

Bovine Germplasm Movement Plan

Executive Summary

The Bovine Germplasm Movement Plan (BGMP) provides movement guidance criteria to allow domestic movement of bovine semen, embryos, and high genomic merit cattle that have no evidence of infection and are in a foot-and-mouth disease (FMD) Control Area. The BGMP is the result of a collaborative effort by industry, state, federal, and veterinary diagnostic laboratory representatives. Funding was provided by the USDA National Animal Disease Preparedness and Response Program (NADPRP) to the University of Wisconsin Madison from March 2022 to June 2024. Read the full [Bovine Germplasm Movement Plan \(BGMP\)](#) guidance to learn more.

The bovine germplasm industry consists of semen production, oocyte harvest, and embryo production leading to high genomic merit animals. An estimated 70-75% of dairy cattle and 10% of beef cattle in the U.S. are bred by artificial insemination in all 50 states. Over 512,000 embryos were transferred to U.S. dairy and beef operations in 43 states. A diagnosis of FMD in the U.S. is expected to halt semen and embryo export. Maintaining safe domestic movement of germplasm and high genomic merit animals from their birth location into the genetic system was the focus of this guidance.

Disease monitoring (surveillance) will be required during an FMD outbreak to find additional cases and to obtain movement permits. The BGMP used the [Secure Beef Supply \(SBS\) Plan movement permit guidance](#) and further defined how a premises can meet the “*no evidence of infection*” criteria. In addition to meeting the conditions to be an At-Risk or Monitored Premises as defined in the [USDA FMD Response Plan](#), the BGMP proposed the following additional surveillance considerations:

- 1. Screening Test: Active Observational Surveillance (AOS)**
 - a. Close daily observation of animals for at least 14 days prior to movement with record keeping of normal findings, and prompt reporting of abnormal findings.
 - b. If diagnostic tests are NOT available, AOS is conducted daily for at least 28 days.

- 2. Diagnostic Test: Serum antibody enzyme linked immunosorbent assay (ELISA) test for FMD**
 - a. Studies conducted at FADDL on bovine sera determined the diagnostic sensitivity (99.8%) and the diagnostic specificity (96.6%).
 - b. Target population: Bulls and donor females with AOS records and whose semen, or embryos can be stored frozen.
 - c. USDA has an SOP written and NAHLN labs identified to receive the commercially available and validated antibody ELISA test. The corresponding test interpretation and policy for decision making are yet to be developed by USDA.
 - c. This happened as a result of this project and subsequent support through the 2023 USAHA Resolution 1: [Foot-and-Mouth Disease Diagnostics – Serology Assay Deployment to National Animal Health Laboratory Network Laboratories](#)

- 3. Diagnostic Test: Oral swab real-time reverse transcriptase polymerase chain reaction (rRT-PCR) test for FMD**
 - a. Target population: High genomic merit animals with AOS records that need to move.
 - b. This test has not been validated for use in animals with NO clinical signs of FMD. Research is needed on the sensitivity of this test in a new population of animals. The timeline is unknown as lab work and animal studies are needed. Currently, no funding for this exists. The background and request for support is described in the 2023 USAHA Resolution 2: [Foot-and-Mouth Disease Diagnostics – Oral Swab Deviation for a New Population of Animals](#)
 - c. USDA NAHLN Program Office has an Emergency Use Approval (EUA) process. Additional information, including an exercise, is needed to assess its application on non-clinical animals.

Enhanced biosecurity is another component of the SBS Plan movement permit guidance: “*Biosecurity measures listed in the Biosecurity Checklist are in place and acceptable to Responsible Regulatory Officials.*” To date, there is not a specific “biosecurity checklist” for FMD prevention for bovine germplasm facilities. The BGMP provides guidance based on facility type for germplasm facilities to use. Facilities are encouraged to use [Secure Beef](#), [Secure Milk](#), and [Secure Pork](#) Supply enhanced biosecurity materials on their respective websites.

The BGMP has **nine movement recommendations** with permit guidance criteria described (high genomic merit animals, frozen semen, fresh and frozen *in vivo* embryos, frozen *in vitro* embryos, and oocytes). This guidance is designed to inform industry and decision makers managing the response about risk mitigation steps. Two 2023 USAHA resolutions provide additional details: [#11: Foot-and-Mouth Disease National Movement Standstill Exemptions: Bovine Germplasm](#) and [#12: Movements of in vivo-derived Bovine Embryos in a Foot-and-Mouth Disease Outbreak](#).

Acronyms and Terminology

FADDL: Foreign Animal Disease and Diagnostic Lab

Germplasm: Semen, embryos, oocytes

Germplasm facilities: Those housing male or female donor animals that need to move one or more live animal(s), semen, or embryo(s) into or out of their facility. This includes semen production centers, embryo production centers, satellite collection centers, veterinary clinics, breeding facilities, and other livestock operations that are involved in the creation of bovine germplasm.

High Genomic Merit Animal: These animals have unique genetic traits or genomic test results that rank them in the top 1-2% of their breed. This could be determined by their breed specific indices like Net Merit (NM\$) or Total Performance Index (TPI) for Holsteins; Jersey Production Index (JPI); or Expected Progeny Differences (EPD) for beef breeds.

Jersey Production Index (JPI): Based on the ratio of lifetime combined fat and protein to lifetime dry matter intake, relative to other cows in the same herd born in the same year.

NAHLN: National Animal Health Laboratory Network; 48 approved for FMD PCR in the U.S.

Net Merit (NM\$): Ranks dairy animals through a formula that factors a combination of traits that are genetically and economically important to dairy herds.

SOP: Standard Operating Procedure

Total Performance Index (TPI): A method of ranking sires and cows according to a formula. It seeks to identify cattle who excel in three categories: production, health, and conformation.

USAHA: United States Animal Health Association (www.usaha.org)

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