USDA-ARS is currently funding four regional genotyping laboratories in Manhattan, KS; Raleigh, NC; Fargo, ND; and Pullman, WA. Each of the genotyping labs has the capability to do high-throughput screening for MAS. This service will provide more streamlined MAS for breeding programs.

**DNA**: the genetic code that controls the structure and function of wheat.

**Gene**: a specific segment of DNA that codes for a certain characteristic.

**Selection**: when individual plants are chosen because they have beneficial characteristics.

**Marker**: a specific DNA segment that is tightly associated with a gene of interest and can be used as a flag to track the gene.

**Marker Assisted Selection**: when individual plants are chosen using markers as flags to track genes.

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**25 States participating in USA MAS Wheat Breeding Consortium**

**DNA**  
**GENE**  
**SELECTION**  
**MARKER**  
**MAS**

**Marker Assisted Selection**: when individual plants are chosen using markers as flags to track genes.

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**Dedicated to the Genetic Improvement of U.S. Wheat**

http://maswheat.ucdavis.edu
**Wheat CAP - Coordinated Agricultural Project for Wheat** is a multi-state, multi-institution project dedicated to the genetic improvement of U.S. wheat through research, education and outreach.

**US Wheat CAP**
Most U.S. wheat breeders are in the public sector and have released most of the currently grown cultivars. The U.S. Wheat Coordinated Agricultural Project (CAP) has been funded by USDA-CSREES to continue and improve this great tradition by forming a network of three dozen scientists, including breeders and molecular biologists from 25 states.

The primary goal of the Wheat CAP is to establish marker assisted selection (MAS) in public wheat breeding programs and use this new technology to continue improving wheat yield, disease resistance and wheat quality so that U.S. wheat continues to compete favorably in the global economy.

**Wheat CAP provides:**
- Discovery of new genes
- Coordinated problem solving of regional issues
- Testing of cultivars and germplasm across broader environments
- Interaction between breeders and molecular biologists to speed the breeding process through Marker Assisted Selection (MAS)
- New germplasm and cultivars made publicly available
- Improvement of all wheat market classes
- A forum for interaction between breeders, growers and end-users
- Opportunities for public education and student training

### Marker Assisted Selection (MAS)

Traits important to growers and end-users are controlled by the genetic makeup of each wheat cultivar. Scientists work to identify genes controlling agronomic, disease resistance and quality traits. Historically, a laborious selection process has been necessary to breed for these traits. For example, a large team is required to hand inoculate a field with virus to select for resistant lines. Now, selections can be made more efficiently with a process called Marker Assisted Selection (MAS) where molecular markers close to the genes of interest are used to assist breeders in selecting the best gene combinations. For example, plants resistant $R$ to infection have a marker pattern different from lines susceptible $S$ to virus infection.

**MAS provides:**
- Multiple trait selection
- Disease resistance selection without infection
- Selection at seedling stage
- Nationally and internationally accepted varieties
- Lower labor requirements

Hundreds of seedlings with the desired trait can be selected by a single person utilizing MAS.