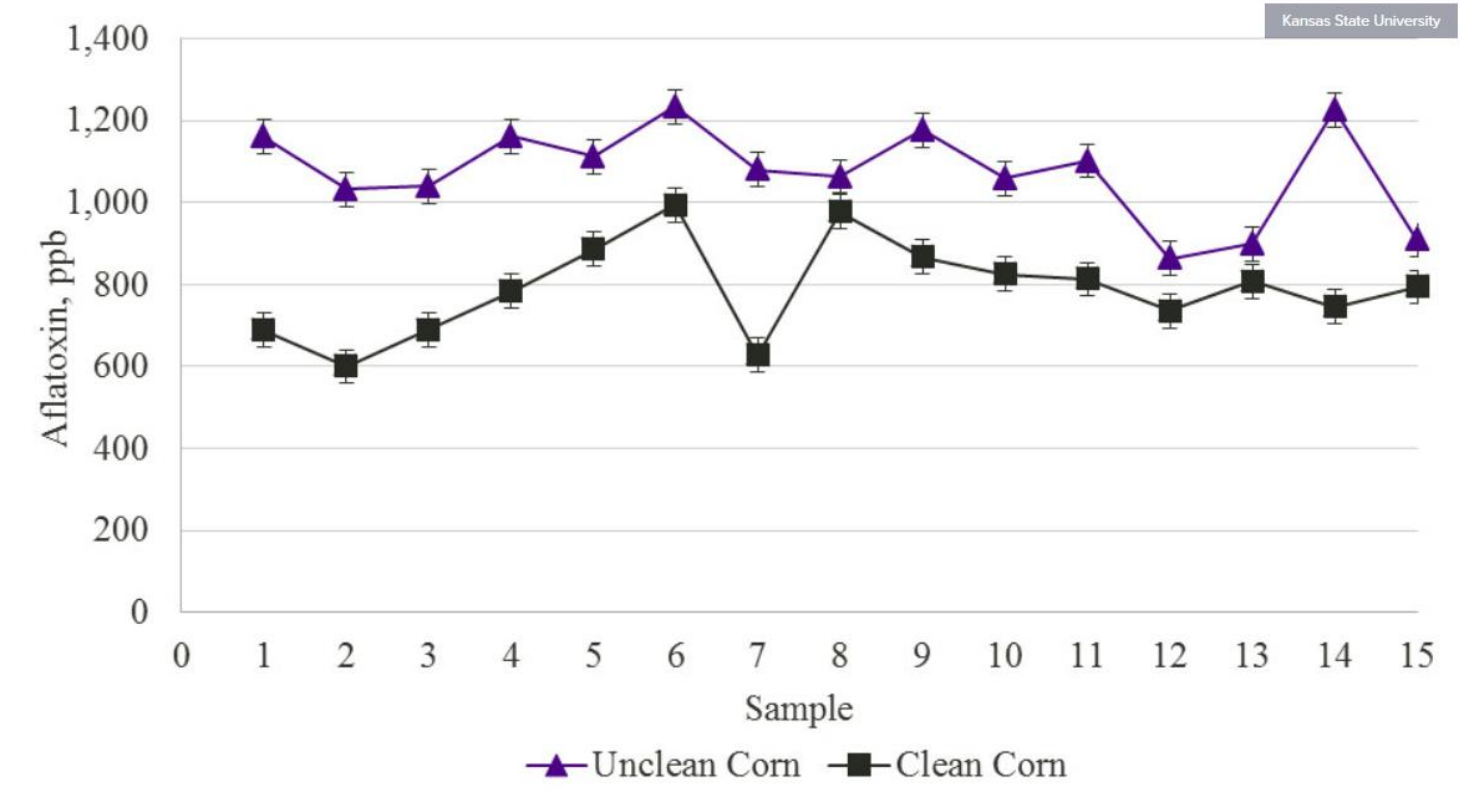
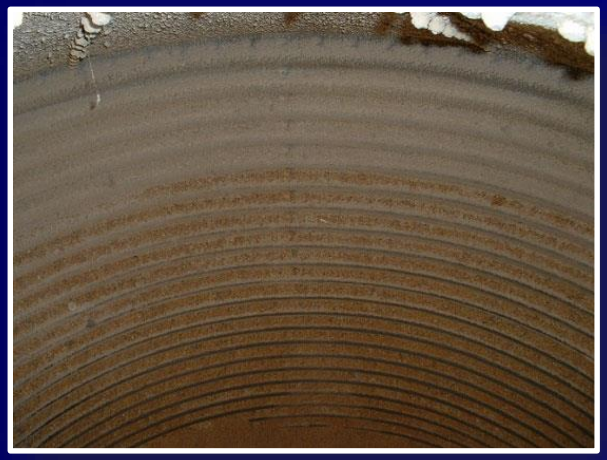


Figure 2: Aflatoxin level in corn before and after cleaning

Information about Mycotoxins

- A minimum of 300+ mycotoxins have been shown to induce toxicity in animals
- Thousands of secondary toxins have been identified but few tested for toxicity
- Testing options:
  - -Alltech 37+ program: analyzes 38 mycotoxins
    - -on farm quick test: Alltech RAPIDREAD
  - -Kemin: does 5 main mycotoxins
  - -commercial labs: test for mycotoxins but charge by individual
- Treatment options:
  - -Vomitoxin: hard to bind
    - -products: sodium metabisulfite
      - Defusion from Provimi
      - Feed Aid from Nutriquest (can bind thiamine)
      - Biofix (BioMin)
      - Integral (Alltech)
  - -Aflatoxins: bound with inexpensive sodium bentonite, clays, sodium aluminosilicates but not effective against other toxins

What are some contact point for Mycotoxins??



What needs to be done to manage Mycotoxins??

- testing of corn and finished rations for mycotoxins before processing and after mixing
- testing other ingredients for mycotoxins: corn, DDG's, soybean meal, etc
- monitoring feed storage bins on farm:
  - using double bins to allow for completely emptying bin
  - physical inspection of inside of bins weekly with flashlight and clean if needed (power wash bins)
- adding binders to rations based on mycotoxins present, time of year and quality of ingredients
  - consider low levels year around for "insurance"

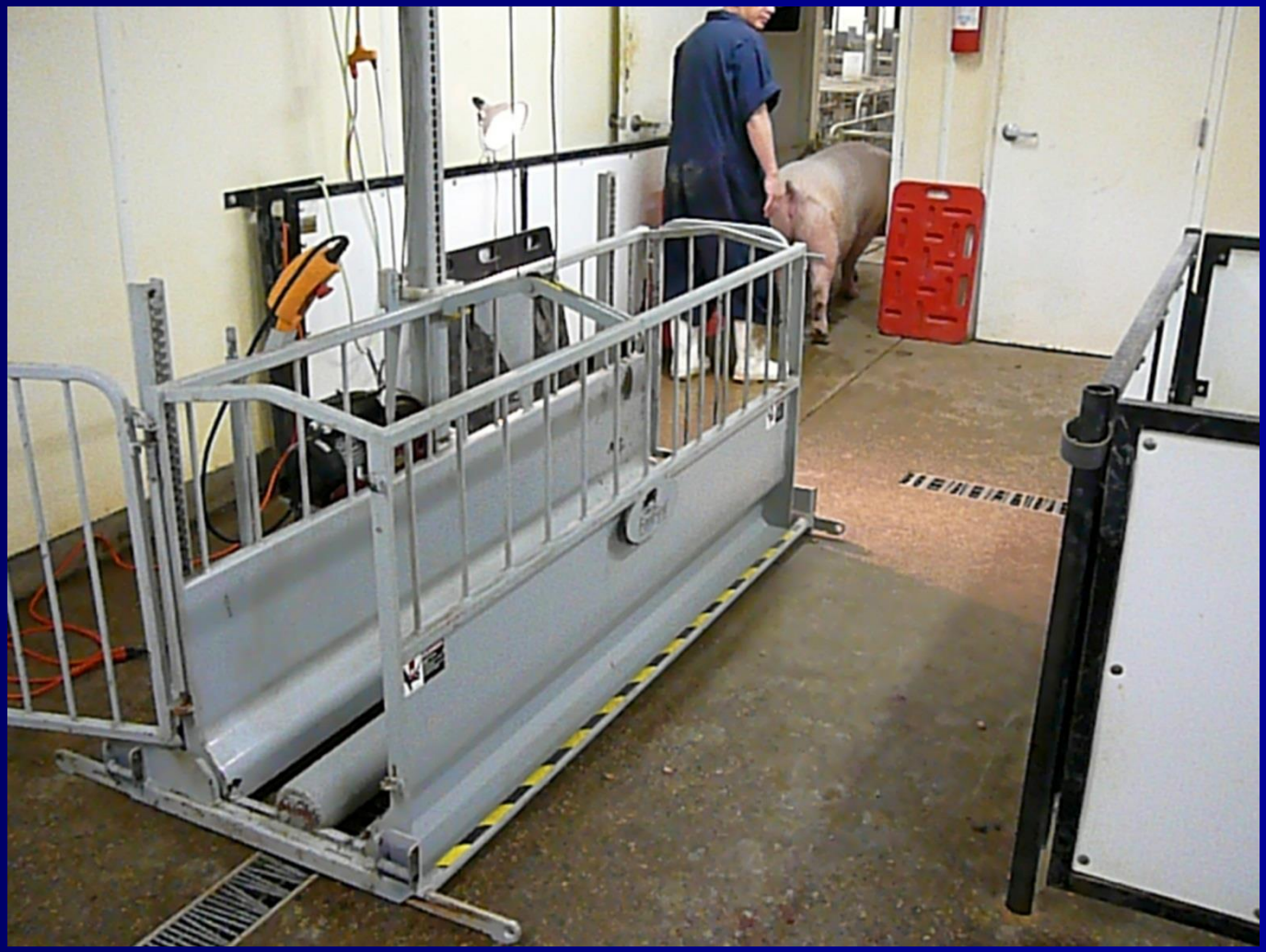
What needs to be done to manage Mycotoxins?? (cont.)

- seed corn selection for dropping ears: probably not going to happen
- harvesting: drying corn, cleaning corn before placing in bin
- corn storage bin management:
  - completely emptying bin before putting in new corn, clean any spots on walls or floors as needed
  - freeze corn by running bin fans on cold nights
    - stops toxin growth
    - keeps bugs out
    - don't need to warm back up as temperature goes back up

Soundness: Feet and leg issues?

Improving gilts selection looking at feet, toe, and leg structure

Chute for trimming Sow Toes and Dew Claw



What probably caused this uneven toe growth?

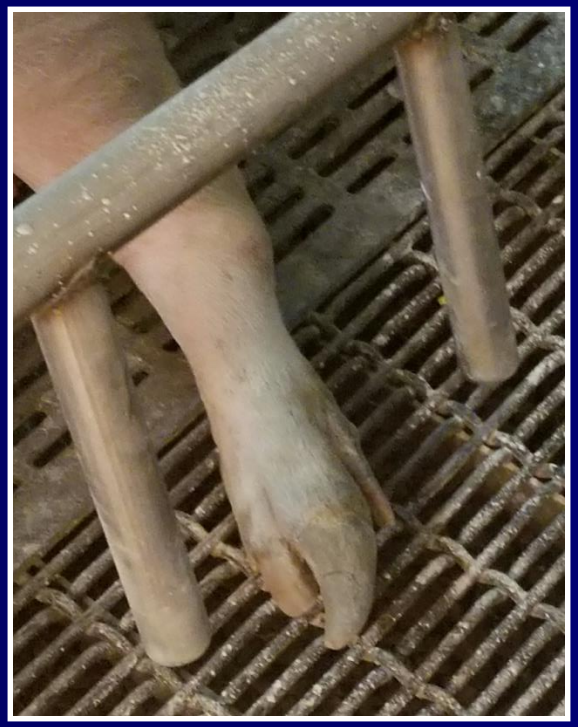
Trimming toes and Dew Claws With Fiskars 3x Trimmers (Home Depot)

Do the trimming in farrowing?

3 Fingers Width = Ideal toe length

Cut Dew Claws back to coronary band (where hair and toe meet)

Trimming sequence



Trimming Dew Claws With Trimmers

Trimming Completed

What do we see in the industry?

- less selection pressure on replacement gilts
- industry expansion putting pressure on availability of breeding stock
- farms seeing high employee turn over
- employee training-lack of training and SOP's
- facility changes to more loose sow housing
- floor design in gestation barns needing research
- lack of spaces in farms for injured animals-soft laying mats
- not understanding financial impact of sows deaths and injuries

How to lower female death loss & culling?

- PQA certification employees
- training staff to identify, mark and treat sick / lame females
- have a way to identify females needing treatment in sows housing area and keep detailed records (red card)
- make sure there are written SOP's on how to handle and treat sick and lame females
- work with your farm veterinary to develop a written list that can posted on how to treat sick and lame females with along with withdraw times
- record detailed information on each treated female and keep for 12 months (PQA requirement)
- have a shorter detailed list of reasons for female deaths and culling reasons
- get all females up everyday

How to lower female death loss & culling? (cont)

- if females are to be euthanized ensure proper training procedures and record primary death reason
- best time to check farms with crate gestation is after feed is dropped
- with pen gestation farm needs a trained pen walker:

  daily observation of each sow and marking and treating as needed
- take temperature of sows after farrowing
- improve feet care through
  - nutrition evaluation
  - gilt selection
  - feet maintenance by trimming toes
- increase testing of ingredients for molds and mycotoxins
  - add binders to feed if needed

What are the plans at your farm to lower female death loss and culling?

Thank you for your time.

"information solutions"

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