

**noHow**  
IMPROVES FARM BUSINESS

# The maXipig

Michel Loicq

18 months of mXp-experience

# History

- What about germs in semen?
  - Bacteria
  - Virus
- How to sterilize the semen?
  - Antibiotics
  - UV light
  - Other supplementations

# First attempts....

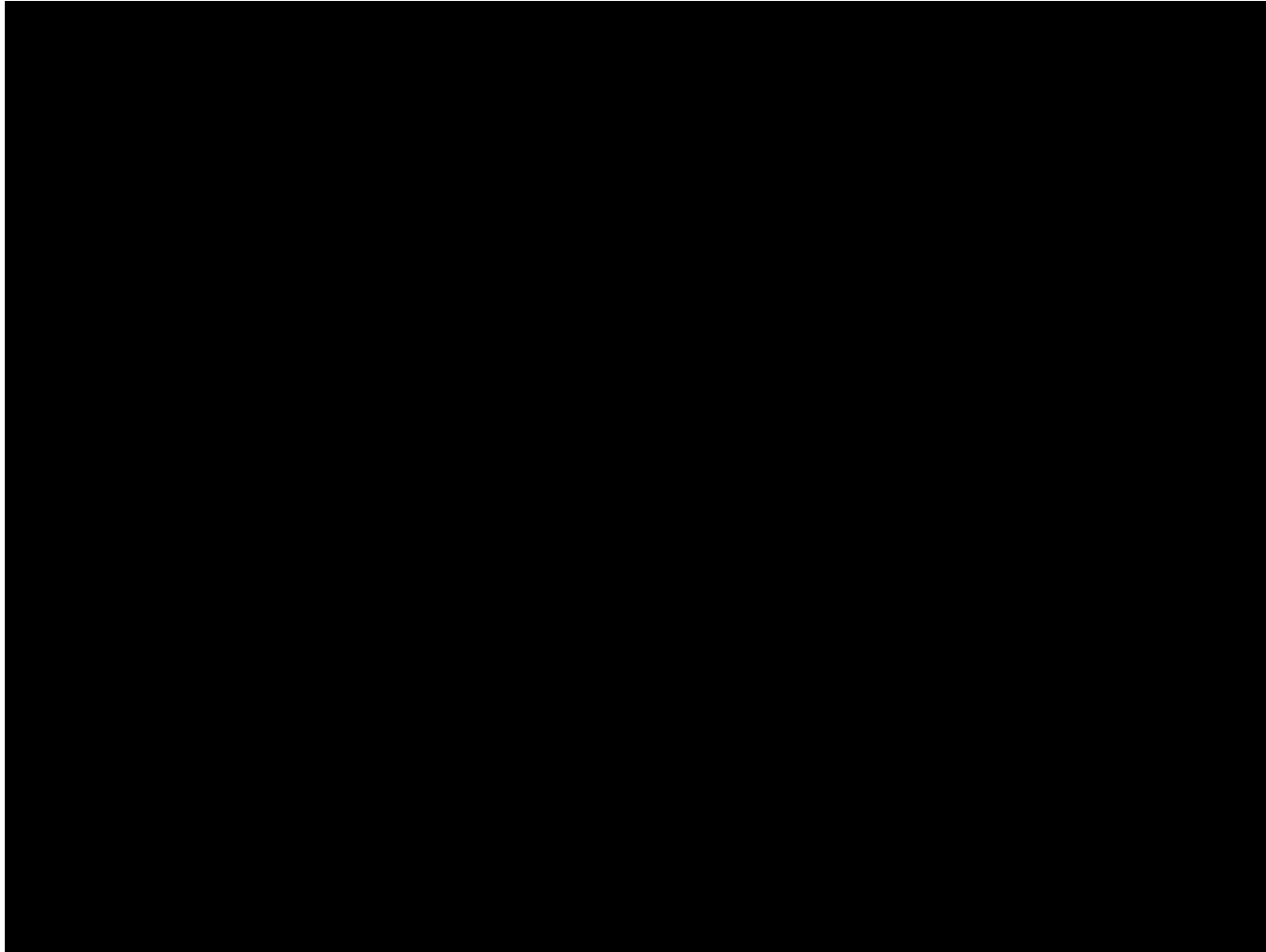
## PEARS?

- Some depopulation-repopulation
  - High health herds: PEARs-free
  - Situation AI centers in Belgium:  
No safe semen within Belgium
  - Same problem in Spain
- >>> Effect of using ultraviolet light photo-stimulated disinfection
- >>> University of Barcelona and Gerona

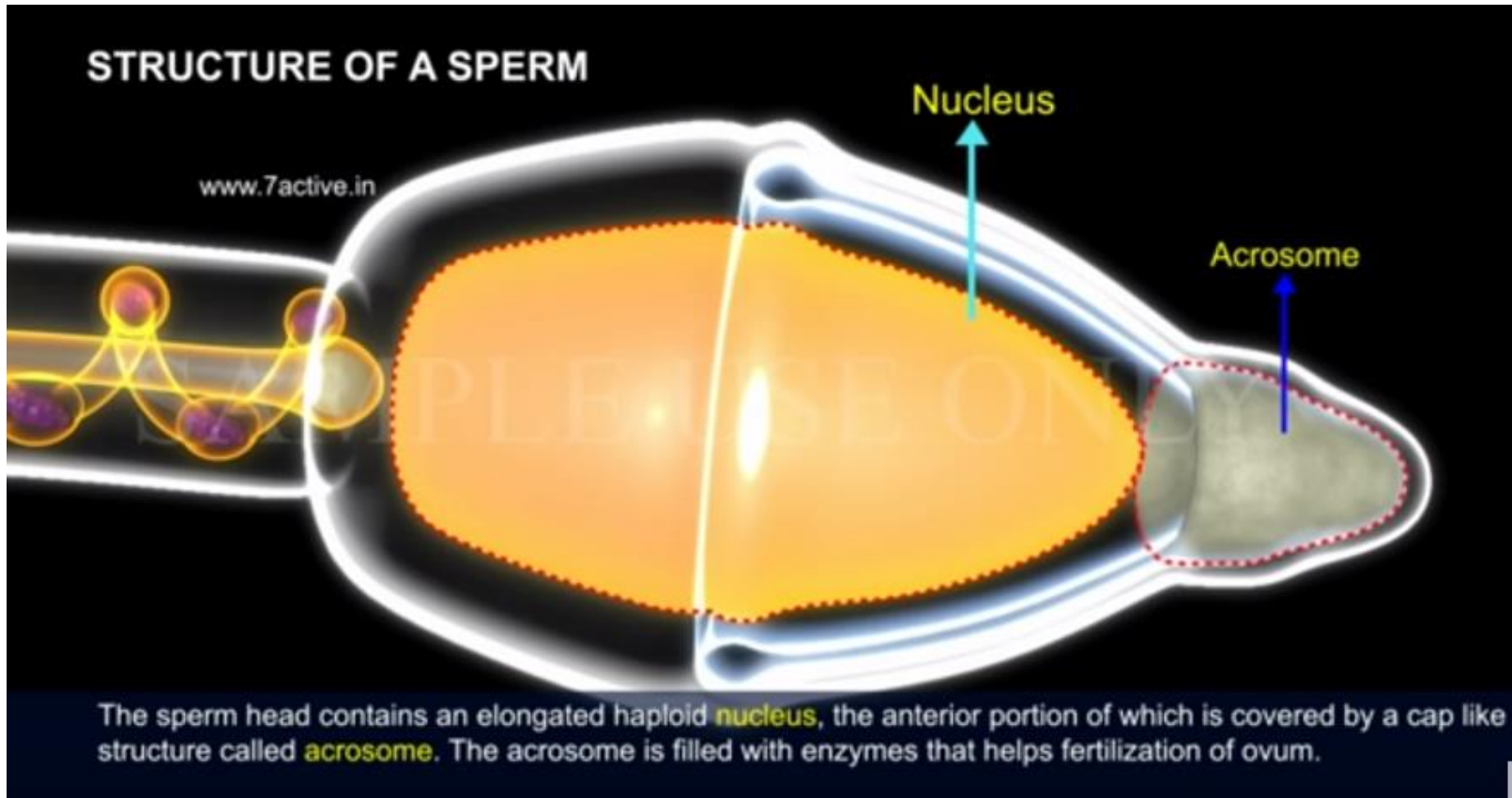
# Marc Yeste, U Barcelona

- Ultraviolet bactericid and virocid
- Also damaging spermatozoïds
- Decision:
  - Use other light/ frequencies/ time protocols
  - Use of infrared treatment
- Conclusion:
  - No effect on bacteria nor virusses
  - Effect on viability/ motility and acrosomic capacitation

# Spermatozoïds: Viability and motility



# Spermatozooids: capactation acrosome



Source: 7active studio

# Easier entry to the ovum



Source: 7active studio

## Viability following incubation at 37°C in function of time

TIME	CONTROL	maXipig®	SIGNIFICANCE
0 min.	93,5 ±2,0%	<b>92,1 ±1,6%</b>	NS
15 min.	92,8 ±2,4%	<b>93,0 ±1,1%</b>	NS
30 min	92,1 ±1,9%	<b>93,0 ±2,1%</b>	NS
60 min	66,8 ±1,0%	<b>90,5 ±1,9%</b>	*
90 min	60,3 ±1,2%	<b>94,6 ±2,3%</b>	*

Source: Yeste M. et al. **Specific LED-based red light photo-stimulation procedures improve overall sperm function and reproductive performance of boar ejaculates.** Scientific Reports 2016 Mar 2;6:22569

maXipig<sup>6</sup>

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Acrosome integrity following incubation at 37°C in function of time.

TIME	CONTROL	maXipig®	SIGNIFICANCE
0 min.	95,0 ±2,1%	<b>95,8 ±2,3%</b>	NS
15 min.	94,1 ±2,0%	<b>95,8 ±2,3%</b>	NS
30 min	93,7 ±1,5%	<b>95,0 ±1,9%</b>	NS
60 min	85,1 ±1,1%	<b>96,3 ±2,4%</b>	*
90 min	70,7 ±1,1%	<b>92,8 ±2,5%</b>	*

Source: Yeste M. et al. **Specific LED-based red light photo-stimulation procedures improve overall sperm function and reproductive performance of boar ejaculates.**  
Scientific Reports 2016 Mar 2;6:22569

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# References

OPEN

**Specific LED-based red light  
photo-stimulation procedures  
improve overall sperm function and  
reproductive performance of boar  
ejaculates**

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Published: 02 March 2016

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Alejandro Peña<sup>1</sup>, Sergi Bonet<sup>5</sup> & Joan E. Rodríguez-Gil<sup>1</sup>

# References

## Red light improves spermatozoa motility and does not induce oxidative DNA damage

Daryl Preece, Kay W. Chow, Veronica Gomez-Godinez, Kyle Gustafson, Selin Esener, Nicole Ravida, Barbara Durrant & Michael W. Berns

*Scientific Reports* **7**, Article number: 46480 (2017)

doi:10.1038/srep46480

Download Citation

Cellular microbiology Cellular motility

DNA damage response Imaging and sensing

Infertility

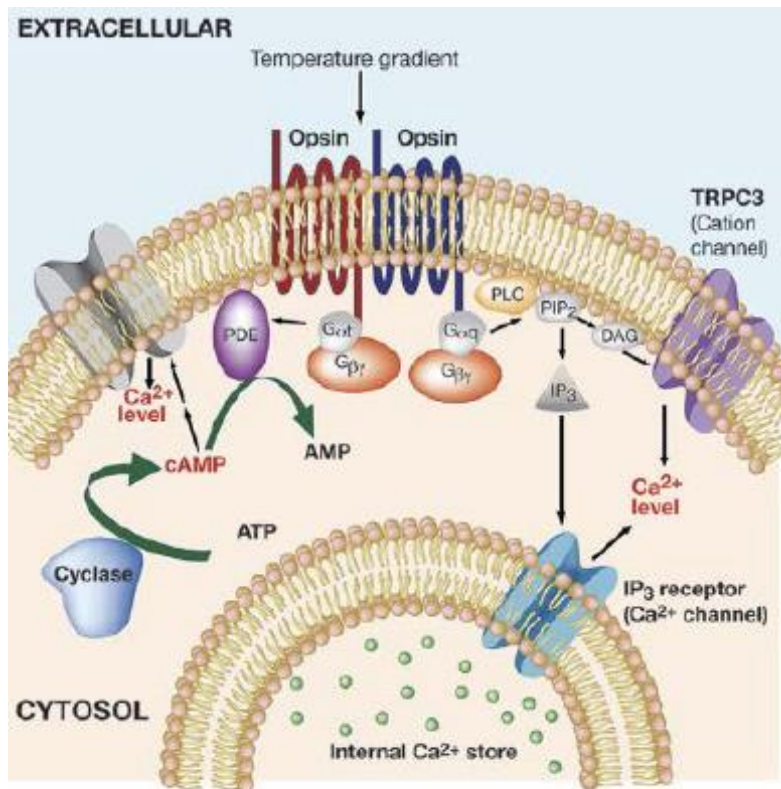
Received: 27 October 2016

Accepted: 17 March 2017

Published online: 20 April 2017

# How is this possible???

- Energy restoring procedure?



KREBS cycle

Pérez-Cerezales et al. (2015) Sci Rep 5: 16146

# Start field trials

- Spain (M. Yeste et al, 2014-2015)
- 2 herds of +/- 600 sows
- Fertility rate : + 4.4%
- TBP: + 1.4 piglets per cycle
- Published in 2016

# Fertily and prolificacy

“In vivo” Fertility parameters of boar sperm ejaculates subjected to a previous photo-stimulation procedure

Treatment	N	Farrowing rate (%)	Total piglets at parturition	Live-born piglets at parturition
Control	800	83,7	13,5±0,2	12,7±0,2
<b>maXipig®</b>	<b>520</b>	<b>88,1*</b>	<b>14,9±0,3*</b>	<b>14,0±0,2*</b>

N = Number of sows

Source: Yeste M. et al. Specific LED-based red light photo-stimulation procedures improve overall sperm function and reproductive performance of boar ejaculates. Scientific Reports 2016 Mar 2;6:22569

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# Extended trials in 8 herds

- Spain (S. Balach and J. E. Rodriguez-Jil, 2014-2015)
- Published in 2016

Farm	Start date	Finish date	Nº sows	Genetic line	Semen supplier	AI type	Boar breed
5 *	02/08/2014	31/12/2015	1320	A	a	60ml/2 billion sp	Duroc / Pietrain <b>First</b>
2	28/04/2015	31/12/2015	750	A	a	60ml/2 billion sp	Landrace / Largewhite / Duroc / Pietrain
3	01/07/2015	31/12/2015	2200	A	b	90ml/3 billion sp	Pietrain
4	02/07/2015	31/12/2015	1500	B	c	45ml/1,5 billion sp	Pietrain
7	02/07/2015	31/12/2015	1500	C/D	a	45ml/1,5 billion sp	Duroc
6	06/07/2015	31/12/2015	500	A	a	45ml/1,5 billion sp	Pietrain
9	10/07/2015	31/12/2015	750	B	a	45ml/1,5 billion sp	Pietrain
8	16/07/2015	31/12/2015	1000	A	a	90ml/3 billion sp	Pietrain
10	02/09/2015	31/12/2015	800	A	a	45ml/1,5 billion sp	Pietrain

# Fertility

“In vivo” Farrowing rate of boar sperm ejaculates subjected to a previous photo-stimulation procedure. Extended tests\*.

Treatment	N	Farrowing rate (%)
Control	6833	90,0
Photo-stimulated	3044	92,3

N = Number of sows

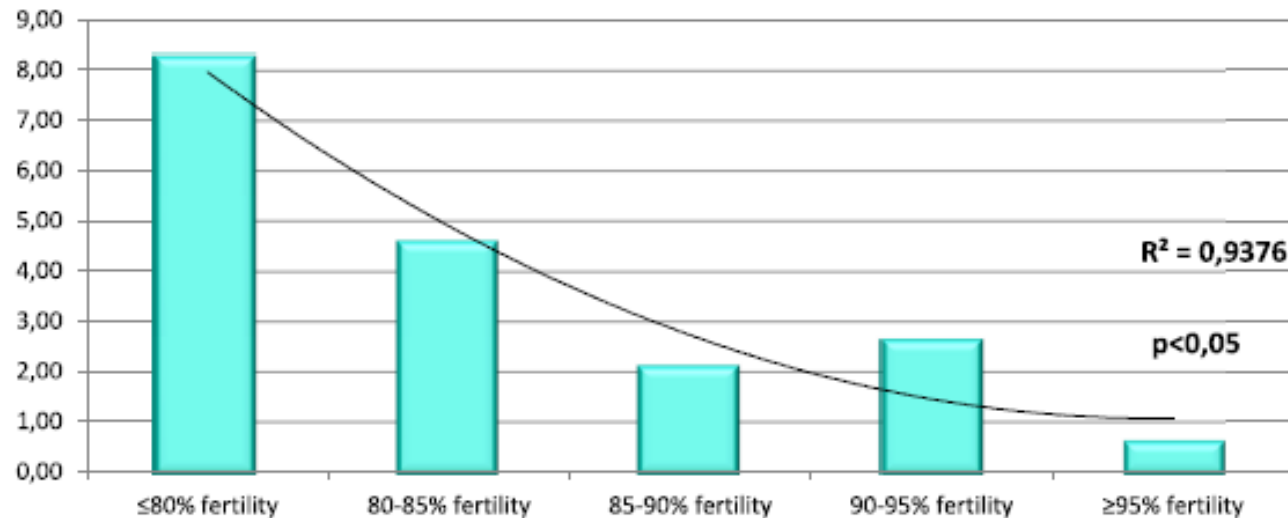
**+1.3 TBP**



# Fertility

Range	Nº sows CONTROL	Nº sows LED	% Fertility CONTROL	% Fertility LED	LED batch improvement
≤80% fertility	118	116	77,119	85,345	+8,226
80-85% fertility	1338	191	83,931	88,482	+4,551
85-90% fertility	1865	1032	89,383	91,472	+2,089
90-95% fertility	1958	1407	90,500	93,105	+2,605
≥95% fertility	1554	298	96,396	96,979	+0,583

difference between range groups of fertility index farms



# Start trials in Belgium/ France

Two possibilities:

1. Simultaneous trials = at the same moment
2. Consecutive trials = before and after

# 1. Simultaneous trial

- Attention:
- Same genetics equally divided for:
  - Same amount of sows/ gilts Control-maXipig
  - Same parities in both groups
  - Gilts
  - Boars
  - Lactation period
  - Housing (windows or not?)
  - ((Interval weaning-insemination control afterwards))

# First trial Belgium

- 220 Hypor sows
- 4 batches
- Each batch: 25/25
- 1 cycle completed

# Making the groups

Concerning	Number	Parity	Average TB	Insemination With Maxipig weaned on 15th feb
26 sows	714	0	NA	-
	713	0	NA	-
	710	0	NA	-
	709	0	NA	-
	711	0	NA	-
	665	1	10	-
	668	1	17	-
	662	1	16	-
	596	3	13	-
	592	3	15,5	-
	578	3	17,5	-
	586	3	15,5	-
	589	3	19	-
	562	4	15,3	-
	554	4	16	-
	560	4	13,6	-
	552	4	13,7	-
	467	6	16	-
	432	7	13,6	-
	437	7	13,5	-
	434	7	15,5	-
	455	6	10,2	-
	425	7	14,4	- See 559
	525	5	14,1	- See 594
	546	4	20	- See 630
	581	3	15	-
<b>Results in average</b>		<b>4,10</b>	<b>14,97</b>	

28 sows	594	3	14,5	X See 525
	712	0	NA	X
	715	0	NA	X
	717	0	NA	X
	716	0	NA	X
		0	NA	X
	667	1	10	X
	669	1	15	X
	666	1	15	X
	610	2	21	X
	628	2	13	X
	595	3	15,5	X
	590	3	14	X
	558	4	18,3	X
	542	4	16	X
	541	4	16,7	X
	561	4	16,7	X
	556	4	14	X
	461	6	17,4	X
	469	6	14,6	X
	468	6	14	X
	435	7	12,2	X
	439	7	13,5	X
	441	7	13,8	X
	404	8	14,6	X
	405	8	12,2	X
	559	4	13,6	X See 425
	630	1	17	X See 546
<b>Total resultados</b>		<b>4,17</b>	<b>14,90</b>	

# Getting the results

Concerning	Number	Parity	Average TB	Insemination With Maxipig weaned on 15th feb	Tested on 20th march	Average total born					
26 sows	714	0	NA	-	ok	16	3	14,5	X See 525	ok	15
	713	0	NA	-	ok	16	0	NA	X	ok	15
	710	0	NA	-	ok	18	0	NA	X	ok	17
	709	0	NA	-	ok	19	0	NA	X	ok	18
	711	0	NA	-	Negatif		0	NA	X	ok	15
	665	1	10	-	ok	18	0	NA	X		
	668	1	17	-	ok	14	1	10	X	ok	11
	662	1	16	-	ok		1	15	X	ok	14
							1	15	X	ok	17
							2	21	X	ok	16
							2	13	X	ok	20
	596	3	13	-	ok	16	3	15,5	X	ok	20
	592	3	15,5	-	ok	19	3	14	X	ok	15
	578	3	17,5	-	ok	18	4	18,3	X	ok	21
	586	3	15,5	-	ok	14	4	16	X	ok	16
	589	3	19	-	Negatif		4	16,7	X	ok	14
	562	4	15,3	-	ok		4	16,7	X	ok	17
	554	4	16	-	ok		4	14	X	ok	13
	560	4	13,6	-	ok	15	4	14	X	ok	13
	552	4	13,7	-	ok	18	6	17,4	X	ok	17
	467	6	16	-	ok	14	6	14,6	X	ok	14
	432	7	13,6	-	ok	17	6	14	X	ok	11
	437	7	13,5	-	ok	4	7	12,2	X	ok	11
	434	7	15,5	-	ok	15	7	13,5	X	ok	15
	455	6	10,2	-	ok	11	7	13,8	X	ok	15
	425	7	14,4	- See 559	ok	8	7	13,8	X	ok	15
	525	5	14,1	- See 594	ok	24	8	14,6	X	ok	15
	546	4	20	- See 630	ok	11	8	12,2	X	ok	18
	581	3	15	-	ok	19	4	13,6	X See 425	ok	15
							1	17	X See 546	ok	26
<b>Results in average</b>		<b>4,10</b>	<b>14,97</b>			<b>15,429</b>	<b>4,17</b>	<b>14,90</b>			<b>15,96</b>

# Results first trial

			Trial results			
# Sows			Fertility		TB	
	Control	maXipig	Control	maXipig	Control	maXipig
Group I	26	27	92,31	100	15,43	15,96
Group II	25	25	92,00	100	15,61	16,76
Group III	26	26	96,15	96,15	15,75	16,42
Group IV	26	25	96,15	100	16,36	16,58
Total weight	103	103	94,15	99,04	15,60	16,38
Results maXipig -control +/-			4,88		0,78	

# Return on the investment ROI

ROI in months		Control	Maxipig
9	# sows	200	
	Fertility rate	94,15	99,04
	Failure (€/%)	1,25	
	Pigletprice (7kg) (€)	25	
	Farowing Index	2,35	
	Pre weaning mortality (%)	13	
	Total Born	15,60	16,38
	Dead Born +Mm	1,3	1,5
	Life Born	14,28	14,85
	<b>ECONOMY</b>		
	Fertility (€/sow/year)		14,3
	Extra Piglets (€/sow/year)		29,18
	<b>TOTAL FARM RESULT</b> €/year		8.705



## 2. Consecutive trial

- Attention see continuous trial
  - Same genetics sows
  - Same genetics boars
  - Same management
  - Insemination centre
  - Grouphousing
  - Groupes
  - Inseminator...

# Exemple “before”

## Average previous groups

	AI	Echo neg	Echo Pos		TBP/Sow	TBP/group	TBP/AI	LBP/sow	LBP/Group	LBP/AI
BEST ever	176	5	171	97,16	15	2565	14,57	14,16	2421,36	13,76
	169	6	163	96,45	14,53	2368,39	14,01	13,74	2239,62	13,25
	173	3	170	98,27	14,25	2422,5	14,00	13,72	2332,40	13,48
	1	0	1	100,00	16	16	16,00	16,00	16,00	16,00
	171	2	169	98,83	14,85	2509,65	14,68	14,28	2413,32	14,11
	4	1	3	75,00	9,5	28,5	7,13	9,50	28,50	7,13
	163	4	159	97,55	14,23	2262,57	13,88	13,56	2156,04	13,23
	169	5	164	97,04	15	2460	14,56	14,00	2296,00	13,59
	1	0	1	100,00	11	11	11,00	11,00	11,00	11,00
	169	6	163	96,45	14,4	2347,2	13,89	13,62	2220,06	13,14
	168	6	162	96,43	14,42	2336,04	13,91	13,57	2198,34	13,09
	166	3	163	98,19	14,17	2309,71	13,91	13,41	2185,83	13,17
	172	12	160	93,02	13,68	2188,8	12,73	12,96	2073,60	12,06
	170	9	161	94,71	13,83	2226,63	13,10	13,15	2117,15	12,45
	1872		1810			26051,99	13,92		24709,22	13,20
	%age drachtig		96,69	TBP/sow		14,39	TBP/AI	LBP/sow	13,65	LBP/AI

# Exemple “after”

## maXipig

	Echo neg			TBP/Sow	TBP/grou	TBP/insemination	LBP/sow	LBP/Group	LBP/AI
169	4	165,00	97,63	15,19	2506,35	14,83	14,41	2377,65	14,07
166	1	165,00	99,40	15,61	2575,65	15,52	14,7	2425,5	14,61
335		330,00			5082	15,17		4803,15	14,34
<b>Positif</b>		98,51	TBP/sow		15,40	TBP/AI	LBP/sow	14,555	LBP/AI

# Summary

Average	Positif	TBP/S	TBP/KI	LBP/S	LG/KI
Gemiddelde	96,69	14,39	13,92	13,65	13,20
mXp	98,51	15,40	15,17	14,555	14,34
Total diff	1,82	1,01	1,25	0,90	1,14

# Return on investment ROI

## General

	Weaned	0,80		
Return calculated out of		Return out of sow inseminated	Total amount weaned	Return per year
Fertility	3929,97	Weaned piglets	20907,80	522695,04
Weaned	35778,49		22711,01	567775,34
Higher pregnancy	10930,00			
<b>Total</b>	<b>50638,45</b>			<b>45080,30</b>
<b>Payback in months</b>			<b>1,54</b>	

# Return on investment ROI

Best ever

Best ever	Fertility	TBP/s	TBP/KI	LBP/S	LG/AI
Best ever	97,16	15	14,57	14,16	13,76
mXp	98,51	15,19	14,83	14,41	14,34
Total	1,35	0,19	0,26	0,25	0,58
			<b>Weaned</b>	0,22	
		<b>ROI</b>	<b>% Fertility</b>	3033,84	
			<b>Piglets</b>	9752,24	
			<b>Totaal</b>	12786,08	
		<b>Payback in months</b>	6,10		

# Meanwhile

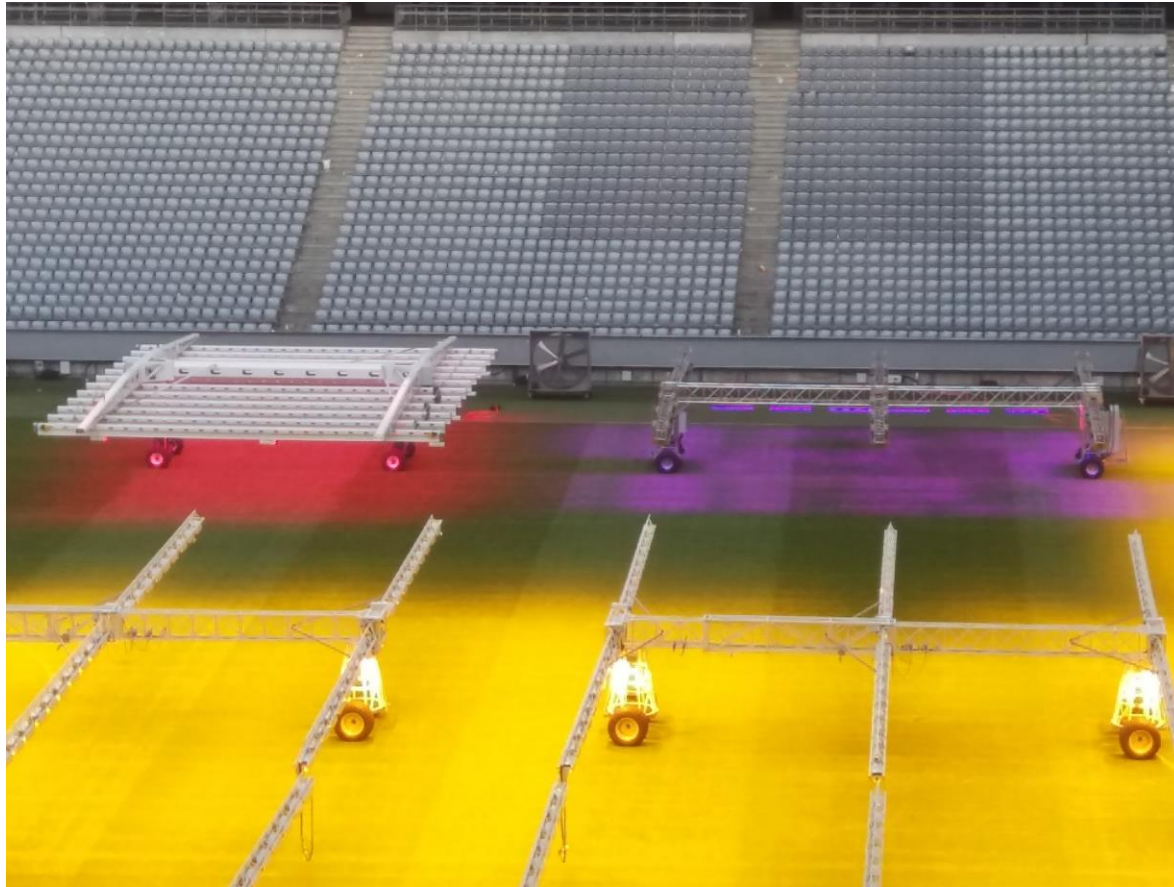
- More than 40 units all over the world
- 18 +/- representable trials
- 40 happy farmers
- 25 “good” feelings

# Overview until today

Country	Name	Brand	Male	Group	Quantity	Fertility before	TBP before	Fertility	TBP	LBP	Follow up	Status	Consistent Fertility	TBP	Remarks	
Belgium	GDB 201702	Hypor		CTR	103		15,24	94,15	15,6	14,28	ML	Completed	Yes +++++	Yes +++	OK	
	200 5WS			mXp	103		15,29	99,04	16,38	14,58					Trial as asked	
	FVL 201701	Danbred		CTR	180			83,2	18,9	16,4	ML	Completed	No	Yes =	No consistency in sending results	
	1200 2WS			mXp	240			89,4	18,9	16,82					No preweaning selection	
	FDP 201709	Danbred		CTR	0						ML/TVM		Yes		14 gilts group I only 8/14 +???	
	500 4WS			mXp	101	Listing?		93,07							No trial	
	PR 201709	Danbred (?)		CTR	0							ML/TVM		Yes		20/250: 12 were return inheat and Regumate: exceptional very bad result previous group. (56% pregnant)
	1000 5WS			mXp	250	Listing?		92							No trial	
	EO 201711	PIC		CTR	0							ML			No trial	
160 3WS			mXp	52			94,3							ALL GILTS: starting up		
PS 201711	Hypor		CTR	176	Best group ever		96,69	15	14,16	ML				Trial before versus after		
750 4WS			mXp	330			98,51	15,4	14,55							
AFV 201712	Danbred (?)		CTR								TVM				?	
?			mXp													
TXA 201710	?		CTR								TVM/ML				?	
?			mXp													
France	SF 201707	Nucléus		CTR	187			77,01	14,29	13,4	ML		Yes			
	400 5WS			mXp	182			80,77	14,62	13,55						
	PLF 201710	Topigs 20/TN70		CTR	235			96,6	15,34	14,56	ML				Comparison to heated sprmz	
	500 3WS			mXp	248			98,4	15,94	14,88					Trial as asked	
	SH 201710	Nucléus		CTR	16			94			ML				Trial as asked	
	220 3WS			mXp	18			100		16						
	LD 201712	Axiom LWD		CTR	463			93,5								
	1200 2WS			mXp	464			95,9								
UK	CDI 201710	?		CTR	117			90,6			ML/TVM				?	
				mXp	108			96,3								
	CDII 201710	?		CTR	35			91,5			ML/TVM				?	
				mXp	25			96								
Spain	Ga201706			CTR							MLL					
				mXP												
	Gd201706			CTR	260			90,3		13,74	MLL					
				mXP	349			95,1		14,46						
	Ca201706			CTR	1023			87,9	16,87	15,29	MLL					
				mXP	982			89,6	17,1	15,54						
	Va201706			CTR	573			90,75			MLL					
				mXP	919			93,36								
	In201711			CTR	243			84,77	14,44		MLL					
				mXP	204			90,2	14,64							
Fo201706			CTR	797			92,7		13,01	MLL						
			mXP	482			94,4		12,95							
Finland	Je201701		DM	CTR	541			86,69	16,98	15,49	AB/MLL					
			XDM	mXP	660	86,93		93,03	17,69	16,03						
	Je201701		DMMIX	CTR	676			83,14	16,97	15,49	AB/MLL					
			XDMMIX	mXP	511	85,93		86,5	16,9	15,42						
	Je201708		F-SEOS	CTR	74			85,14			AB/MLL					
		XF-SEOS	mXP	45	86		95,56									
Portugal	Pt201711			CTR						LM/MLL						
				mXP	1013	90		96,25								
China	XX201711			CTR				95			AT/MLL					
				mXP				97								
	On201711			CTR							AT/MLL					
Canada	Ro201804			CTR							MLL					
				mXP												



# Infrared combined with Ultraviolet



# Questions?

