Attachment 1 Performance Work Statement and QASP
Genome Sequencing, Beltsville MD

GENERAL INFORMATION

1. **Background**
1.1. Ultra-long DNA reads are required to assemble the most complex regions of livestock genomes. Assembly of these regions will assist in the identification of genetic markers for Highly Pathogenic Avian Influenza resistance, enable the construction of a dairy pangenome for crossbred genomic evaluations, and increase our understanding of feed efficiency in dairy and beef cattle.
1.2. This work enhances the NP-101, Food Animal Production parent project 8042-31000-112-000-D under Objective 1-. Develop biological resources and computational tools to enhance the representation and annotation characterization of dairy breed-specific bovine and other genomes.
1.3. The project conducts essential research related to the dairy industry as statutorily required by eCFR::7CFR 2.65 subsection 5 and subsection 8 relating to conducting basic research into industry problems

2. **Scope of Work:**
2.1. The Prime Contractor shall provide all personnel, equipment, and supervision necessary to deliver a Genome Sequencing service requirement. The Prime Contractor shall extract DNA, create sequencing libraries, generate sequence data as described and transfer sequencing data to USDA-ARS.
2.2. The contractor shall perform all work described in this Performance Work Statement in accordance with all applicable Federal, State, and local laws, regulations, and codes.
2.3. This is a performance-based requirement, the contractor shall perform to the requirements and standards as established by this PWS. The labor mix of employees to perform this contract remains the discretion of the Contractor for all services.
2.4. All in scope requirements are Firm Fixed Price. This is not a Time and Materials requirement.
2.5. Samples will be shipped to the Contractor facility at Government expense. This is not included in the Firm Fixed Price.

3. Service performance is at a facility designated by the Prime Contractor, with delivery of results electronically to the Government Technical Monitor.

4. **Period of Performance**: The period of performance is for one year.

5. **Invoicing and Payment**:
5.1. The "Submit Invoice-to" address for USDA orders is the Department of Treasury's Invoice Processing Platform (IPP).
5.2. All invoices shall be submitted via the electronic Invoice Processing Platform. This is a mandatory requirement initiated by the U.S. Department of Treasury. More information is available at https://www.ipp.gov. The Department of Treasury is the point of contact for all IPP Collector account inquiries.
5.3. Payment is in arrears pursuant to the clause at FAR 52.212-4. Note FAR 52.212-4 (i)(1) Items accepted. Payment shall be made for items accepted by the Government that have been delivered to the delivery destinations set forth in this contract.
5.4. Payment will not be made for service in advance of delivery.
5.5. The invoice cycle shall be no less than monthly.
5.6. Advance invoice approval is not required, as required approval tiers exist in IPP.

6. **Definitions:**

6.1. CLIN – Contract Line Item, numbered. Established in the solicitation schedule, will start with "0001."
6.2. Government Technical Monitor – USDA Employee Technical representative appointed by the Contracting Officer to monitor, evaluate, and communicate to the CO the Contractor's performance in complying with contract requirements in an efficient and timely manner.
6.3. Privity of Contract - Contract service providers shall be accountable solely to the Prime Contractor, who, in turn, is responsible to the Government. For the purposes of this requirement, any reference to "contractor" is referring to the Prime Contractor.
6.4. Calendar Days'- Every single day on the calendar (12 AM to 11:59 PM), including weekends, holidays, and non-working days.
6.5. 'Business Days' – Standard business days 8AM to 5PM Eastern with holiday exceptions as noted:

Listed below are official Government holidays:
New Year's Day January 1*
Martin L. King Birthday Third Monday in January
President's Day Third Monday in February
Memorial Day Last Monday in May
Juneteenth As Indicated
Independence Day July 4*
Labor Day First Monday in September
Columbus Day Second Monday in October
Veterans Day November 11*
Thanksgiving Day Fourth Thursday in November
Christmas Day December 25*
Or when the USDA-ARS facility is closed due to local or national emergencies, administrative closings, or similar government-directed facility closings
*In accordance with Federal regulations, if these holidays fall on a Saturday, the holiday will be observed on Friday, if Sunday, holiday will be observed on Monday.

CONTRACTOR PERFORMANCE REQUIREMENTS

7. **Technical Requirements/Tasks**

7.1. **General**: Long-read DNA sequencing using Oxford Nanopore Technologies and Pacific Biosciences sequencing will be performed on 82 cattle and an assortment of tissues. This sequence will be used to generate genome assemblies of all 82 animals supporting four separate projects:

7.1.1. 1) the generation of an immuno-diverse Holstein pangenome from 45 cattle
7.1.2. 2) a dairy breed specific pangenome including 5 animals each from the major dairy breeds, Jersey, Brown Swiss, Guernsey, Ayrshire, and Milking Shorthorn
7.1.3. 3) DNA methylation profiling across 15 tissues in 3 high and 3 low efficiency Holstein dairy cows
7.1.4. 4) complete genome assembly of one Angus and DNA methylation profiling across 6 tissues in 3 grass-fed and 3 grain-fed Angus

7.2. The Prime Contractor shall submit progress reports every two weeks to the Government Technical Monitor.
7.3. Samples will be shipped to the contractor at Government expense.

7.4. **Data Requirements:**

7.4.1. 45 animals, ≥ 100 Gb of minimum read N50 ≥ 50kb each from buffy coat sample.
7.4.2. 25 animals, 5 breeds, ≥ 150 Gb of minimum read N50 ≥ 50kb plus one SMRT cell each (≥ 110 Gb sequence data) from semen. One animal per breed will also require ≥ 40 Gb of minimum read N50 ≥ 150kb and one Pore-C (≥ 80 Gb per breed).
7.4.3. 6 animals, 15 tissues each, ≥ 60 Gb of minimum read N50 ≥ 20kb from each tissue.

7.4.4. 6 animals, 6 tissues each, ≥ 60 Gb of minimum read N50 ≥ 20kb from each tissue. One animal will also have ≥ 180 Gb of minimum read N50 ≥ 150kb, one SMRT cell (≥ 110 Gb sequence data), and one Pore-C (≥ 80 Gb sequence data)

7.4.5. Raw data files (pod5 and bam) and processed data (fastq) will be transferred to USDA Government Technical Monitor within 12 weeks of sample receipt.

QUALITY CONTROL

8. **Quality Assurance Surveillance Plan (QASP):** The Government shall establish a QASP as a means of evaluating whether the Contractor is meeting the performance standards/quality levels identified in the PWS to ensure that the government pays only for the level of services received.

Tasks	**Standards**	**Acceptable Quality Level (AQL)**
Technical Requirements and Tasks identified in Section 7	*Standards as established in Technical requirements and tasks identified in Section 7*	*100%*