

## Understanding the benefits of genomic selection: from cattle breeding to farm's advantage

### Description

With traditional breeding, farmers have enhanced production traits in their herds by choosing superior individuals based on "breeding values" achieved by combining phenotypic recording of individual performance with pedigree information.

Advances in molecular technologies and bioinformatics have now also made it possible to use genomic selection as a new tool to boost the genetic gain in animal breeding. Genomic selection is based on the principle that information from a large number of markers could be used to estimate breeding values very early in life: it is not sex limited and can be extended to any novel or challenging traits that are recorded in a reference population (e.g. feed conversion efficiency, methane emission and disease resistance etc.), thereby improving selection accuracy while reducing the generation interval.

To apply genomic selection, breeding schemes have been redesigned, novel imputation algorithms and statistical methods have been developed and operational and logistical constraints have been addressed.

Transferring genomic selection within herds can help farmers to: 1) achieve higher annual rates of genetic gain exploiting genomic bulls; 2) select the best heifers as herd replacements; 3) sell pedigree heifers at a higher price; 4) optimize intra-herd mating plans to achieve maximum rates of genetic gain while controlling inbreeding; 5) increase accuracy in parentage recording; and 6) avoid genetic defects.

This course will be designed to address these issues and provide fundamental information on genomic selection, focusing on its practical application to optimize herd management. Topics such as next generation molecular technologies and novel phenotypic traits to be recorded on farm will complete the course contents. The course is aimed at a wide audience: veterinarians, breeding center technicians, Ph.D. students in animal science or related fields, farmers and farmer associations interested in exploit genomic selection potential.

### Program

- **Monday:** Traditional selection tools  
Next generation molecular tools  
Livestock genomics in developing countries
- **Tuesday:** Basic principles of genomic selection
- **Wednesday:** Visit to EXPO Milano 2015
- **Thursday:** Genomic selection on farm
- **Friday:** Precision farming  
Phenotypes for the future

### Lecturers and Guest speakers

**Paolo Ajmone Marsan** – Università Cattolica del Sacro Cuore

**Paul Boettcher** – FAO

**Stefano Capomaccio** – Università Cattolica del Sacro Cuore

**Nicola Macciotta** – Università degli Studi di Sassari

**Lamberto Morelli** – INSEME Spa

**Riccardo Negrini** – Università Cattolica del Sacro Cuore

**Ezequiel Nicolazzi** – Parco Tecnologico Padano, Lodi

**Erminio Trevisi** – Università Cattolica del Sacro Cuore

### Period

**June 8<sup>th</sup> – 12<sup>th</sup>, 2015**

### Location

Palazzo Trecchi  
Via Trecchi 20  
26100 Cremona – ITALY

### Language

The course will be delivered in English. Upon request, this course can be repeated in another language.

### Scientific advisor

**Paolo Ajmone Marsan** –  
Università Cattolica del Sacro  
Cuore

### Participation fee

The participation fee is € 1,600.00. For applications made before March 10<sup>th</sup>, 2015 a 20% discount will be applied (participation fee = € 1,280.00). If two or more members of an organization apply for the same course the first participant will pay the full fee, but additional members will have a reduced participation fee of € 1,200.00.

The application deadline for the course ZOO05 is April 24<sup>th</sup>, 2015.

The participation fee includes:

- Tuition costs, including all training materials and use of the location's training facilities and related services
- Participant costs, including the course field trips, transfer to and from EXPO Milano 2015 + entrance ticket, the lunches of Monday, Tuesday, Thursday and Friday, a gala dinner and special evening event, and a final dinner.

### **Field trips**

- LGS laboratory and Italian Holstein Breeding Association
- Parco Tecnologico Padano, Lodi
- Inseme Breeding Center, Zorlesco (Lodi)

### **Participants' profile**

- Farmer
- Farmers associations
- Livestock industry managers
- Breeding centers
- Veterinarians
- Government officials (Agriculture and Animal Health Department)
- Ph.D. students
- Others with a specific interest in the topics

