

9th April

2013

Technical FORUM

Pig Breeding today and tomorrow

Together
we can create
Pig genetic

Pig breeding today and tomorrow

OUTLINE – DAY PROGRAM

10 h: Coffee

10 h 15 – 12 h 30:

- > Introduction to NUCLEUS company : Organization and market share in France – *J. Gourmelon*
- > Economical interest and expected genetic progress for pig breeding - *C. Roguet* from Ifip
- > Breeding work : Breeds management – breeding goals – technical follow up of farms – *B. Ligonesche*
- > Specific work done in GGP farm - testimonies of 2 GGP farmers
- > Valorization by female line : GP farm specificities – testimony of GP farmer
- > NUCLEUS abroad : Testimonies of a foreign customer (Russia) – *P. Gréau*

Lunch

14 h – 16 h 30:

- > Valorization of pig breeding by artificial insemination - *B. Le Rossignol*
- > Health program NUCLEUS (Objectives – tools – results) – *H. Pirouelle*
- > Valorization of NUCLEUS breeding stock in production farm : different testimonies (depopulation/ Repopulation – Reproduction management – Fattening management)
- > Which use for genomic selection? – *B. Ligonesche*

FORWARDS

This nucleus FORUM is a place to communicate and exchange on our way of working (multiples testimonies of farmers and technicians I want to thanks here for their participation), our projects and recent results. Pig breeding is under perpetual evolution.

We did not create any new program every month; however we take care to translate requirements expressed on fields on breeding goals and orientate their evolution. Our Organization and different teams allows us to reach exciting challenges.

What are genetic potential of NUCLEUS today? What kind of performances allows our genetic and sanitary potential? How can you reach that kind of performance in your farm? Those are questions we want you have during this day.

Production Farm with 400 sows in France with F1 Gilt (LW x LD) and NUCLEUS PIETRAIN

PSY: 35

Piglets/sow/litter: 13.5

FCR 8-115 kg: 2.45

Lean Meat percentage: 61.2

ADG 8-115 kg: 720 g

Mortality rate: 4.0 %

} Win-win relation

Pig breeding today and tomorrow

NUCLEUS is results of politic willingness and a story of more than 25 years of breeding. Organized around different pig producers groups, Actors from NUCLEUS united to increase efficiency of their breeding work and share same vision of their genetic and sanitary development. Additionally to juridical organization (4 French shareholders today), we have willingness to build strong technical, commercial and administrative teams as well as GGP farmer teams.

4 shareholders (Cam, Cap50, Cooperl Arc Atlantique and Fipso) are each ones in their areas organized on strong pig chains. On French territory, NUCLEUS shines even more. Pig breeding gives, by farms performances and by slaughtering performances and meat quality, an added value to each of its users with strong profitability.

Teams of NUCLEUS workers, with technical and commercial team of each of its shareholder, are a pool of multiple and complementary competences totally oriented to genetic work. Our guide is first satisfaction of French market, and then to answer to consumers, farmers and slaughterhouses requirements. It is also necessary to open our minds to foreign markets by technical surveillance and organization of commercial way adapted to different technical context. In those cases, rigor and field knowledge are basis of our know-how.

Third pillar of our organization are GGP farmers and presence of good environment. Thirty GGP farmers are carriers of our identity (breeding is done by our GGP farmers). Membership to NUCLEUS group (work in framework of collective pig breeding on 4 main breeds and on 2 autonomous populations) and Network organization (IFIP-INRA) allows us to benefit from competences and equipments for research (People and public stations).

In summary,

- Be grouped in order to be more efficient and share common objectives and means (NUCLEUS Sanitary project – NUCLEUS is alliance of genetic and sanitary, specific work on maternal quality, NN line in Pietrain, Big GGP population)
- Be specialized with dedicated team
- Have a good vision for future of pig breeding

Today, on French market, NUCLEUS it's:

- 37 % market share on semen with our 2 terminal boars
- 150 000 F1 gilts marketed annually in France (GP farm + autoreplacement gilts)
- On international field, NUCLEUS is under structuring to be solid actor (15 000 breeding animals sold in 2012 – 1st French company) with presence on 3 main continents (Europe, America and Asia)
- R&D budget managed directly by NUCLEUS for 1 Million euro/ year and through Bioporc and FG porc for 1.1 Million euro/year.

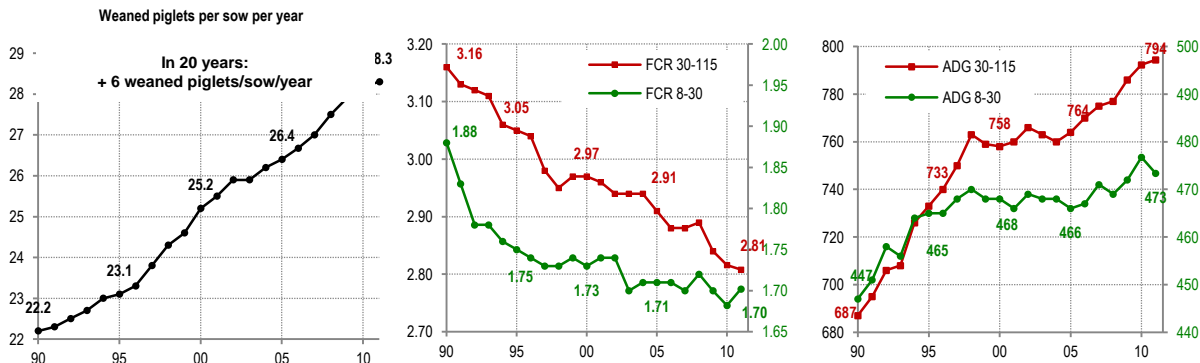
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Economical interest and expected progress for pig breeding

1) Technical performances in production farms increase

Sow productivity in production farm increased for 6 weaned piglets in 20 years, i.e. 0.3 additional weaned piglets per sow per year. Litter size went from 10.8 to 13.1 born alive between 1990 and 2010 and interval between farrowing has been reduced for 7 days. Production performances have also been increased, even if they increase more slowly at middle of 90. In fattening unit, FCR has been reduced from 3.16 to 2.81 and ADG increased by 105g between 1990 and 2011.

Evolution of reproduction and production performances in production farms



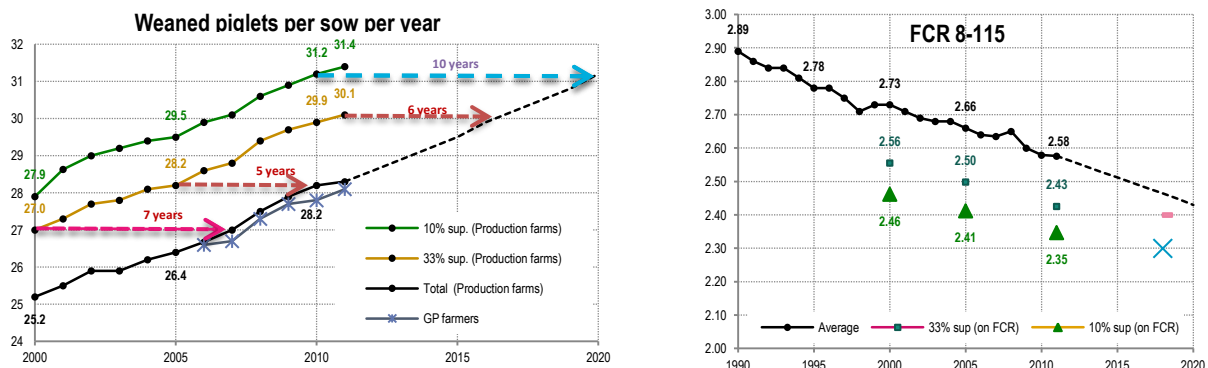
Dispersion of performances between farms is very important: 4.7 weaned piglets per sow and per year and 0.38 points for FCR 8-115 share extreme thirds. This means considerable effects of environment on expression of genetic potential on production farms: Buildings conditions with effects on sanitary and work organization, farm management, technical follow up and farmer profile.

2) Delay for production farm and expected performances

Progress created on GGP farm arrives at GP and then production farms after 1.5 to 2.5 years. "Genetic Delay" of production farm compared to GGP farm is around 4 to 5 years.

In 2010, genetic delay is around 1 weaned piglet per productive sow per year. With this speed, a productive sow will wean 29.2 piglets/sow/year in 2014. Furthermore, average of production farms reaches the one of superior third after 5 to 7 years and the ones of superior 10% after around 10 years. With this speed, productivity will reach 30.1 weaned piglets and will go above 31 weaned piglets in 2012. For FCR between weaning and sale, level of third of best farms is reached by national average 10 years later. With this speed, average FCR 8-115 will be around 2.43 in 2020.

Zootechnical performances expected in 2020



Source : IFIP – GTTT and GTE NE

3) Economical assessment

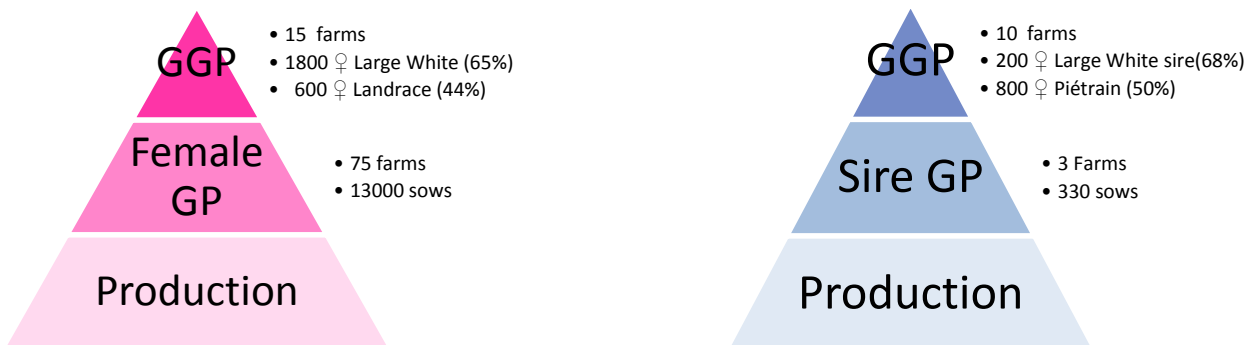
For a cost for each farmer of 2.2 to 2.7 euros/ produced pig (around 2% production cost), expression of genetic progress allows to reduce production by 8 euros/ produced pig

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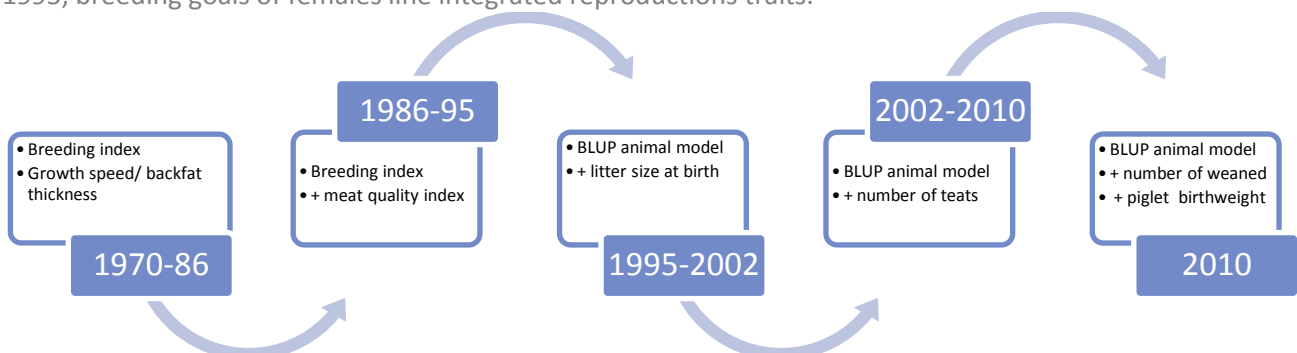
BREEDING WORK ON GGP FARMS

B. Ligonesche

NUCLEUS pyramid is constituted of around 30 GGP farms and more than 75 GP farms. With more than 3500 GGP sows, NUCLEUS owns the biggest GGP herd in France.



From Seventies and beginning of classical breeding methods, tools and breeding goals evolved a lot. In 1966, control of offspring was substituted by individual control of boars in AI centre. Combined control (1 candidate + 1 slaughtered half brother) was settled in 1986 and was substitute by control of collaterals animals at the beginning of nineties. Calculations methods of breeding values also evolved a lot. Switch from breeding index to BLUP animal model at the beginning of nineties was essential step in increase of genetic progress. This calculation method integrating information from candidates and whole information of collaterals is more efficient than breeding index for characters with low heritability like prolificacy. Since 1995, breeding goals of females line integrated reproductions traits.



Evolutions of breeding goals are an answer to requirements of farmers and pig chain. On same time, great adaptation capacity is required from our GGP farmers who have to measure and record increasing number of characters and to implement new breeding methods.

All data collected on GGP farm are recorded on specific management software which evolves according to needs. Information from each farm is centralized in global database from which breeding values are calculated. Furthermore, NUCLEUS gives access to farmers to software for help to selection and for data analysis especially developed by NUCLEUS in collaboration with GGP farmers. Coherence and rigor given by tools' standardization is insurance for success of our projects.

In direct link with breeding technicians, NUCLEUS gives regular technical support to GGP farms: genetic audit, dashboards... Those regular exchanges allow continuous control of quality of the work done on our farms and frequent following of results of breeding. Each year, NUCLEUS has meeting with GGP farmers around presentation of pure breed boars in AI centers and around various technical subjects. This direct and continuous dialogue between NUCLEUS and its GGP farmers constitutes essential strength for our company.

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BREEDING WORK IN GGP FARMS

GGP farmers testimonies

> EARL DARTOIS – 22 - GUITTE Large White Female line GGP farmer

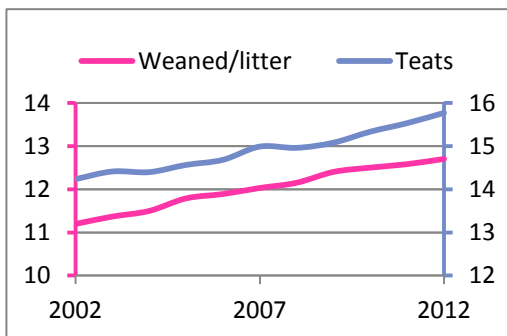


EARL Dartois is farrow-to-finish farm with 500 sows. Buildings are under air surpression and air filtration.

« Thanks to tools available from NUCLEUS and to rigorous implementation of breeding goals, genetic progress done is spectacular: in 10 years, functional teats number on tested gilts increased of 1.5 teats in average. This improvement follows increase of live born piglet per litter. » L. Dartois



Famille Dartois



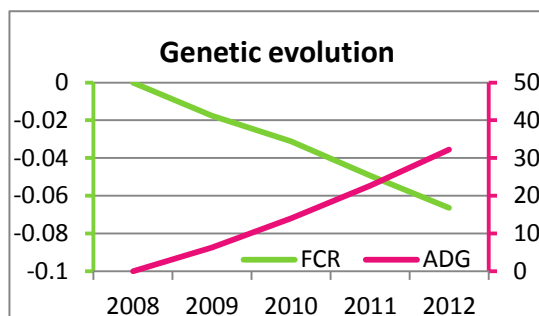
Feeding management is key point of success with Large White GGP SOWS

> EARL COLLINIÈRE – 53 – ARGENTRE Pietrain GGP farmer

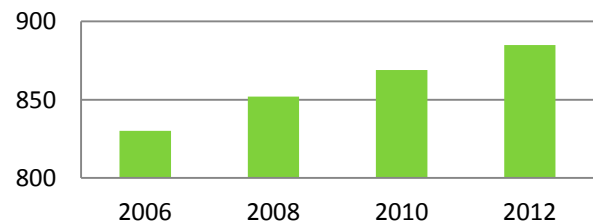
EARL Colinière is a farrow-to-finish farm with 200 sows. With 7 Pietrain GGP farms and more than 800 GGP sows, NUCLEUS owns the biggest Pietrain GGP herd in France.



Laurent Boscher



ADG 35-110 kg in public station (female)



Since 2006, average age at 100kg of tested animals on this farm is lower than 145 days. Genetic progress is validated by evolution of individually measured performances on farm and on public station

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VALORIZATION OF GENETIC

B. Le Rossignol

F1 gilt making – Report on GP farmer: SCEA OUTREMER

Mission: Diffuse to production farms gilt with high genetic and sanitary quality in order to satisfy customers.

- Have a good health status and keep it
- Respects technical and genetic requirements



Cédric Plante

2011 Results of 20 best farms with LW x LD NUCLEUS F1 gilt:

- Productivity : 32
- Total born : 15.04
- Weaned : 12.5
- Mortality/live born : 11.7

« With advices from NUCLEUS and CAP50, I produce 2 000 F1 gilts a year for replacement of 5 000 production sows and production of more than 120 000 slaughter pigs. »

C. Plante

Diffusion of **NUCLEUS** genetic progress:
150 000 F1 gilts a year for 7 millions slaughter pigs

VALORIZATION BY SIRE LINE: ARTIFICIAL INSEMINATION

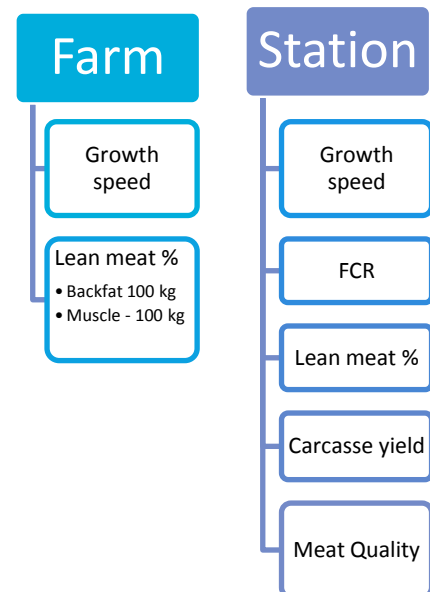
Diffusion of sire lines

NUCLEUS market share in France: 37 % (source ASP)
NUCLEUS boars are available in all French AI centers

- Sire line GGP farmers (P et LWxP) : 9
- GGP sows in sire line : 1 100 sows
- Boars tested/year : 7 500
- Boars entered in AIC in 2012 : 602
- Boars sold to farms in 2012 : 697
- Top 10% best boars enter AI centers


Pietrain animal performances in public station :
(240 tested males from juin 2011 to sept 2012)

- ADG 35-110kg : 922 g
- FCR 30-110kg : 2.29



2 terminal boars


105 boars in AIC



NUCLEUS LWP boars

- Age at 100 kg : 128d
- Backfat 100 : 8.5 mm
- Muscle -100 : 58 mm

810 boars in AIC



NUCLEUS Pietrain boars

- Age at 100 kg : 136d
- Backfat 100 : 7.5 mm
- Muscle -100 : 71 mm

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HEALTH STATUS: CAPITAL STRENGTH

H. Pirouelle

Sanitary strengths (direct pathogens impact and therapeutic prevention) influence for 15% pig production cost. For breeding stock sale, NUCLEUS has objective to propose to production farms products-solutions proposing products/solutions to decrease production costs by high health status.

Consequently, NUCLEUS started in 2000 unique and innovative sanitary program in France to meet following requirements:

- Food safety and animal welfare when decreasing antibiotics use
- Giving to farmers safe products (breeding stock and semen).

To run this program, NUCLEUS used different tools:

- Management of methods of sanitization (Hysterectomies)
- Use of equipment (Building under air surpression and air filtration)
- Specific organization to depopulation-repopulation

Actual state of sanitary policy in NUCLEUS

Kind of farms	Farms number	
	Total	Under filtration
GGP female lines	13	7
GP female line	74	9
GGP/GP sire line	11	5



Filtration equipment

According to our objective, 37% of our GP farms in female line are today coming from our sanitization program.

Maintenance of our health status is a priority, different methods are used.

In farm

- Buildings under air surpression and air filtration
- Localization of the farm
- Feed thermization
- Bacteriological quality of water
- Strict procedure for transfer rooms

For animals transfer

- Way to carry breeding stock
- Dedicated truck, truck under air filtration
- Cleaning area conception

Biosecurity on farm

NUCLEUS follows this way by depopulation and repopulation of 2 GGP farms in 2013.

Furthermore, to run this policy, NUCLEUS owns 2 protected farms to prepare gestating herd with high sanitary status before population.



Pig breeding today and tomorrow

USERS HAVE THE FLOORS

Farmers testimonies

> DEPOPULATION - REPOPULATION

- Report at EARL du Scy – 600 production sows x Pietrain boar

Farmers take advantage of settlement of new co-worker and of farm restructuration to run ambitious project of depopulation-repopulation

Productivity: 30.9
Total born: 15.21
Health costs/sow/year: 44 €
Global FCR: 2.69



*Each worker has his own shower:
Shower is compulsory for each worker*

Depopulation-repopulation agenda:

- Settlement and beginning of restructuration : April 2007
- Beginning of depopulation and transfer of first piglets : Sept 2008
- Last sows culling on 17/12/2008 and fattening pigs on 30/12/2008
- Arrival of new herd in march 2009 and first farrowing on 10/03/2009

> Reproduction management

- Report to SCEA Mont au Roux – Christophe Deschamps and Jean-Pierre Thomas

« Threshold of 35 weaned piglets per productive sow is reached on best NUCLEUS production farms »

800 farrow-to-finish production sows – LW x LD F1 sows x Pietrain boars

In crop area, with on farm feed mill and co products use, biogas production. Worker specialization in farrowing units is key of success (800 sows – 3 workers)

- Productivity : 34.51
- Total born : 15.63
- Weaned : 13.33

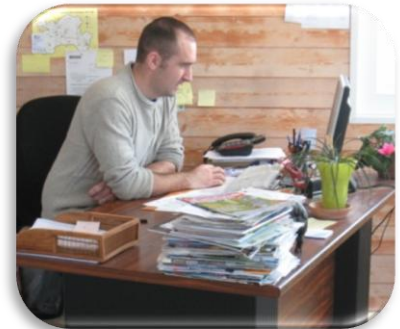
- Sold pigs/sow/year : 28.1
- Global FCR : 2.78
- Mortality rate 8-115 : 3.1 %
- Lean Meat % : 61.3 %



- Feed management of NUCLEUS hyperprolific sow
- Combination of farmers know-how and maternal qualities of NUCLEUS sows
- Success in gilt introduction in sow herd



SUCCESS KEYS



Mathieu Couillard

Farm conception: strict separation of sows' building and fatteners' buildings with specific worker and strict marching forward

Entrance room for worker with shower

Safe animal and semen entrance:

- LW gilts coming from GGP farm under air filtration.
- Semen coming from AI Center under air filtration

Health Costs: from 100 €/sow/year (before) to 44 €/sow/year (after)

Pig breeding today and tomorrow

USERS HAVE THE FLOORS

Farmers testimonies

> POST-WEANING AND FATTENING MANAGEMENT

▪ Farm Report – SCEA du domaine d'Abas

«From rigor come performances and existing progress margins give lots of hope for the future.»

150 Farrow-to-Finish sows – NUCLEUS genetic by autoreplacement and NUCLEUS Pietrain boars.

In 2012, threshold of 13 weaned piglets has been regularly reached. Nicolas built 120 additional spaces for weaners in consequence of higher sow productivity.

Rigor in daily follow-ups of post-weaning and fattening units is guarantee to get very good results:

- ADG 8-115 : 780 g
- Lean Meat % : 61.5
- Objective : FCR 2.20

- NUCLEUS Pietrain : Lean Meat and homogeneity
- Respect of biosecurity
- Respect of density and atmosphere requirements at each step.
- Precise feeding



Nicolas Aubert



SUCCESS KEYS

▪ Report in farm – EARL COCMAN

« Normal farm for exceptional performances »

126 Farrow-to-finish sows – LW x LD F1 Gilts x NUCLEUS Pietrain boar

- Global FCR : 2.59
- Age at 115 kg : 169 j
- FCR 8-115 : 2.25
- Mortality 8-115 : 3.2 %



G. Cocman with his technician K. Legeay

SUCCESS KEYS



- Heavy piglets at weaning time
- Respect of density and atmosphere requirements at each step.
- NUCLEUS Pietrain boar
- Maximize performances when decreasing labour costs

Pig breeding today and tomorrow

NUCLEUS ABROAD

B. Josselin and A. Buchet

Step by step, NUCLEUS built international way to valorize its genetic potential and its know-how. Today, NUCLEUS has activities on three main continents: Europe – Asia – America through collaboration contracts – sale and technical follow-up to pyramids construction. In 2012 – 2013 (march), NUCLEUS exported more than 18 000 breeding animals

- Spain – Germany – Italy → 10 000 breeding animals
- Russia – Romania – Ukraine → 5 500 breeding animals
- China – South Korea → 2 700 breeding animals

Be chosen by big world actors of pig production is a proof of technical and sanitary level of NUCLEUS breeding stock.



GENOMIC USE

B. Ligonésche

Complementary expectations around meat quality

Pig breeding is sector under continuous evolution: in methods, selected traits, breeding goals... Last years, increasing development of molecular genetics methods opened way to first uses of genomic selection for cattle. During last 8 years, research programs for pig worked on several areas (QTL assessment, Effect of pig breeding on allelic frequencies, birth defects, genetic variability of immune response...)

DELISUS program finished in 2011: first program based on use of 64K SNP for pig. Results open very interesting perspectives for research and for projects in progress.

Beginning of UtOplge program required high implication of GGP farmers and breeding technicians. Based on Pietrain breed and entire male problematic, this project aims to study methods of settlement of genomic selection in pig breeding and assessment of their efficiency. Working with public station of Le Rheu (3 000 entire males tested on 3 years term), this program will study growth characters, body composition, meat quality, behavior and link them with 64 000 SNP for pigs.

Furthermore, NUCLEUS generalized DNA collection to all sows in GGP farms in order to be ready for future programs on genomic selection.

Settlement of systematic data collection on several meat quality indicators on carcasses coming from GGP farms allow, on one hand to characterize very precisely our lines on several criteria (from slaughtering to meat processing) and on the other hand to start development of future breeding tools coming from genomic selection.

Best French farmers use
NUCLEUS genetic, why don't you?



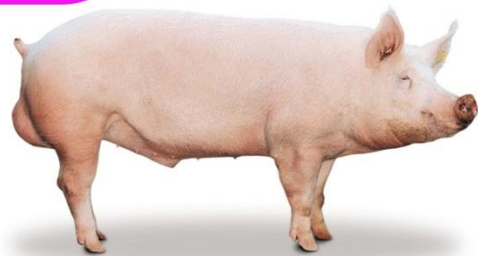
Landrace

Prolificacy

**Dam
Lines**

Productivity

Large White



***More numerous, vigorous and
homogenous piglets***



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