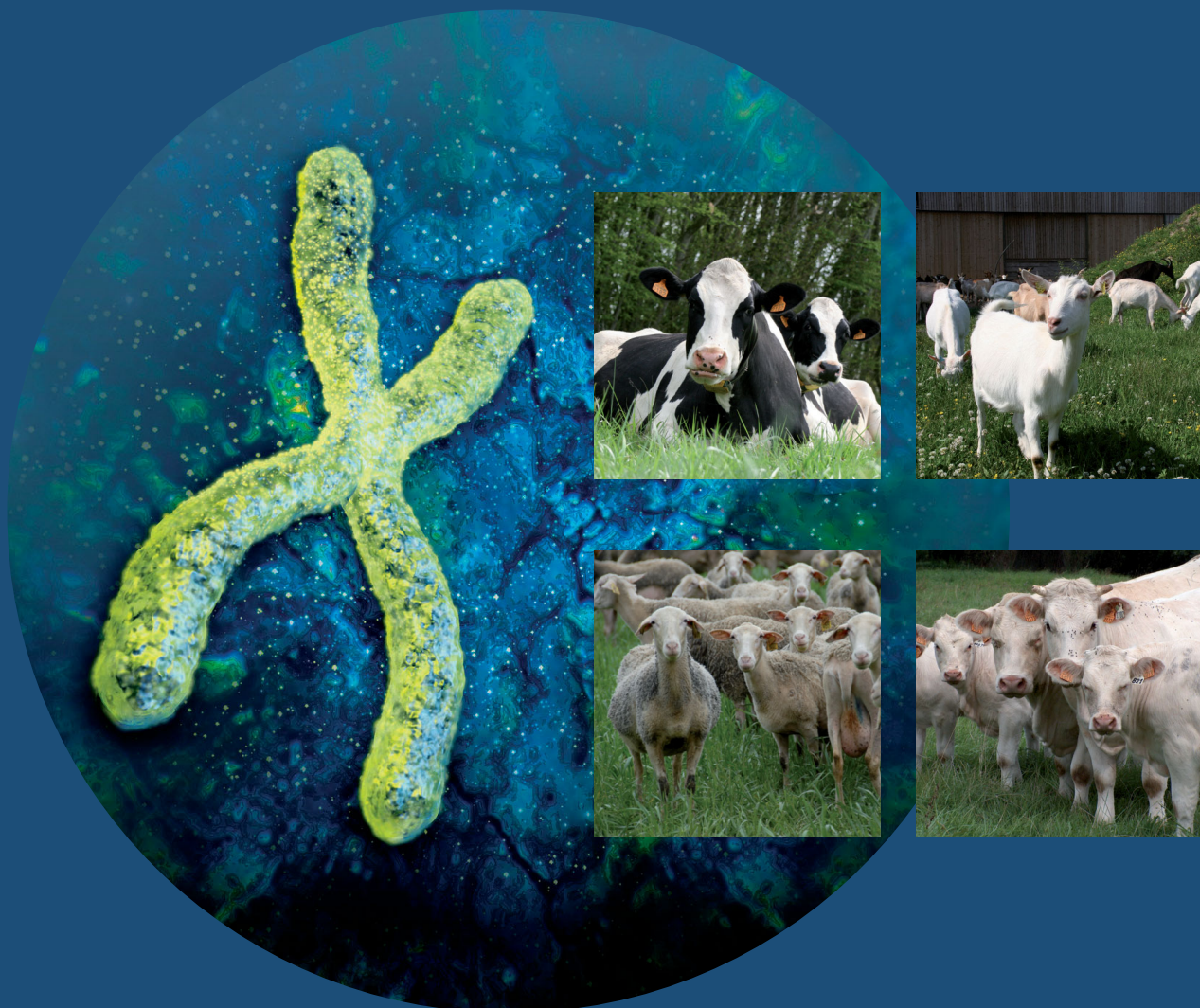


# French genetics for cattle, sheep and goat industries

Diversity - Progress - Reliability



“

*France has a rich and exceptional genetic diversity.*

*This national asset has enabled achieving levels of productivity and genetic progress that put France among the world leaders for the rearing and breeding of ruminants.*

”

Over  
**50 breeds**

of cattle, sheep  
and goats are targeted  
in official selection  
programmes



**For our foreign partners, this range of quality breeds is also a crucial advantage.**

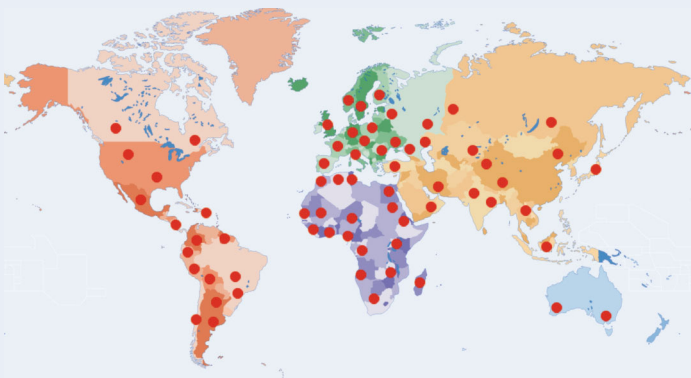
**It offers a wide palette of husbandry characteristics to meet the diversity of farmers' objectives and rearing conditions as well as the needs of supply chains around the world.**

## Among the world leaders

With a 3.8 million herd of dairy cows, France is ranking first in the European Union and world's second as exporter of dairy products.

The national herd includes not only highly productive breeds (such as **Prim'holstein**, **Montbéliarde**, **Normande**, **Brune** and **Pie Rouge des Plaines**) but also others, particularly well suited to difficult farming conditions (**Abondance**, **Tarentaise** for example).

The productivity of its national herds of 850,000 goats (**Alpine**, **Saanen**, etc.) and 1.5 million dairy ewes (**Lacaune**, **Manech Tête Rousse**, **Corse**, etc.) makes France a major producer of goat's milk (ranking 5th in the world) and ewe's milk.





# a land of livestock farming



With more than 4.2 million head of beef cows, the French herd is by far the largest in Europe.

Its beef breeds (among them [Charolaise](#), [Limousine](#), [Blonde d'Aquitaine](#),...) are renowned worldwide.

The total global offer also includes breeds with remarkable hardiness and maternal traits ([Salers](#), [Aubrac](#), [Gasconne](#)).

Over twenty sheep breeds for meat production ([Ile de France](#), [Charollais](#), etc.), for hardiness (e.g. [Causse du Lot](#), [Blanche du Massif Central](#)) or for high prolificacy ([Romane](#)) make up a herd of 4.2 million ewes.

Whether purebred or crossbred, their complementary advantages offer a range of solutions for the diversity of feeding conditions and climate.

## On the international scene

For fifty years now French breeds have benefited from substantial and steady genetic progress.

Hence, a large number of livestock farmers around the world have adopted French breeds to access higher productivity levels and functional advantages.

Every year more than 2.5 million doses of semen from 70,000 breeding cattle and several thousand French embryos are marketed internationally.

French genetics  
has been adopted  
in more than

**90  
countries**



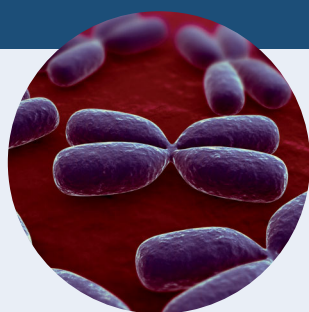
“ Over 50 breeds of cattle, sheep and goats are targeted in official selection programmes with the active involvement of more than 70,000 farmers. ”

# A high-performance to drive genetic

For the sake of efficiency,  
every stage in the genetic improvement  
programmes is managed by a specialized  
organization.

**FRANCE GENETIQUE ELEVAGE**,  
as the national value chain organization  
for the genetic improvement of ruminants:

- **gathers under a single umbrella** both the aforementioned specialized organizations as well as those representing livestock farmers (FNB, FNPL, FNO, FNEC),
- **guides and coordinates** this vast collective set-up
- **ensures** that new scientific knowledge and technological innovations are constantly assimilated.



## GENOMIC SELECTION: A REVOLUTION ON THE WAY

France was among the first countries to obtain official validation at international level from Interbull for its genomic evaluation methods designed by INRA, UNCEIA and the Institut de l'Élevage.

**The detailed genomic evaluation of very young animals based on DNA analysis makes genetic progress even swifter and broadens the market supply of breeders.**

The genomic indices for breeds Prim'Holstein, Montbéliarde or Normande cover all the characteristics evaluated by progeny testing. Their reliability is guaranteed by very large reference populations (bulls evaluated using both genomic methods and conventionally by progeny testing).

The accumulated experience on these breeds will pave the way to genomic selection of other dairy breeds and beef cattle breeds.

### THE NATIONAL INDIVIDUAL IDENTIFICATION SYSTEM



**The national identification number is the basis for recording all the information related to a single animal all throughout its life: information on husbandry, pedigree, health, genetic information, and more.**

This is considered as a key asset allowing a wide range of collected data to be readily available with a reliability level securing the precision of genetic indices.

The Chambers of Agriculture are locally responsible for operating the system.



### BREEDING OBJECTIVES



**The breeding objectives for each breed relates to precise and diverse criteria: productivity (quantity and quality of product) and functional traits (fertility, longevity, morphology, stance, etc.).**

The Breeding Organizations responsible for their definition and for herd book maintenance and for breeding livestock classification are gathered under a single national umbrella "Races de France".



### RIGOROUS METHODS AND PROCEDURES



**In order to provide rigorous and consistent procedures, the technical protocols for each stage are identical for all breeds in a species raised for the same purpose (meat or milk).**



# collective system improvement

## COLLECTION AND RECORDING OF HUSBANDRY DATA



The collection and recording of husbandry data (productivity, functional traits) concern over 4.9 million animals in 70,000 farms.

Such performance recording, along other related services, is provided by technical organizations independent from the breeding organizations.

They are federated at national level in the organizations "France Conseil Elevage" for dairy livestock and "Bovins Croissance" for meat cattle.



## SELECTION OF BREEDING ANIMALS



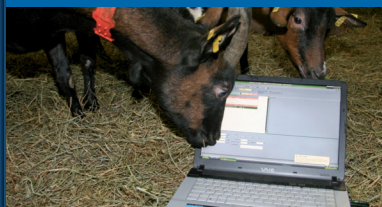
The selection of breeding animals is based on performance recording of over 7,000 males produced from mating best performers within each breeds.

These very wide-range programmes are conducted by Breeding Companies which are also responsible for the production and for providing insemination service.

They are represented at national level by UNCEIA.



## THE NATIONAL GENETIC INFORMATION SYSTEM



All data on pedigree, parentage, husbandry and so on are recorded in a single national genetic information system that feeds into the national genetic database.

Every year this involves data recording, monitoring and processing of over four million animals. Data include records for 26 million basic results from milk recording, 7 million inseminations, 1.6 million live weights, etc.

This network for the exchange of livestock farming data and related services is run by regional IT service organizations (ARSOE) under a national umbrella: FIEA.



## GENETIC EVALUATION OF BREEDING ANIMALS



Independently of all livestock farmers' organizations, the government has taken responsibility for the genetic evaluation of breeding animals as a guarantee of objectivity.

Using the most modern statistical methods (BLUP or Best Linear Unbiased Prediction for example), the computation of genetic values (indices) takes into account all the parentage factors and corrects for environmental effects.

This scientific work is carried out by INRA (the French national institute for agricultural research), which also runs the National Genetic Information Database.



They are defined and updated by the Institut de l'Élevage, (the French livestock farming institute), which also provide technical assistance to all the organizations taking part in genetic improvement programmes.

For 40 years, this national research and development organization has also been responsible for overseeing and providing technical assistance for national identification/traceability systems.



The CNBL is the national consultation organization for technical and genetics issues in the milk sheep sector.

It's coordinated by the Institut de l'Elevage.





## DAIRY CATTLE

With 650 bulls subjects to progeny testing and 25 000 genomic analyses, French selective breeding schemes rank among world leaders.

The results are outstanding: the average equivalent adult lactation of the herd evaluated for milk production stands at 9,797 kg. The figure is 10,751 kg for Prim'Holstein.

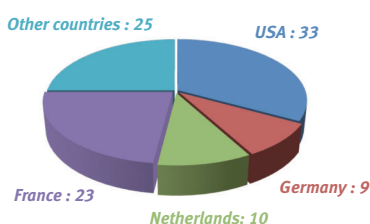
### INTERBULL INTERNATIONAL EVALUATION (APRIL 2011) NUMBER OF BULLS IN THE TOP 100 PRIM'HOLSTEIN GLOBAL MERIT INDEX

Source : Institut de l'élevage/INRA/Interbull 2011

The official international rankings of Interbull regularly confirm the excellent results achieved.

In April 2011, France was ranked:

- 2<sup>nd</sup> for Prim'Holstein breed
- 1<sup>st</sup> for Montbéliarde breed

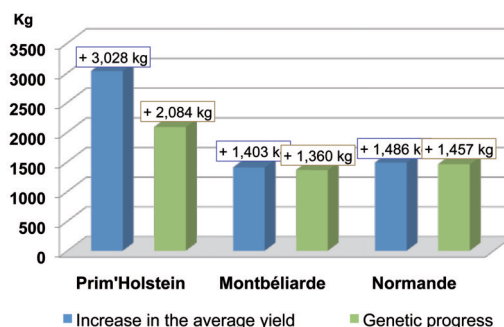


### INCREASE IN THE AVERAGE YIELD PER COW SUBJECT TO MILK RECORDING AND GENETIC PROGRESS (1990 TO 2010)

Source : Institut de l'élevage/FCEL 2011

For the three main French dairy breeds, the annual genetic progress has been between 65 and 100 kg of milk.

This has been the primary factor of farm productivity increase over the last twenty years.



**3,1**  
million females  
inseminated

**2,5**  
million cows  
in performance  
recording

**650**  
bulls subject to progeny testing  
**25 000**  
genomic analyses (males and females)

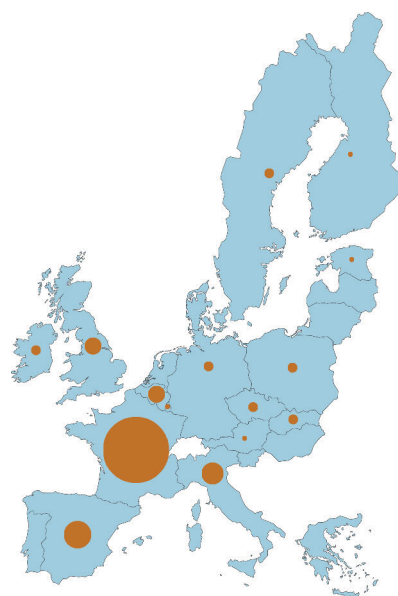
**MARKETING 2010**  
**100**  
bulls selected for AI after conventional evaluation  
**230**  
bulls selected for AI after genomic evaluation



## BEEF CATTLE

France develops high-performance programmes for nine beef breeds, either specialized or hardy. For the three main breeds, on-farm and on-station evaluation of young bulls are complemented by progeny testing programmes whose scale is unrivalled anywhere in the world.

In addition to their suitability for meat production (feed efficiency and results of slaughter of male offspring), these evaluations also cover the maternal qualities (calving and suckling traits of their daughters).



### DEVELOPMENT OF PERFORMANCE RECORDING FOR BEEF CATTLE IN EUROPE

With 912,000 cows in performance recording programmes and 12,000 bulls in on-farm performance evaluation, the French national herd can claim to be the largest European genetic pool for farming of beef cattle.

**912 000**  
cows in performance  
recording

**726 000**  
purebred inseminated  
females

**12 000**  
bulls on-farm  
performance evaluation

**2 160**  
bulls on-station  
performances  
evaluation

**120**  
bulls subject to progeny  
testing programmes

**50**  
bulls selected  
for AI

# and internationally programmes



## MEAT SHEEP

As in beef cattle, the selection programmes are characterized by a rigorous on-station evaluation followed by progeny testing for both meat quality and maternal traits (prolificacy, suckling qualities).

Thanks to the development of genotyping, no ram on the farms of the selection base possesses the VRQ -allele for high sensitivity to scrapie, and 95 % are resistant (ARR/ARR).

**285 000**

*ewes in performance  
recording*

**170 000**

*females  
inseminated*

**3 500**

*rams on-station  
performances  
evaluation*

**220**

*rams subject  
to progeny testing*

**100**

*rams selected for AI*



## DAIRY SHEEP

The effectiveness of selection programmes translates into substantial genetic progress. For the Lacaune breed, the ram milk index increases annually by an average of 5.5 litres, along with significant progress in the index for milk solids and functional traits.

The milk production records results confirm this impact at farm level. For the Lacaune breed, the average is 288 litres per lactation, 73 g/l butterfat and 55 g/l protein.

**835 000**

*ewes in performance  
recording*

**490 000**

*purebred females  
inseminated*

**2 640**

*rams on-station  
performances  
evaluation*

**730**

*rams subject  
to progeny testing*

**250**

*rams selected for AI*



## GOATS

The size of the population of goats under milk production recording and the number of bucks subject to progeny testing (70 males annually) are unparalleled reference anywhere in the world. The 1,000 buck mothers show exceptionally high performance with an average lactation in the range 1,100 kg to 1,200 kg.

The average milk production of 258,000 goats of Saanen and Alpine breeds subject to milk performance is 834 and 812 liters respectively.

**378 000**

*goats in performance  
recording*

**80 000**

*purebred females  
inseminated*

**150**

*bucks on-station  
performances  
evaluation*

**70**

*bucks subject  
to progeny testing*

**40**

*bucks selected for AI*



## Robust sanitary safeguards

Centres for semen production and all AI bulls are under the constant sanitary supervision of the National Breeding Stock Control Laboratory (Laboratoire National de Contrôle des Reproducteurs). The recording of analyses results in the national breeding stock sanitary database provides access at any time to the complete health history of each bull.

The reliability of recorded information is further consolidated by the national semen traceability system. The latter tracks doses from production to insemination through individual barcode identification of each straw.

Every year more than  
**350.000**  
sanitary analysis  
are carried out on bulls  
used for  
insemination.



FGE is member  
of the International Committee  
for Animal Recording (ICAR)  
and of Interbull

## IN 2010 “FRANCE GÉNÉTIQUE ÉLEVAGE” WAS AWARDED THE ICAR (INTERNATIONAL COMMITTEE FOR ANIMAL RECORDING) QUALITY CERTIFICATE

Since 2008, “France Génétique Élevage” has committed the entire French genetics improvement system in the development of a **Quality Management System (QMS)**. This has been designed following ISO 9001 standard, and covers all technical organizations and all breeds for every process impacting outcome quality.

This Quality Management System has been officially recognized at international level for the whole range of its activities relating to cattle breeds. This is yet more evidence of the reliability of the French procedures, which secures the impartiality of its evaluations and the quality of its products.

Contact : FGE - 149, rue de Bercy - 75012 Paris France - Tél. : 00 33 (0)1 40 04 52 02 - Fax : 00 33 (0) 1 40 04 52 99  
france-genetique-elevage@france-genetique-elevage.fr

www.france-genetique-elevage.fr

Design: Institut de l'Élevage/Bêta Pictoris - ISBN : 978-2-36343-065-6 - Réf : 001112022 - Juin 2011

Fotography copyright: Babout/Bourgault/CNIEL, Coop du Mouton Vendéen, CIV, Excellence Bazadaise, Fotolia, France Blonde d'Aquitaine Sélection, France Limousin Sélection, France Pie Rouge, Géode, Groupe Gascon, B. Hardy/La Chèvre, INRA, Institut de l'Elevage, La Chèvre, Maison de la Transhumance, A. Meekma, OS Abondance, OS Aubrac, OS Ile de France, OS Lacauze, OS Mouton Charollais, OS Mouton Vendéen, OS Parthenaise, OS races ovines laitières des Pyrénées, OS Rouge des Prés, OS Tarentaise, OVILLOT, Pâtre, Ponsard CIV, P. Pulvéry, Simmental France, G. Soldi, UMOEST, UNCEIA, Union Rouge Flamande, E. Wendling, DR