



## **EPI Technology Data**

*by Baumgartner Environics, Inc.*

Data & Statistical Analysis  
Collected and Provided by  
Murphy-Brown, LLC

***Baumgartner Environics, Inc.***

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Environmental Solutions by  
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Greetings,

It is a rarity when a production improvement technology can quickly be proven. It takes consistent and reproducible data to show 99.9% statistical significance in a data set.

EPI® technology has met and surpassed the criteria laid before it by the world's largest pork producer, Murphy-Brown, LLC. EPI® was installed in two 2000-head nurseries and tested for five turns. A total of 22,077 nursery pigs were treated by EPI® and were compared to control groups. Beyond measuring traditional production parameters such as average daily gain (ADG), weight gain and mortalities, Murphy-Brown, LLC also measured multiple dust size levels, ammonia, odor and hydrogen sulfide in the barns.

With consistent and reproducible results, Murphy-Brown, LLC proved to itself that EPI® technology installed in the hog production barn is a "must have" technology. Not only did EPI® technology reduce dust, ammonia, odor and hydrogen sulfide in the barns, it caused ADG to increase by 12.2%, increased weight by 9.3% and reduced mortalities by 26.1% in the trials.

Murphy-Brown, LLC research trials prove a savings of \$.35/cwt. and better. These results, and more importantly, future results from EPI® technology in your production barns, is why BEI is excited to share this proven, patented and profitable production tool. Contact us at 320-523-1644, write to us at [bei@EPIair.com](mailto:bei@EPIair.com) or visit us at [www.EPIair.com](http://www.EPIair.com). We are ready and eager to improve your operation's productivity.

Sincerely,

John Baumgartner

President

BEI

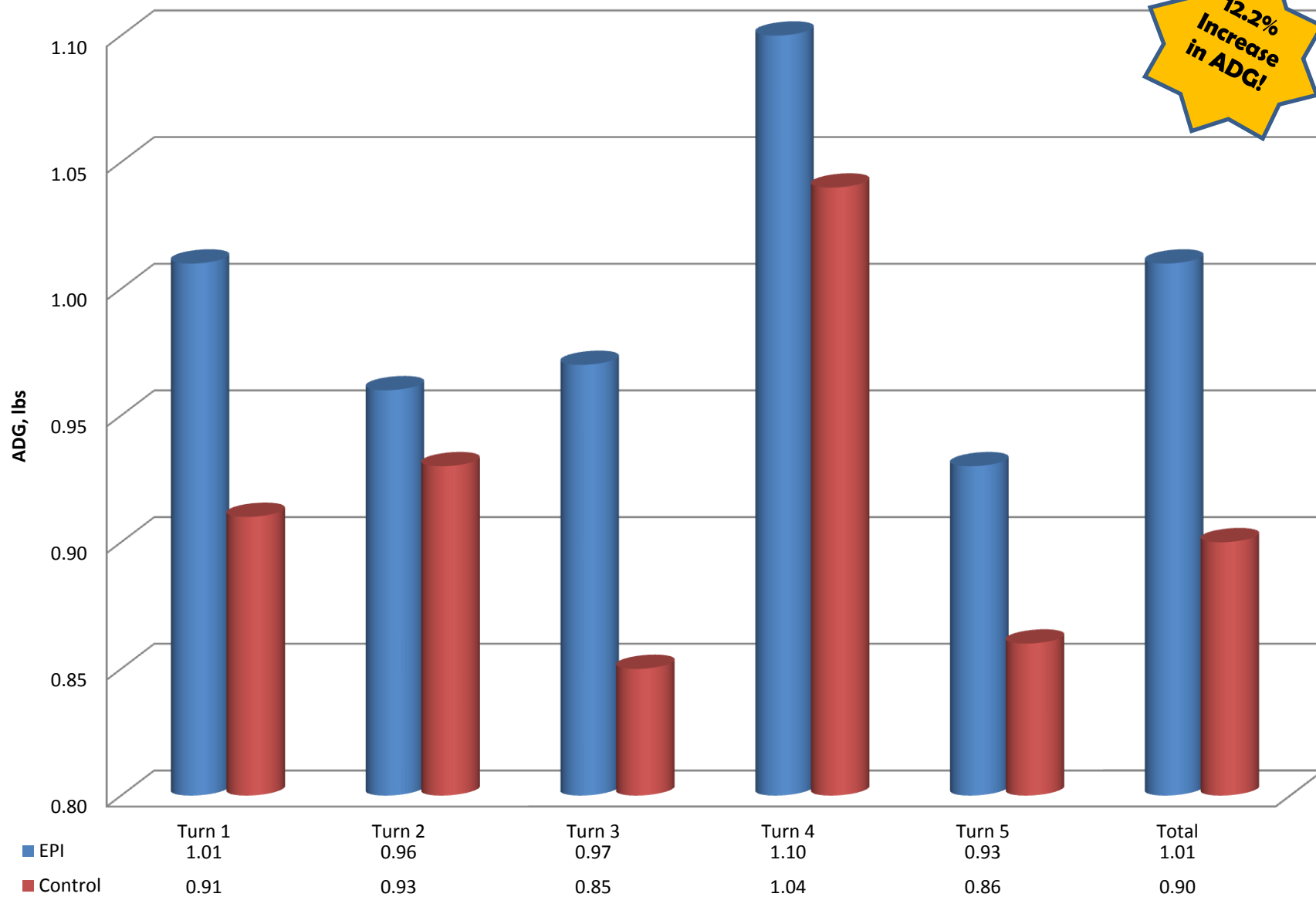
Matthew Baumgartner

General Manager

BEI

**ADG: EPI v. Control**  
**P value = 99.9% confidence**

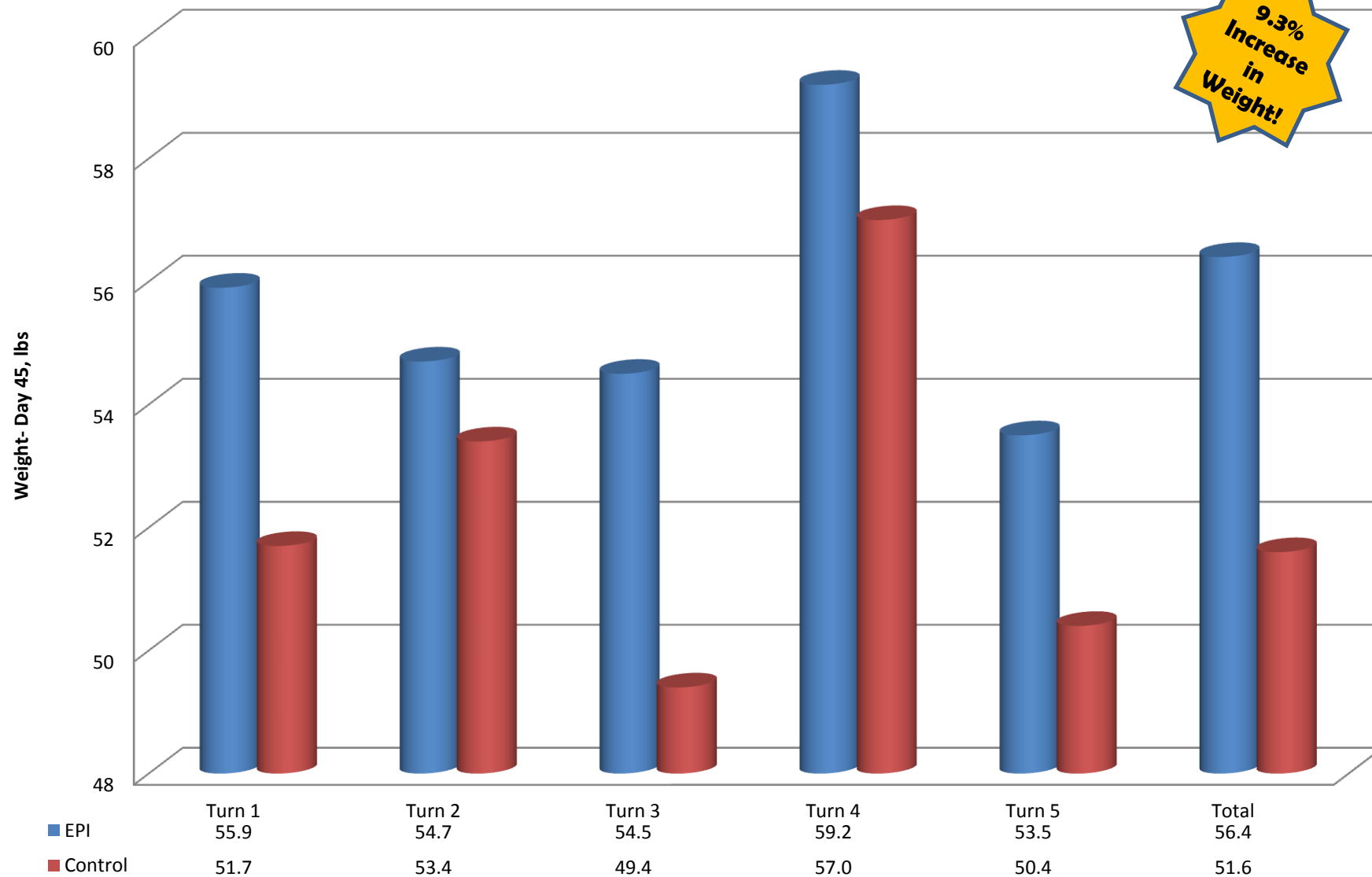
**12.2%  
Increase  
in ADG!**



## Weight Gain: EPI v. Control

P value = 99.9% confidence

**9.3%  
Increase  
in  
Weight!**

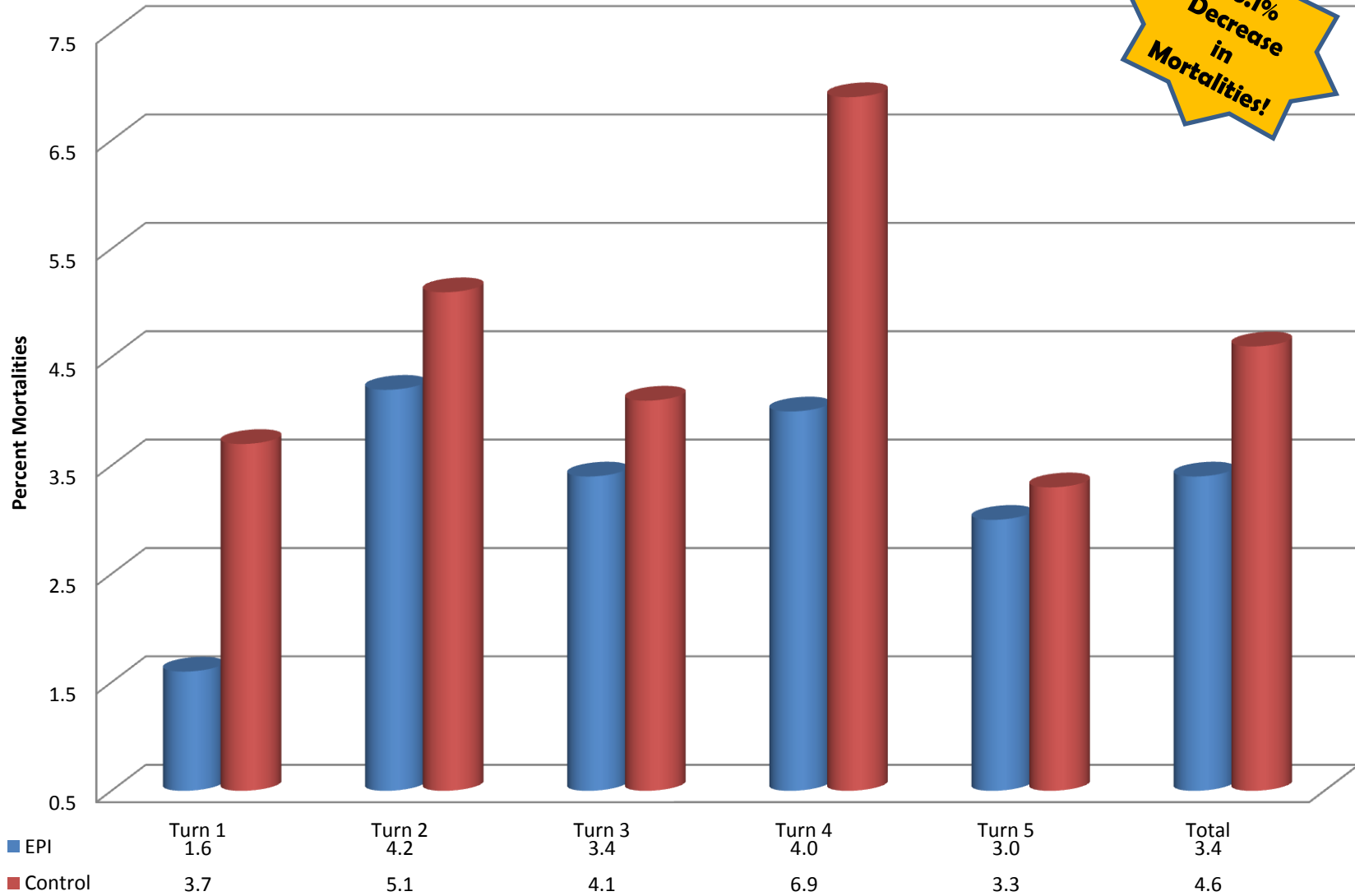




## Mortality: EPI v. Control

P value = 99.9% confidence

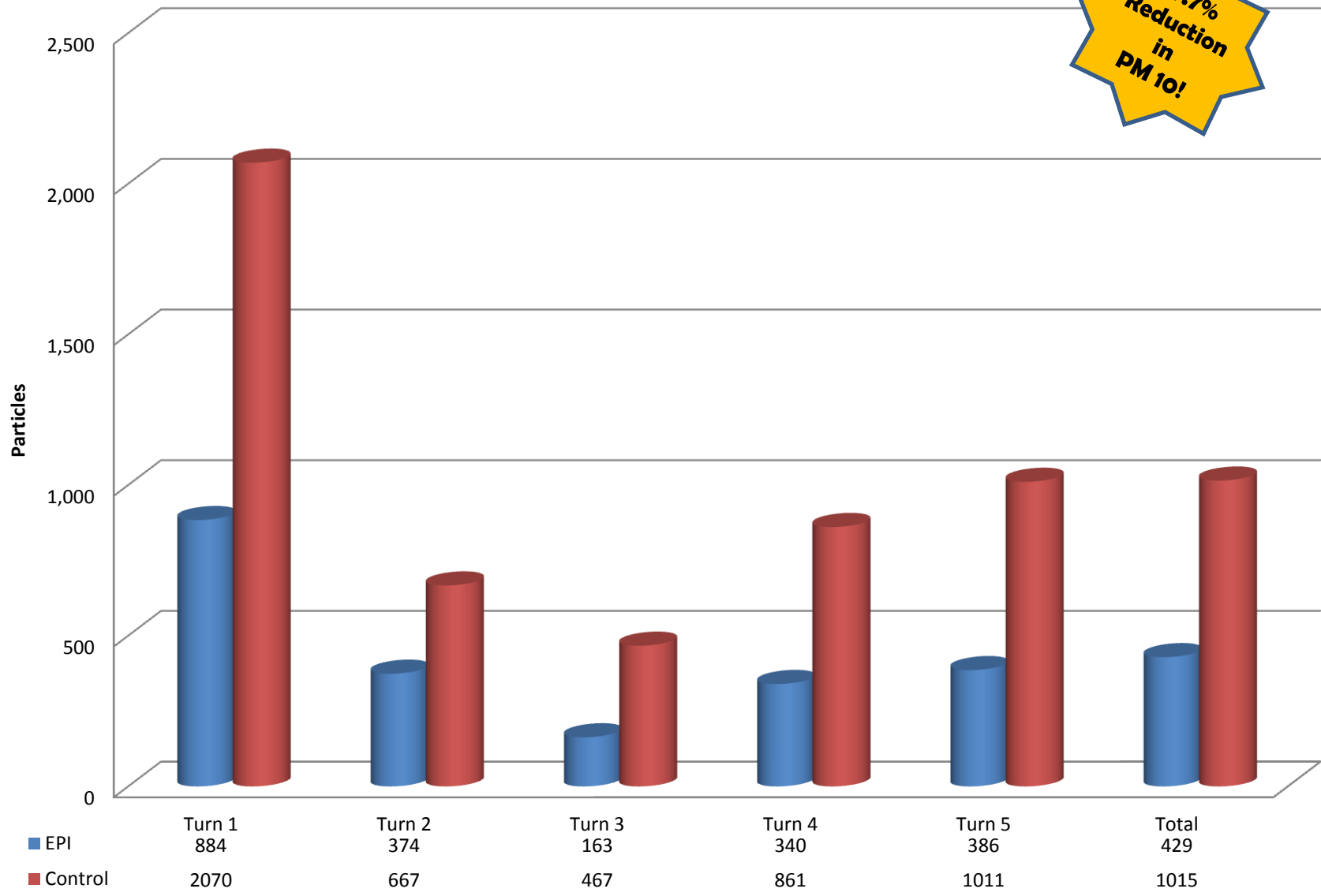
**26.1%  
Decrease  
in  
Mortalities!**



## PM 10: EPI v. Control

P value = 99.9% confidence

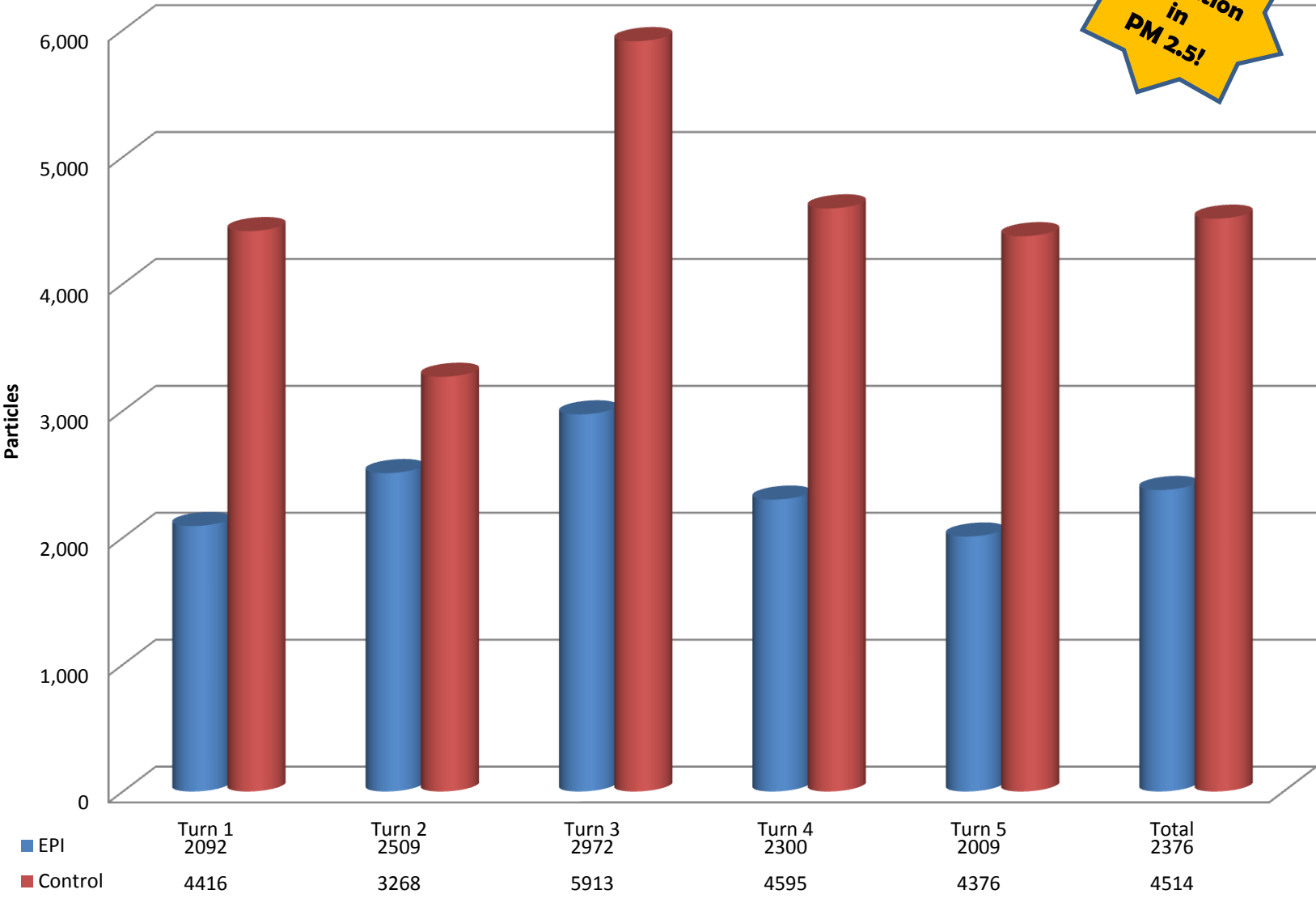
**57.7%  
Reduction  
in  
PM 10!**



# PM 2.5: EPI v. Control

P value = 99.9% confidence

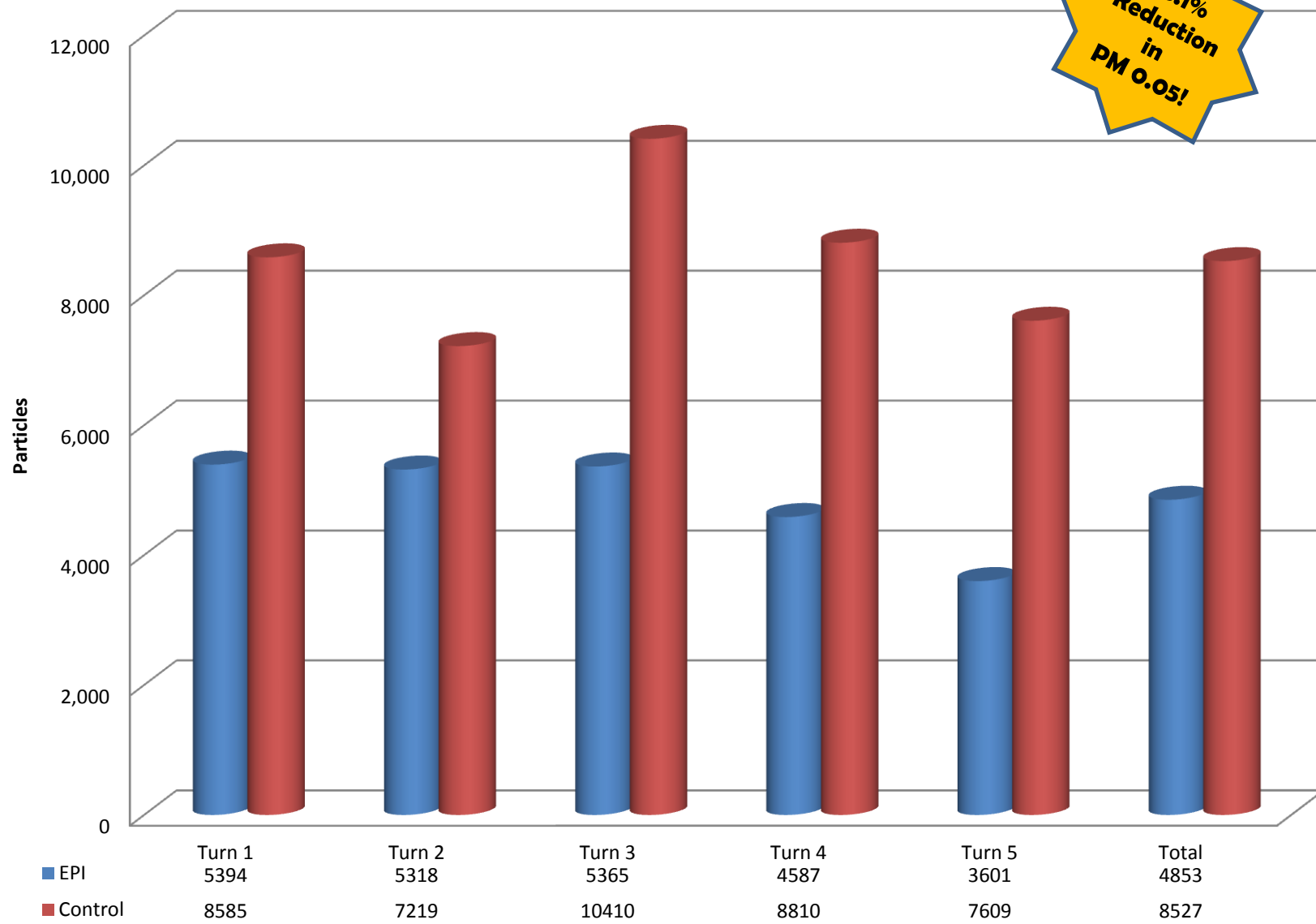
**47.4%  
Reduction  
in  
PM 2.5!**



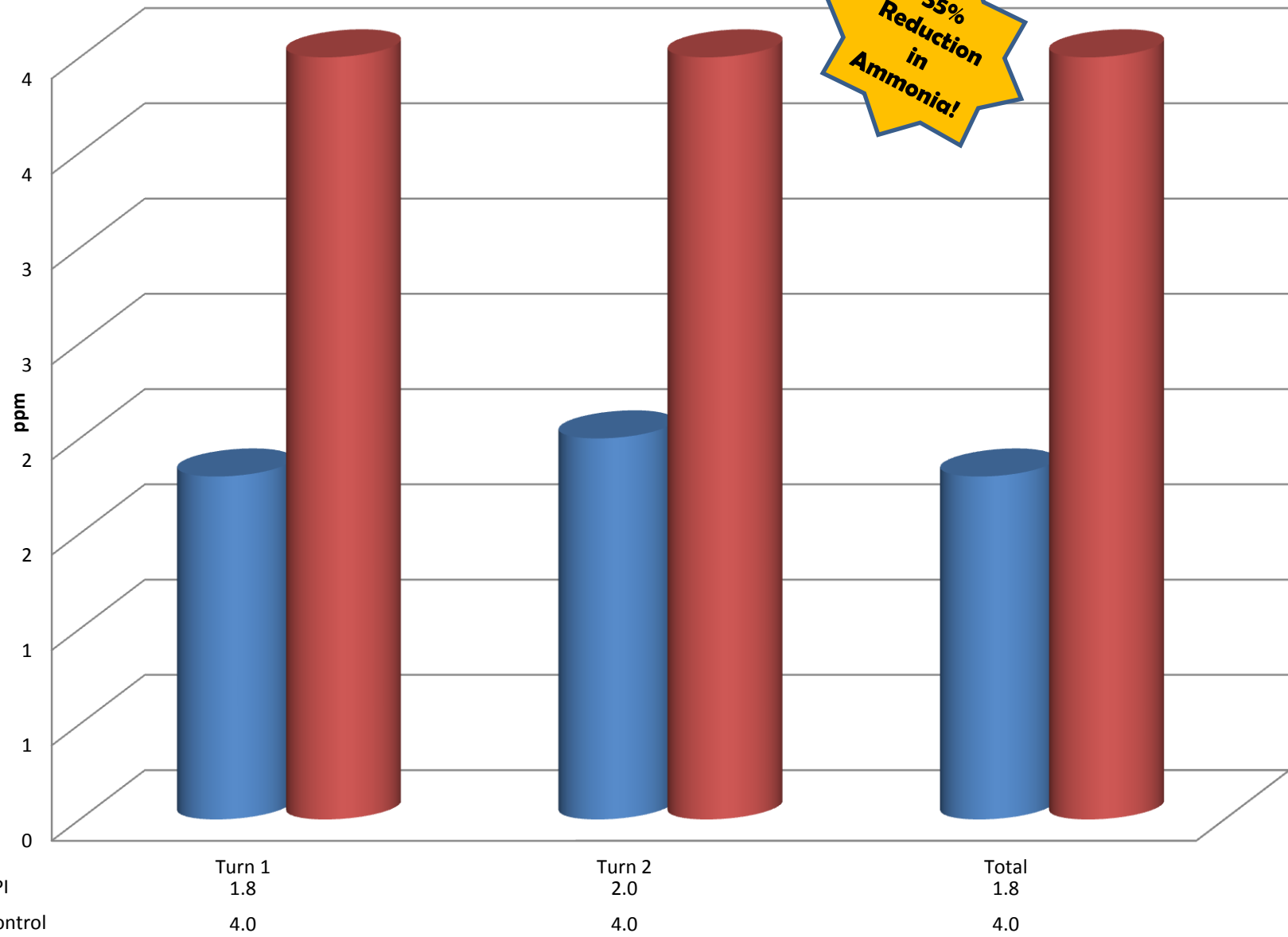
## PM 0.05: EPI v. Control

P value = 99.9% confidence

**43.1%  
Reduction  
in  
PM 0.05!**

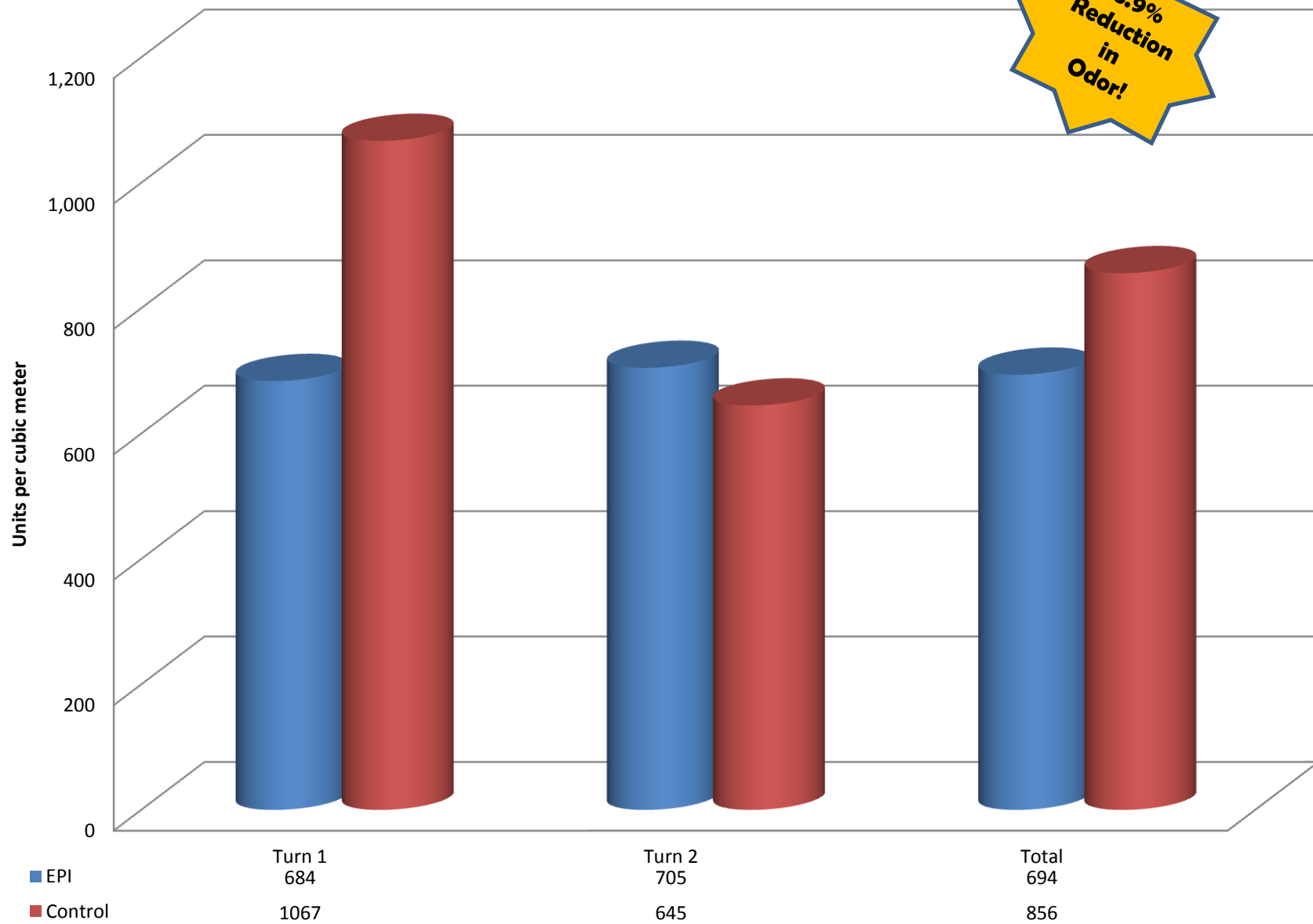


## Ammonia: EPI v. Control



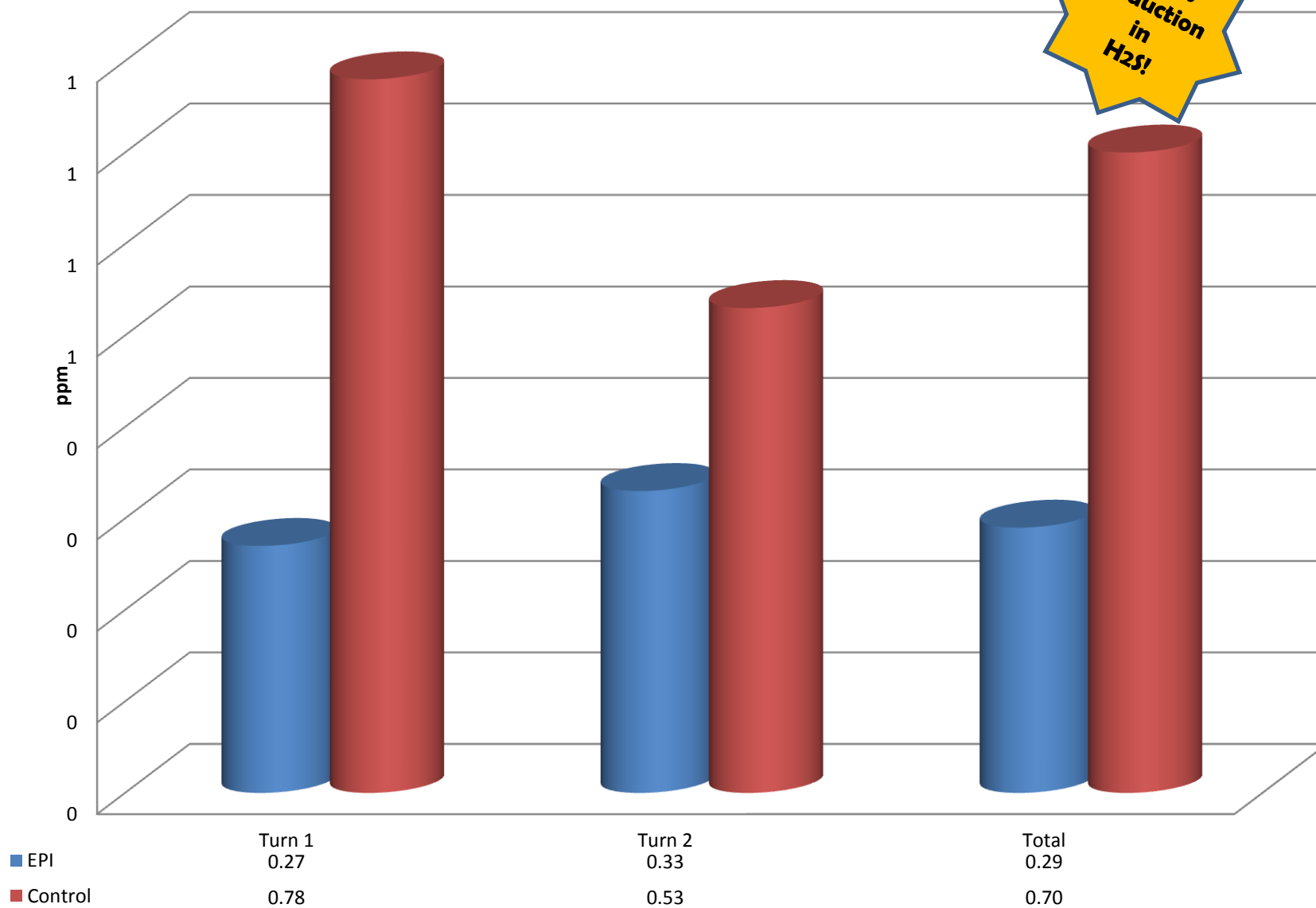
## Odor Threshold: EPI v. Control

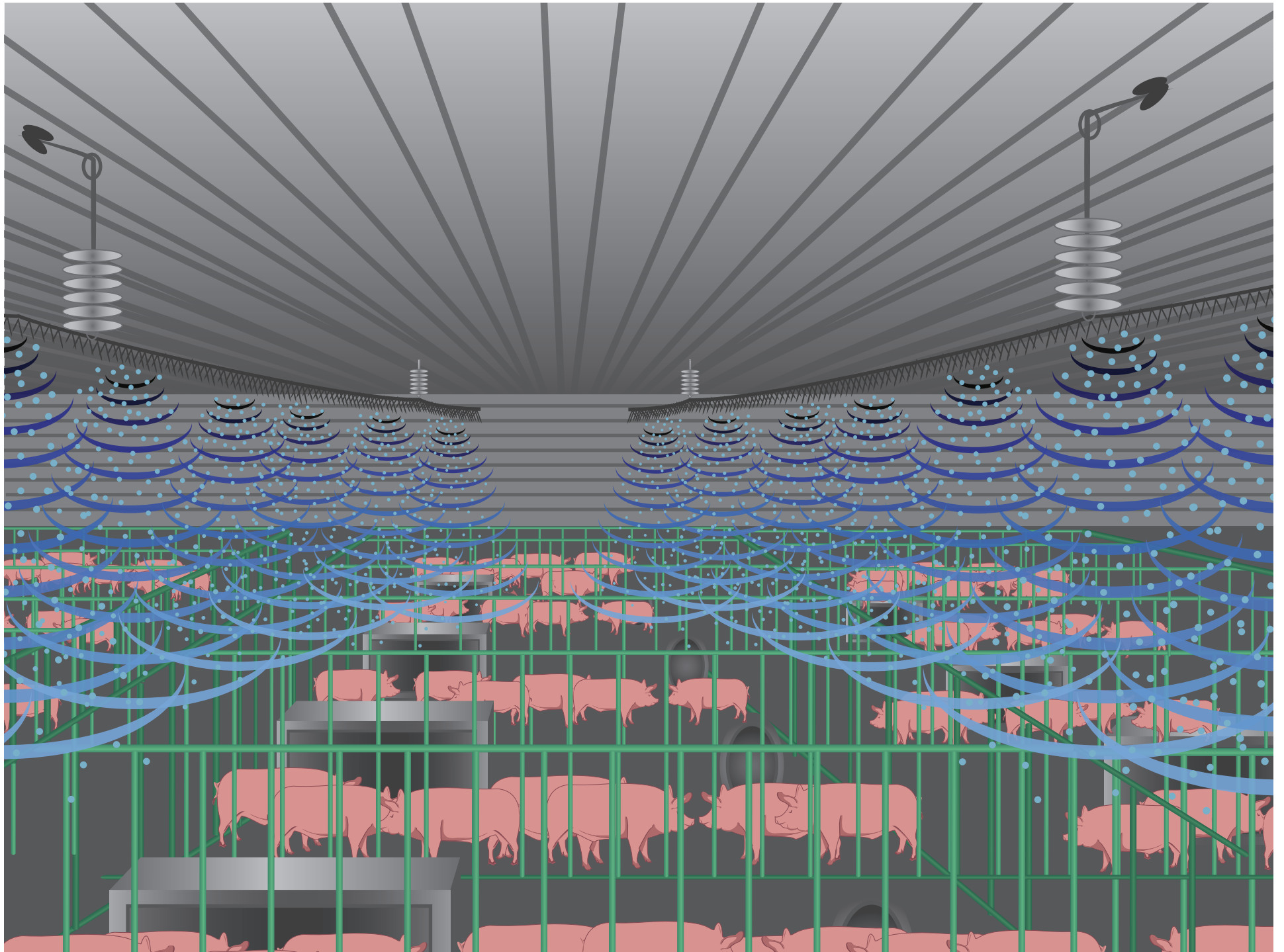
**18.9%  
Reduction  
in  
Odor!**



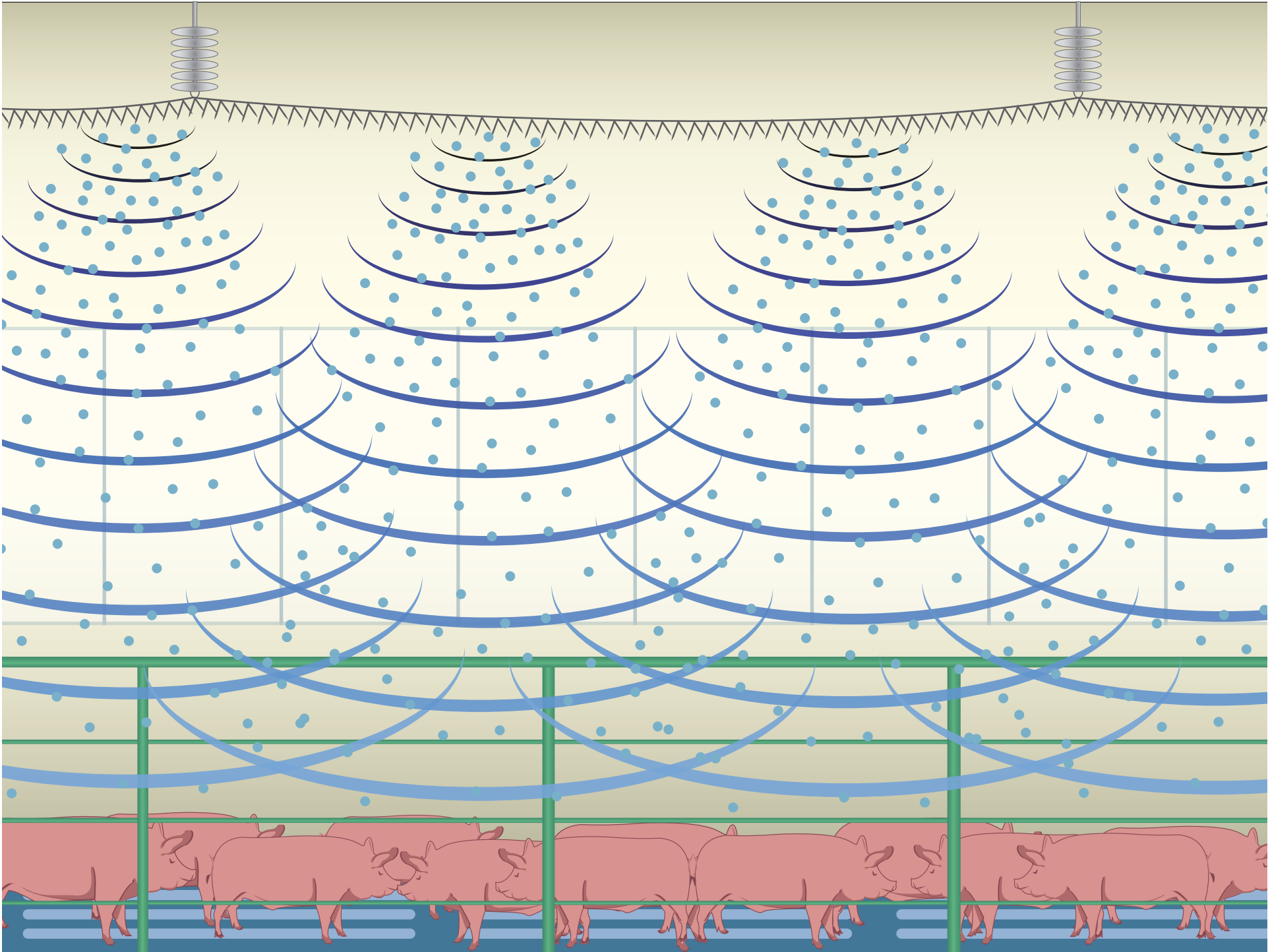
## Hydrogen Sulfide: EPI v. Control

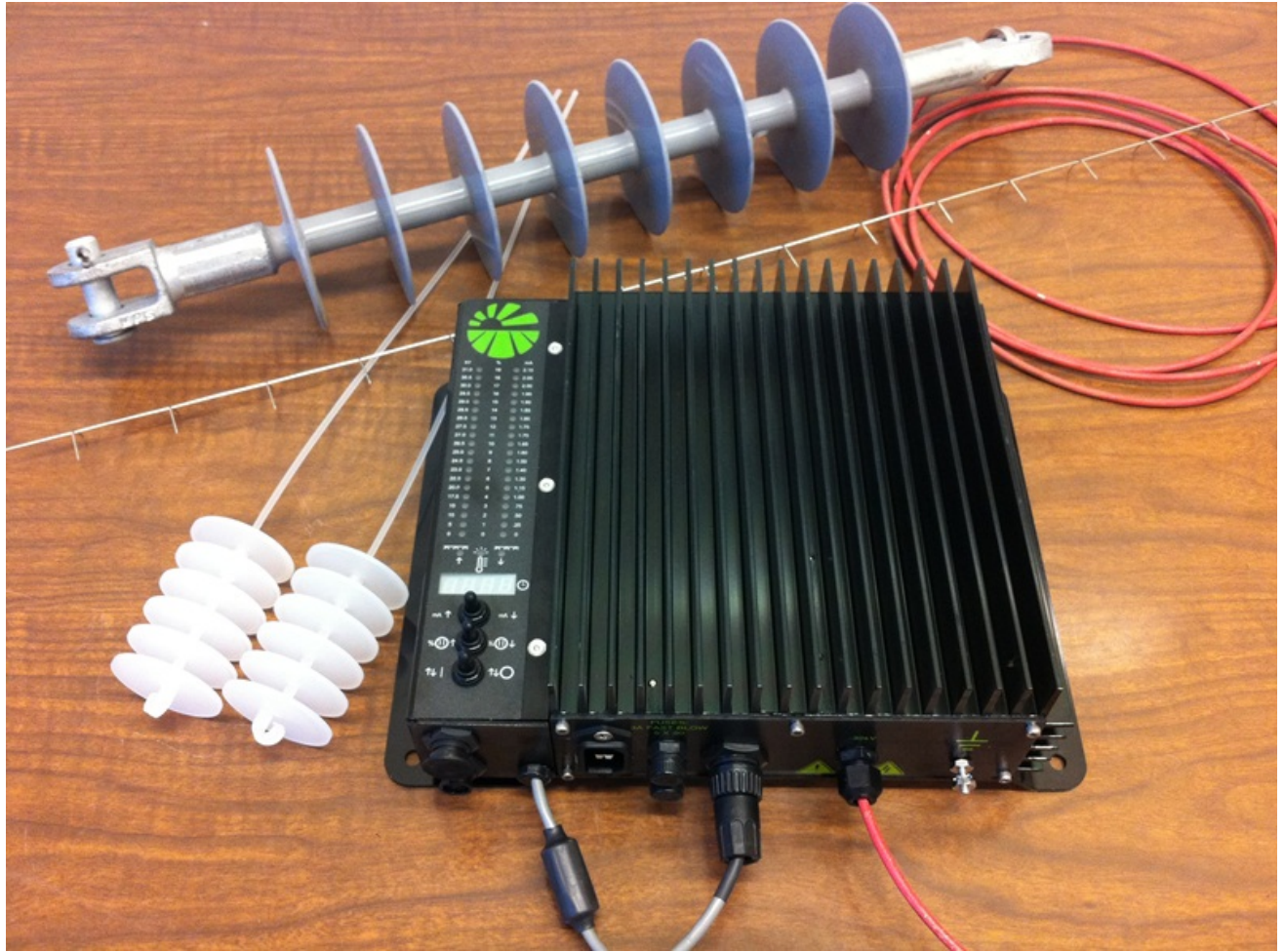
P value = 95% confidence











**The basic components of the EPI System have no moving parts.** A power supply, specially designed to withstand a corrosive environment, delivers ions under “high-pressure” into the air through stainless steel corona points. The corona line is insulated from a ground via insulators.



The power supply is mounted inside, or outside, the production room. Common 110-220 Volt, 50-60 Hz electric service is required. **The maximum wattage draw of one power supply is approximately 100 watts.** Specially designed red wire delivers the ions to the corona lines. Gray wires communicate with the automation switches and motor.





Stainless steel wire cabling is installed on the surface of a ground plane (usually the ceiling) and feeds to a central automated winch that lifts the corona line closer to the ground plane. **This patented system maintains the ion flow of the EPI system to optimize the delivery of ions over time.**



**Our patented stainless steel corona points are attached to a stainless steel cable, which is stretched across the length of the production room.** The corona line is connected to the lift system cabling via specially designed ceiling insulators spaced regularly along the length of the corona line. When the lift system winch spools cable, the ceiling insulators are pulled through the lift system cable support eyelets which, in turn, lift the corona line closer to the ground plane.





Polarized dust particles collect on the nearest grounded surfaces first, as shown on the ceiling and feed pipe. This EPI system had only been operating for two days in the swine nursery production room pictured. Collected dust is no longer available in the air to cause stress on the animals' respiratory systems. This allows the animals to grow faster. **EPI air is the best ventilation enhancement in decades.**



Another photo in the same room shows dust collecting on the feed motor. The EPI System requires a paradigm shift in thought about room cleanliness. **Dust collected on surfaces is much superior to dust suspended in the air.** Removing dust from the air enhances ventilation and reduces stress on the respiratory system, allowing pigs to grow faster. Again, this photo was taken after only two days of EPI System operation.



A thick dust layer can be collected, as shown in these photos taken inside this Iowa wean-to-finish barn. **This 12 gauge wire has attracted a 1" diameter layer of dust.** When the animal production phase has been completed, wash and clean the room as normally done. When the EPI System is turned off, nearly all the components may be power washed.



# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 1-5: April 28, 2009 to April 2, 2010

Test - Two Production Rooms with EPI - 22,077 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

	Technology Test		Difference	P - Value	Percent Change
	EPI	None	EPI - None		
<b>Growth Performance<sup>b</sup></b>					
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	14.8	14.8	0.0	0.9	--
ADG, lb	1.01	0.9	0.11	0.001	12.2%
Weight, day 45, lb	56.4	51.6	4.8	0.001	9.3%
Percent Mortality	3.4	4.6	-1.2	0.001	-26.1%
<b>Gas Level<sup>c</sup></b>					
day 45 post placement					
Odor Threshold (units/m <sup>3</sup> )	694	856	-162	0.3	-18.9%
Hydrogen Sulfide (H <sub>2</sub> S), PPM	0.29	0.7	-0.41	0.05	-58.6%
Ammonia (NH <sub>3</sub> ), PPM	1.8	4.0	-2.2	0.2	-55.0%
<b>Dust Particle Counts<sup>d</sup></b>					
day 45 post placement					
Dust Particulates, 0.05um	4853	8527	-3674	0.001	-43.1%
Dust Particulates, 2.5um	2376	4514	-2138	0.001	-47.4%
Dust Particulates, 10.0um	429	1015	-586	0.001	-57.7%

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes one turn of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental units with 10 samples per treatment.

<sup>c</sup> Two samples were collected from each room in each barn. The mean of both samples was used as the experimental units with 3 samples per treatment (one set of samples leaked air).

<sup>d</sup> Multiple dust samples were collected throughout the trial period. Sample data was pooled by room and room means were used as the experimental units with 10 samples per treatment.

# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 1-5: April 28, 2009 to April 2, 2010

Test - Two Production Rooms with EPI - 22,077 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

## Barn 4\*

	Technology Test		Difference	P - Value	Percent Change
Growth Performance <sup>b</sup>	EPI	None	EPI - None		
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	15	14.8	0.2	0.5	--
ADG, lb	1.04	0.9	0.14	0.002	15.6%
Weight, day 45, lb	57.8	51.7	6.1	0.004	11.8%
Percent Mortality	4.2	4.3	-0.1	0.7	-2.3%
Gas Level <sup>c</sup>					
day 45 post placement					
Odor Threshold (units/m <sup>3</sup> )	694	750	-56.5	0.6	-7.5%
Hydrogen Sulfide (H <sub>2</sub> S), PPM	0.27	0.98	-0.7	--	-71.4%
Ammonia (NH <sub>3</sub> ), PPM	2.0	6.0	-4.0	--	-66.7%
Dust Particle Counts <sup>d</sup>					
day 45 post placement					
Dust Particulates, 0.05um	5771	9525	-3754	0.009	-39.4%
Dust Particulates, 2.5um	3072	5228	-2156	0.009	-41.2%
Dust Particulates, 10.0um	598	1274	-676	0.02	-53.1%

\* Older barn with perceived lower ventilation efficiency.

## Barn 5\*\*

	Technology Test		Difference	P - Value	Percent Change
Growth Performance <sup>b</sup>	EPI	None	EPI - None		
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	14.6	14.7	0.2	0.7	--
ADG, lb	0.98	0.9	0.09	0.13	10.0%
Weight, day 45, lb	54.9	51.5	3.4	0.09	6.6%
Percent Mortality	2.7	3.7	-1.0	0.001	-27.0%
Gas Level <sup>c</sup>					
day 45 post placement					
Odor Threshold (units/m <sup>3</sup> )	749	962	-213	0.6	-22.1%
Hydrogen Sulfide (H <sub>2</sub> S), PPM	0.30	0.76	-0.5	0.2	-65.8%
Ammonia (NH <sub>3</sub> ), PPM	2.0	5.0	-3.0	0.2	-60.0%
Dust Particle Counts <sup>d</sup>					
day 45 post placement					
Dust Particulates, 0.05um	3935	7528	-3593	0.002	-47.7%
Dust Particulates, 2.5um	1681	3799	-2118	0.002	-55.8%
Dust Particulates, 10.0um	261	756	-495	0.008	-65.5%

\*\* Newer barn with perceived higher ventilation efficiency.

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns during 5 turns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes five turns of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental units with 10 samples per treatment.

<sup>c</sup> Two samples were collected from each room in each barn. The mean of both samples was used as the experimental units with 3 samples per treatment (one set of samples leaked air).

<sup>d</sup> Multiple dust samples were collected throughout the trial period. Sample data was pooled by room and room means were used as the experimental units with 10 samples per treatment.

# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 1: April 28, 2009 to June 6, 2009

Test - Two Production Rooms with EPI - 4,338 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

	Technology Test		Difference	P - Value	Percent Change
<b>Growth Performance<sup>b</sup></b>	EPI	None	EPI - None		
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	14.6	14.3	0.3	0.2	--
ADG, lb	1.01	0.91	0.09	0.3	9.9%
Weight, day 45, lb	55.9	51.7	4.2	0.3	8.1%
Percent Mortality	1.6	3.7	-2.1	0.001	-56.8%
<b>Gas Level<sup>c</sup></b>					
day 45 post placement					
Odor Threshold (units/m <sup>3</sup> )	684	1067	-383	0.2	-35.9%
Hydrogen Sulfide (H <sub>2</sub> S), PPM	0.27	0.78	-0.51	0.2	-65.4%
Ammonia (NH <sub>3</sub> ), PPM	1.8	4.0	-2.3	0.4	-57.5%
<b>Dust Particle Counts<sup>d</sup></b>					
day 45 post placement					
Dust Particulates, 0.05um	5394	8585	-3191	0.3	-37.2%
Dust Particulates, 2.5um	2092	4416	-2324	0.1	-52.6%
Dust Particulates, 10.0um	884	2070	-1186	0.08	-57.3%

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes one turn of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental unit with 2 samples per treatment.

<sup>c</sup> Two samples were collected from each room in each barn. The means were pooled by room and the pooled means were used as the experimental units with 2 samples per treatment (one set was not analyzed).

<sup>d</sup> Multiple dust samples (96) were collected throughout the trial period. Sample data was pooled by room and room means were used as the experimental units with 2 samples per treatment.

# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 2: June 9, 2009 to August 21, 2009

Test - Two Production Rooms with EPI - 4,782 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

	Technology Test		Difference	P - Value	Percent Change
<b>Growth Performance<sup>b</sup></b>	EPI	None	EPI - None		
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	15.3	15.3	0.0	1.0	--
ADG, lb	0.96	0.93	0.03	0.8	<b>3.2%</b>
Weight, day 45, lb	54.7	53.4	1.3	0.8	<b>2.4%</b>
Percent Mortality	4.2	5.1	-0.9	0.14	<b>-17.6%</b>
<b>Gas Level<sup>c</sup></b>					
day 45 post placement					
Odor Threshold (units/m <sup>3</sup> )	705	645	60	0.2	<b>9.3%</b>
Hydrogen Sulfide (H <sub>2</sub> S), PPM	0.33	0.53	-0.2	--	<b>-37.7%</b>
Ammonia (NH <sub>3</sub> ), PPM	2.0	4.0	-2.0	--	<b>-50.0%</b>
<b>Dust Particle Counts<sup>d</sup></b>					
day 45 post placement					
Dust Particulates, 0.05um	5318	7219	-1901	<b>0.03</b>	<b>-26.3%</b>
Dust Particulates, 2.5um	2509	3268	-759	0.2	<b>-23.2%</b>
Dust Particulates, 10.0um	374	667	-293	<b>0.01</b>	<b>-43.9%</b>

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes one turn of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental unit with 2 samples per treatment.

<sup>c</sup> Two samples were collected from each room in each barn. The mean of one sample was all the data available 1 sample per treatment (\*Note: one set of samples was mistakenly not analyzed by ISU Olfactory Lab). No statistical comparison could be made.

<sup>d</sup> Multiple dust samples (181) were collected throughout the trial period. Sample data was pooled by room and room means were used as the experimental units with 2 samples per treatment.

# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 3: October 17, 2009 to December 11, 2009

Test - Two Production Rooms with EPI - 4,406 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

	Technology Test		Difference	P - Value	Percent Change
<b>Growth Performance<sup>b</sup></b>	EPI	None	EPI - None		
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	14.8	14.7	0.1	0.4	--
ADG, lb	0.97	0.85	0.12	0.14	<b>14.1%</b>
Weight, day 45, lb	54.5	49.4	5.1	0.3	<b>10.3%</b>
Percent Mortality	3.4	4.1	-0.7	0.2	<b>-17.1%</b>
<b>Dust Particle Count<sup>c</sup></b>					
day 45 post placement					
Dust Particulates, 0.05um	5365	10410	-5045	0.1	<b>-48.5%</b>
Dust Particulates, 2.5um	2972	5913	-2941	0.08	<b>-49.7%</b>
Dust Particulates, 10.0um	163	467	-304	0.1	<b>-65.1%</b>

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes one turn of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental unit with 2 samples per treatment.

<sup>c</sup> Weekly dust samples were collected throughout the trial period in all rooms. Sample data (240/trt) was pooled by room and room means were used as the experimental units with 2 samples per treatment.

# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 4: December 18, 2009 to February 12, 2010

Test - Two Production Rooms with EPI - 4,305 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

	Technology Test		Difference	P - Value	Percent Change
	EPI	None	EPI - None		
<b>Growth Performance<sup>b</sup></b>					
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	14	14.3	-0.3	0.4	--
ADG, lb	1.1	1.04	0.06	0.09	5.8%
Weight, day 45, lb	59.2	57	2.2	0.05	3.9%
Percent Mortality	4.0	6.9	-2.9	0.001	-42.0%
<b>Dust Particle Count<sup>c</sup></b>					
day 45 post placement					
Dust Particulates, 0.05um	4587	8810	-4224	0.08	-47.9%
Dust Particulates, 2.5um	2300	4595	-2295	0.05	-49.9%
Dust Particulates, 10.0um	340	861	-521	0.05	-60.5%

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes one turn of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental unit with 2 samples per treatment.

<sup>c</sup> Weekly dust samples were collected throughout the trial period in all rooms. Sample data (240/trt) was pooled by room and room means were used as the experimental units with 2 samples per treatment.

# The EPI Technology Effect

Nursery Production Trial: Murphy-Brown LLC (Circle 4 Farms)

Turn 5: February 5, 2010 to April 2, 2010

Test - Two Production Rooms with EPI - 4,246 hd (barn 4 and barn 5)<sup>a</sup>

Control - Two Production Rooms without EPI (barn 3 and barn 6)

	Technology Test		Difference	P - Value	Percent Change
<b>Growth Performance<sup>b</sup></b>	EPI	None	EPI - None		
day 3 - day 45 post placement					
Initial Weight, lb (day 3 post placement)	15.3	15.3	0.0	0.6	--
ADG, lb	0.93	0.86	0.07	0.3	<b>8.1%</b>
Weight, day 45, lb	53.5	50.4	3.1	0.2	<b>6.2%</b>
Percent Mortality	3.0	3.3	-0.3	0.4	<b>-9.1%</b>
<b>Dust Particle Count<sup>c</sup></b>					
day 45 post placement					
Dust Particulates, 0.05um	3601	7609	-4008	0.05	<b>-52.7%</b>
Dust Particulates, 2.5um	2009	4376	-2367	0.04	<b>-54.1%</b>
Dust Particulates, 10.0um	386	1011	-625	0.09	<b>-61.8%</b>

<sup>a</sup> Weaned pigs from two sow farms were placed in one of two nursery barns. Pigs from each sow farm were unloaded into a common hallway and allowed to co-mingle, then placed into pens without size sorting. Trial data includes one turn of 2 barns. All differences due to barn and turn were included in the statistical model, but not shown above.

<sup>b</sup> Room sample means were used as the experimental unit with 2 samples per treatment.

<sup>c</sup> Weekly dust samples were collected throughout the trial period in all rooms. Sample data (240/trt) was pooled by room and room means were used as the experimental units with 2 samples per treatment.