Streamlining data management at BioBank AS

Cloud-based platform for animal breeding based on genetic traits

Thermo Fisher Platform for Science Software: key benefits to BioBank AS

- Improved tracking for complex relationships between breeders, owners, animals, samples, inventory, and analytical results
- Increased efficiency through optimized workflows, worklist consolidation, and ease of data entry
- Simplified access to information via intuitive navigation from animals to parents and siblings, and cloud-based infrastructure

Biobanking workflows

BioBank AS is a national biobank in Norway focused on the collection and storage of samples and compilation of test data from animal and plant species. Sample types including tissue, semen, buccal swabs, whole blood, and DNA are taken from a variety of plants and animals. The animal species include cattle, pigs, salmon, trout, tilapia, horses, and household pets such as dogs. The organization also tracks specimen data such as donor animal ID, the heritage relationship between donor animals, breeder, organization and storage location and conditions.

At the start of its workflow, BioBank AS receives and aliquots samples. Aliquots are stored for pedigree lineage tracking or sent to a third part for genotyping of sequencing.

When the biomarker information returns to BioBank AS, it is used for parental verification and is stored and associated with the appropriate samples. The genetic markers associated with traits of interest (disease-or performance-related) can provide information for breeders and owners relating to the diagnosis of disease or confirmation of pedigree.

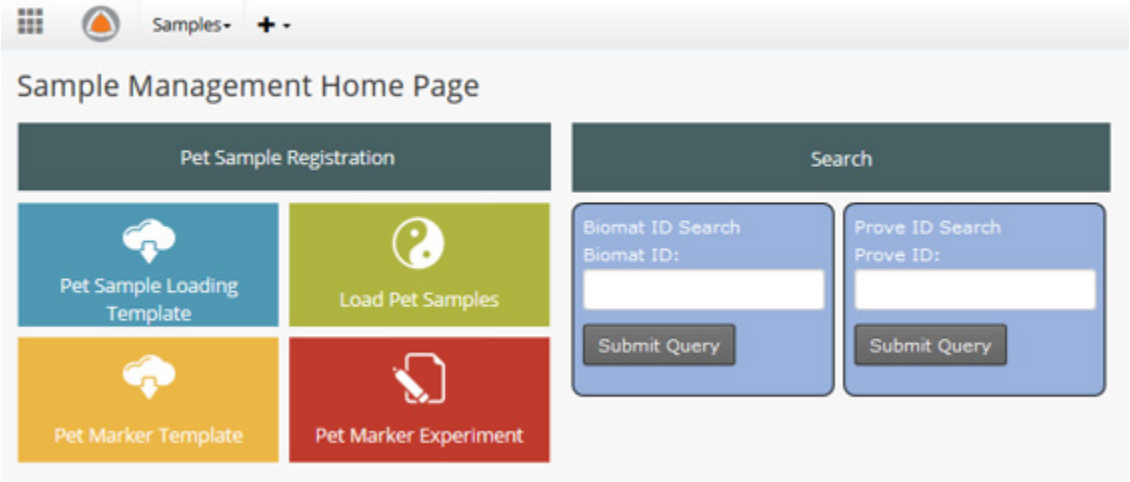

fig.1. Thermo Fisher™ Platform for Science™ software

Managing information in an aging database

The in-house, legacy data management system at BioBank AS was built on Oracle 8i™ and used highly customized Oracle form technology. BioBank AS used the system to track genealogies, handle workflows, and maintain biobanking and DNA extraction data.

For example, when sequencing information was returned to BioBank AS, the Oracle system ran a report to complete the analysis of 18 markers and two alleles for parental verification. Though the Oracle system could create lineage comparisons, it was difficult and time consuming to store and associate them with samples.

The team at BioBank AS knew they couldn't maintain and support the old database going forward, and were afraid it might fail under the strain of their expanding data needs. Maintenance was taking a massive amount of time and resources, and using the system was cumbersome – involving multiple steps and manual data input. The organization wanted to streamline their data management processes with a friendlier user interface to reduce the potential for errors.

> "We face[d] a fundamental choice. Should we develop a new, tailor-made database, or can we find off-the-shelf solutions that give us the same functionality?"
>
> – Sigbjorn Gregusson, CEO of BioBank AS

About BioBank

BioBank AS was founded 2005 as a national biobank for fish, livestock and plants in Norway. Through breeding programs and research and development (R&D), they have collected genetic information and kinship information on their breeding populations for over 40 years, that includes valuable collections and data from before the establishment. BioBank is facilitating the technology and services to the top three breeding companies in Norway to meet their future need for genomic research and efficient breeding, as well as smaller breeding organizations and independent breeders.

A scalable, cloud-based platform for biobanking

BioBank AS selected Platform for Science software to capture, manage, and report on all aspects of its biobanking operations. The system was comprised of a cloud-based Thermo Scientific™ Core LIMS™ software running on the Platform for Science. BioBank AS chose this solution because the platform could be configured to match the organization's specific requirements.

BioBank AS wanted a long-term, cloud-based solution to support the business. The team needed a system that would be able to scale on its timeline to support its large, growing database of over 960,000 IDs. Platform for Science runs on Amazon Web Services (AWS) a secure cloud-hosting option that reduces maintenance and updating that a typical on-premises data management system would require. BioBank AS moved to the cloud so the platform could be up and running quickly and reliably – they could not afford to have a gap (even for a day) in database coverage. Over time, the BioBank AS team plans to move the entire informatics infrastructure to AWS to provide scalability and access to the most modern technologies.

Why AWS

- Scalability to support a growing database
- Reduced maintenance
- Reduced overhead costs

aws partner network

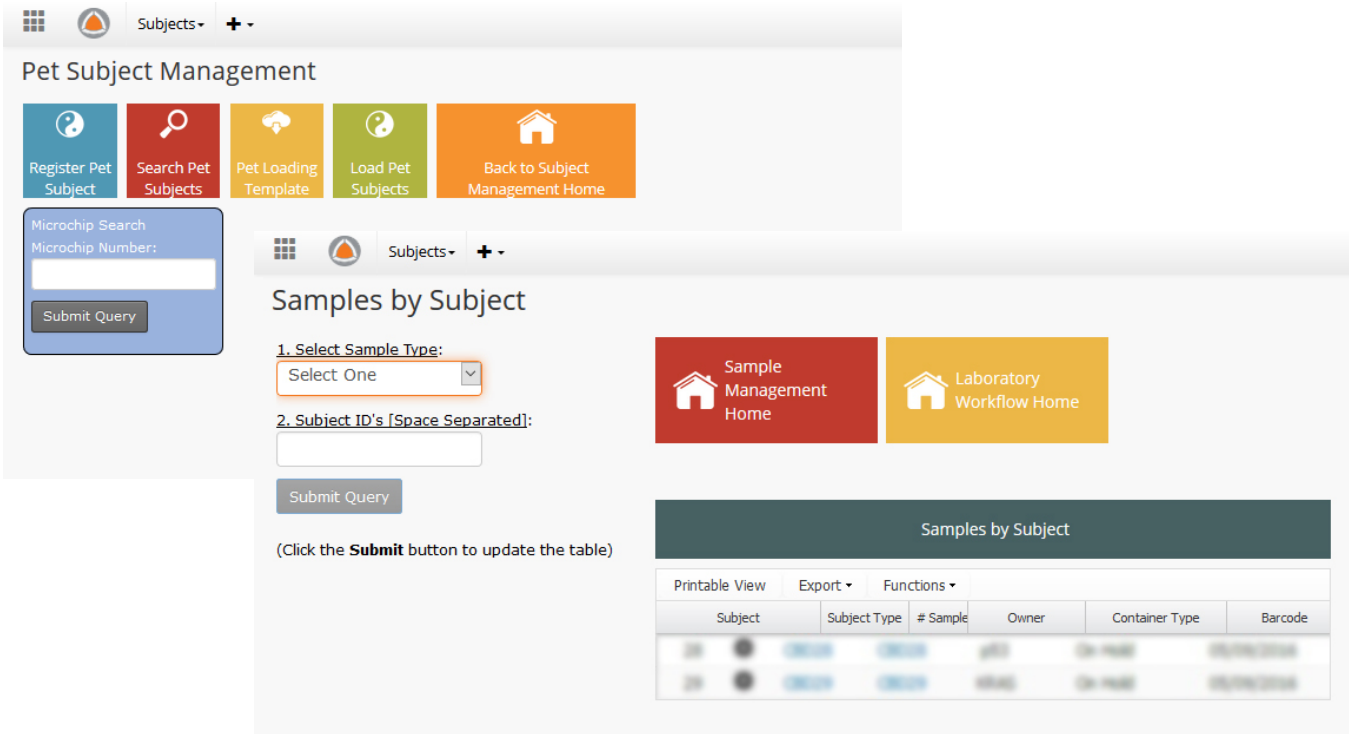

fig.2. Pet data management and workflows are accessible from one dashboard. Information can be sorted by subject, owner, workflow status, etc.

Implementation of the Platform for Science

For the first phase of implementation, BioBank AS sent their IT specialist to the lab to learn their scientific processes from the ground up. He designed streamlined versions of real-life workflows based on an in-depth understanding of how an end user would engage with the platform.

BioBank AS's IT specialist worked with the Thermo Fisher team to configure the platform to optimize workflows and ease of use. For example, dashboards and workflow buttons were created to facilitate user acceptance and increase adherence with processes.

Core LIMS software solution was configured for animal workflows at BioBank AS, including sample accessioning, aliquoting of samples, tracing location, and DNA extraction. Ownership and lineage traits are tracked, as well as the biomarkers and associations necessary for pedigree.

The platform also acts as a repository for raw data associated with samples, including DNA sequencing and genotyping analysis files.

The LIMS streamlined data input and access for users, which was critical to the company's business model requiring continuously sharing data amongst multiple external laboratories, breeders or other partners. Multiple worklists were consolidated into one which identifies process step, progress, and location, enabling a more efficient lab.

BioBank AS took the time to find a vendor that fit its needs, and to understand and map its workflows for ease of use by many groups. "The time we spend now will pay out in the future," said Gregusson, shortly before the system went into production. "To invest time in developing and testing is crucial for us and for our success."

> "Platform for Science has fantastic searching capabilities, and we were able to build gadgets that could support more specific searching capabilities."
>
> – Arne Simensen, System Administrator, BioBank AS

Key components of the solution

- Sample management
- Inventory management
- Subject management
- Laboratory workflows
- DNA extraction
- Quality Control (QC)
- DNA sample shipment
- DNA results entry

thermo scientific

Lessons learned for future implementations

1. Start small

Both teams first approached the project intending to tackle data for multiple species immediately. These workflows were well established at BioBank AS, and users were accustomed to the legacy data entry system. The decision to change direction and move to a smaller, newer workflow allowed creativity in optimizing processes. As users become accustomed to working within Platform for Science software, its footprint will be expanded within the organization. Both teams believe this small first step will lead to better user acceptance and more flexibility to optimize workflows in the future.

2. Cross-train IT administrators on the science

Moving a scientist out of the lab to help configure an informatics platform happens far more frequently than placing an IT specialist in the lab. The organization's choice to train its platform administrators in the lab, prior to configuring the system, created substantial usability benefits in the final product. This offers a new method of process mapping for organizations willing to invest in cross-training employees.

An informatics solution for expanding biobanking needs

BioBank AS tracks the relationships between the different types of data, and produces a variety of reports from lineage analysis to ownership, biobanking storage, sample tracking and more. It is essential for BioBank AS to have a well-organized biological stock of individual samples and associated high quality data, to be able to carry out the work their customers require.

The team estimates Platform for Science software will help save them significant amounts of time, due to its scalability and adaptability. When a customer requests a large number of samples from storage, they can now easily locate the samples and know if any other analyses have been performed. The lab uses the data to pull a variety of reports for internal and external use, for breeders, owners, and other research.

Over time, the organization plans to move its complete biobanking operation to the cloud-hosted platform. Over 40 years of legacy data and a variety of species will be added to the Platform for Science software solution. In addition, biomarker data will be processed within the platform, allowing BioBank AS to retire the legacy system. The organization also plans to extend capabilities to include sequencing samples in-house, as well as integrate financial systems to handle invoicing based on samples, length of storage, DNA testing, etc.

The BioBank AS team is looking forward to fully realizing the benefits of running on the cloud — reduced maintenance and overhead costs, increased security, the ability to scale on demand, and secure, remote access. Looking forward, Simensen noted that the quality data that Platform for Science software solution enables is "going to be the heart of the company."

Find out more at **thermofisher.com/informatics**

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