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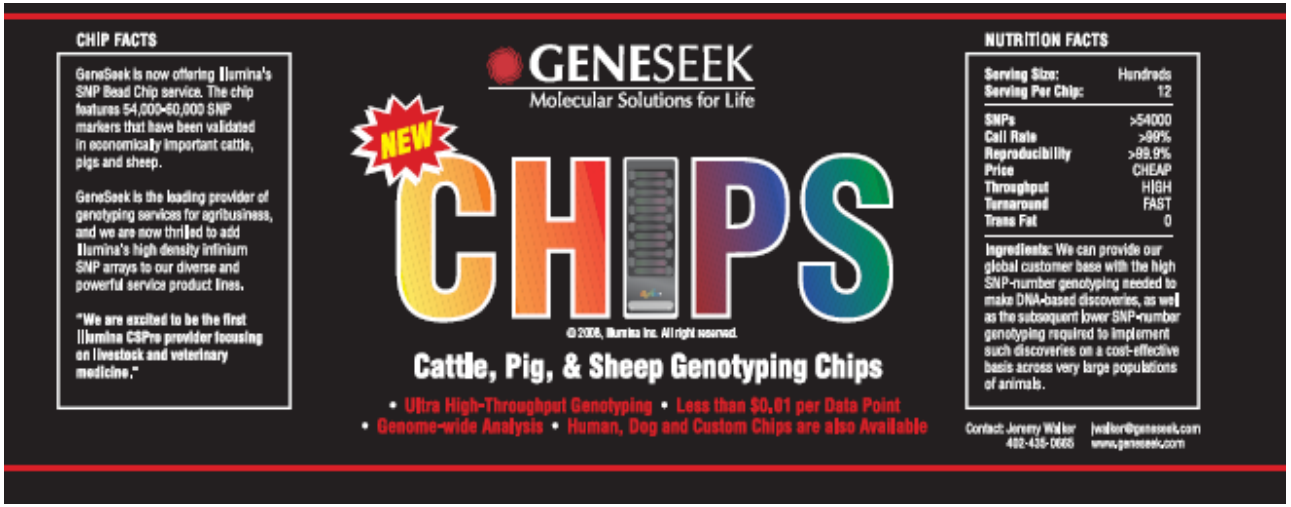
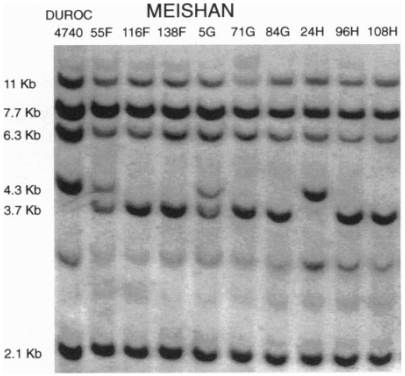
The Evolution of Commercial DNA Testing in the Cattle Industry

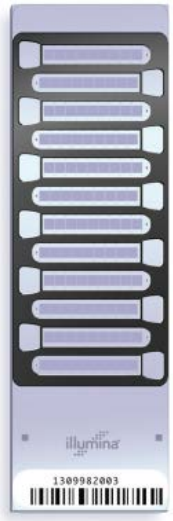


Daniel Pomp
UNC – Chapel Hill
GeneSeek - Neogen

My how things have changed!



1998



2008

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Animal Genetics 1989, **20**, 157-165

Restriction fragment length polymorphisms associated with growth hormone and prolactin genes in Holstein bulls: evidence for a novel growth hormone allele

C. M. COWAN,*† M. R. DENTINE,* R. L. AX*† & L. A. SCHULER†‡

**Department of Dairy Science, †Endocrinology-Reproductive Physiology Program and ‡Department of Comparative Biosciences, University of Wisconsin, Madison, Wisconsin 53706, USA*

Summary. Sperm DNA isolated from sons of three extensively used US Holstein bulls was screened for differences associated with the primary gene structure of the bovine growth hormone (bGH) and prolactin (bPrl) genes. Southern blot analysis of DNA digested with 10 restriction enzymes revealed that offspring from two of the

Red and Black

This page is part of a series "Genetics of Coat Color in Cattle"

This webpage was last updated on August 18, 2009 by Sheila Schmutz

---

MC1R

The photo at the left shows two calves. The bull calf at the left is a classic red (

Red and black are probably the two most common coat colors in cattle. They c
popular in some countries and black in others, but both are common throughou

The gene causing red/black is the the Melanocortin 1 Receptor gene (MC1R),
type" occurs. When E^D is present in an animal, it is typically black. This is the d

BIOTECHNOLOGY AND BEEF CATTLE IMPROVEMENT:

Realities and Myths

Daniel Pomp
Department of Animal Science
Oklahoma State University

PROCEEDINGS

BEEF IMPROVEMENT FEDERATION

Ames, 1994

GENESEEK

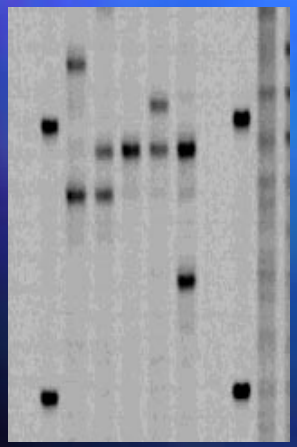
Molecular Solutions for Breeding and Genetics

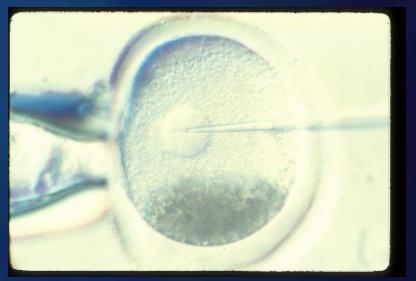
EMERGING TECHNOLOGIES FOR GENETIC IMPROVEMENT OF BEEF BIOTECHNOLOGY: DNA

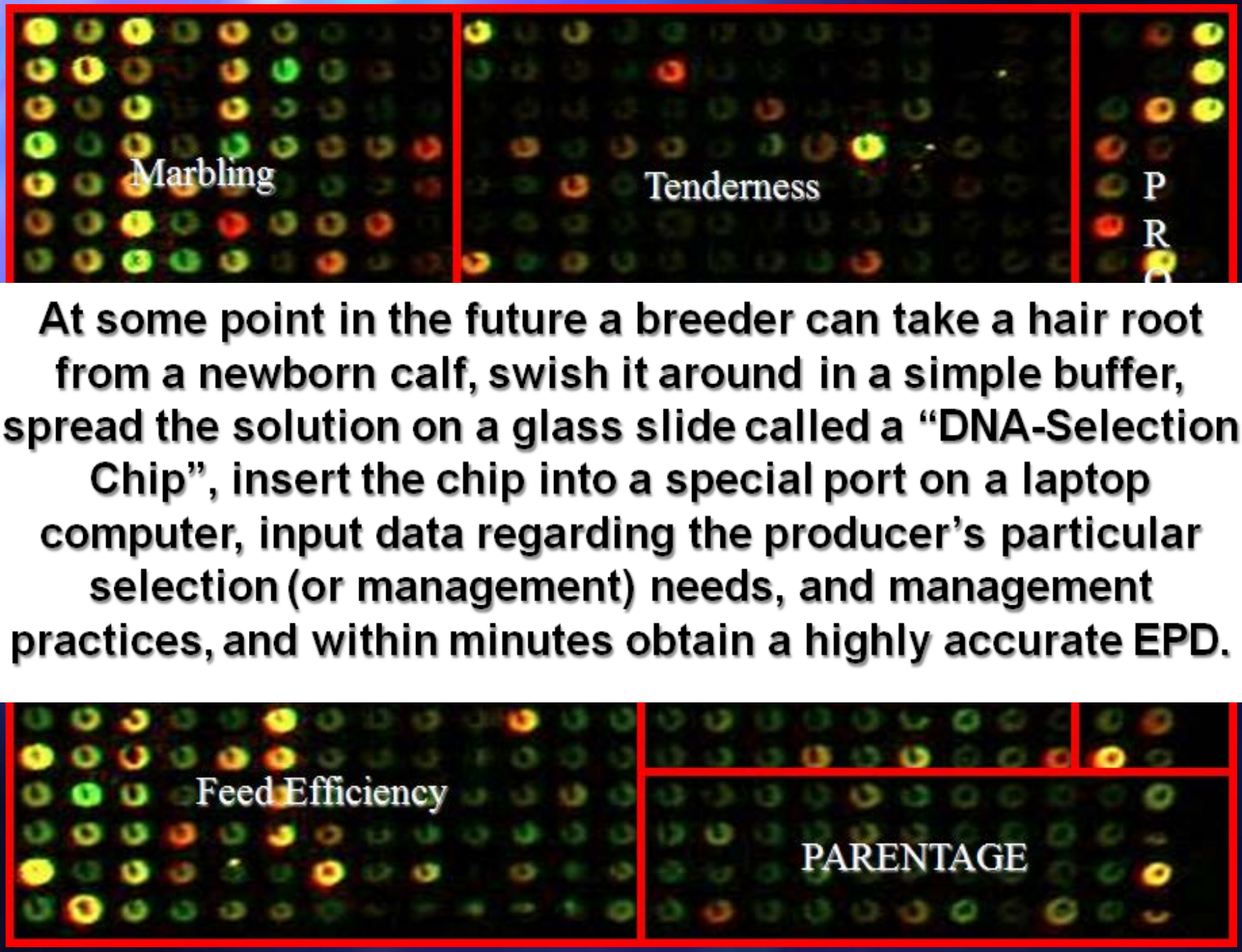
Daniel Pomp, University of Nebraska – Lincoln

PROCEEDINGS
BEEF IMPROVEMENT FEDERATION

Wichita, 2000







At some point in the future a breeder can take a hair root from a newborn calf, swish it around in a simple buffer, spread the solution on a glass slide called a "DNA-Selection Chip", insert the chip into a special port on a laptop computer, input data regarding the producer's particular selection (or management) needs, and management practices, and within minutes obtain a highly accurate EPD.

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Prediction of Total Genetic Value Using Genome-Wide Dense Marker Maps

T. H. E. Meuwissen,* B. J. Hayes† and M. E. Goddard†,‡

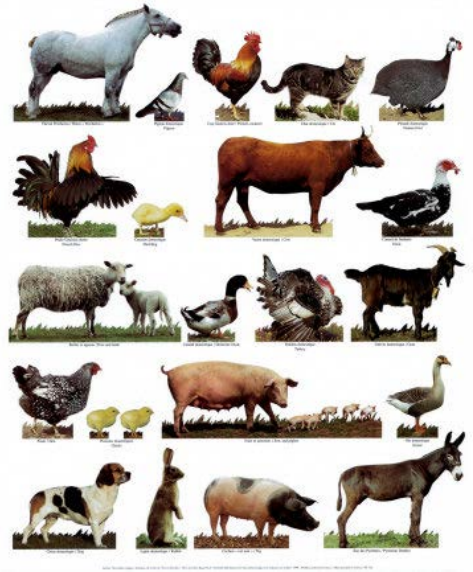
**Research Institute of Animal Science and Health, 8200 AB Lelystad, The Netherlands, †Victorian Institute of Animal Science, Attwood 3049, Victoria, Australia and ‡Institute of Land and Food Resources, University of Melbourne, Parkville 3052, Victoria, Australia*

Manuscript received August 17, 2000
Accepted for publication January 17, 2001

ABSTRACT

Recent advances in molecular genetic techniques will make dense marker maps available and genotyping many individuals for these markers feasible. Here we attempted to estimate the effects of ~50,000 marker haplotypes simultaneously from a limited number of phenotypic records. A genome of 1000 cM was simulated with a marker spacing of 1 cM. The markers surrounding every 1-cM region were combined into marker haplotypes. Due to finite population size (N_e = 100), the marker haplotypes were in linkage disequilibrium with the QTL located between the markers. Using least squares, all haplotype effects could not be estimated simultaneously. When only the biggest effects were included, they were overestimated and the accuracy of predicting genetic values of the offspring of the recorded animals was only 0.32. Best linear unbiased prediction of haplotype effects assumed equal variances associated to each 1-cM chromosomal segment, which yielded an accuracy of 0.73, although this assumption was far from true. Bayesian methods that assumed a prior distribution of the variance associated with each chromosome segment increased this accuracy to 0.85, even when the prior was not correct. It was concluded that selection on genetic values predicted from markers could substantially increase the rate of genetic gain in animals and plants, especially if combined with reproductive techniques to shorten the generation interval.

LES ANIMAUX DE LA FERME / FARM ANIMALS



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ILLUMINA TO DEVELOP iSELECT BOVINE BEADCHIP WITH THREE COLLABORATING INSTITUTIONS TO GENOTYPE OVER 10,000 CATTLE

Genome-Wide SNP Content Designed to Improve Selection for Multiple Breeds of Cattle

SAN DIEGO, CALIFORNIA, August 24, 2006 -- Illumina, Inc. (NASDAQ: ILMN) announced today that it has signed a commercial agreement to develop a new multi-sample Bovine BeadChip that uses the Infinium™ assay to initially genotype over 10,000 cattle. Illumina's recently released iSelect genotyping BeadChip allows the analysis of twelve samples in parallel with over 48,000 SNP markers per sample, on a single microarray. SNP content will be developed in close collaboration with scientists at three organizations: the United States Department of Agriculture (USDA) Agricultural Research Service (ARS), the University of Missouri-Columbia (MU) and the University of Alberta (UA). The SNP content will utilize the release of the bovine draft sequence and recent genome assembly (Btau 3.0) done at the Baylor College of Medicine. The SNP markers will be used by the participants to map quantitative trait loci (QTLs) and to selectively breed cattle. Following development of the new Bovine BeadChip and analysis of the initial batch of samples, Illumina plans to offer the new product in early 2007 as a standard catalog array that can be purchased and used by any customer.

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Ownership
Message Board
Guided Research
Research Wizard

GeneSeek Becomes Illumina's First Certified Service Provider to Use Infinium DNA Analysis BeadChips for Agriculture Research

July 28, 2008 6:00 AM ET

Business Wire
All Business Wire news

Illumina, Inc. ILMN today announced that GeneSeek Inc., a leading provider of genotyping services for agribusiness, is the first organization focusing on this key research community to become an Illumina CSPro® (certified service provider). Illumina CSPro is a collaborative service provider partnership dedicated to ensuring delivery of the highest-quality data available for genetic analysis applications. Using Illumina's Infinium® products, including the iSelect™ BovineSNP50, CanineSNP20, and EquineSNP50 BeadChips, GeneSeek offers its customers access to large-scale interrogation of plant and animal genomes.

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Holy Cow

Matthew Herper, 02.05.10, 03:00 PM EST
Forbes Asia Magazine dated February 08, 2010

Genomics has revolutionized dairy farming.

Breeding insight: Curtis Van Tassell created a gene test for cows.

WORKSHOP
GENOMIC TOOLS FOR IMPROVING BEEF CATTLE PRODUCTION

Statistical and computational approaches for whole-genome prediction of complex traits
Dr. Guilherme Rosa (University of Wisconsin - Madison - USA)

Genomic Selection and GWAS using single step approach
Dr. Ignácio Aguilar (INIA Las Brujas - Montevidéu - Uruguai)

How to validate and apply genomic selection in beef cattle?
Dr. Dorian Garrick (Iowa State University - USA)

Genomic selection for feed efficiency and meat quality traits in beef cattle
Dr. Steve Miller (University of Guelph, Ontario, Canada)

Genomic selection through genome-wide imputation
Dr. Flavio Schenkel (University of Guelph, Ontario, Canada)

Cattle genomics: what have we learned since Dominette´s sequencing?
Dr. Jeremy Taylor (University of Missouri - Columbia – USA)

1000 bull genomes project: results and perspectives
Dr. Ben Hayes (DPI - Victoria Austrália)

Seleção genômica para características de importância econômica direta em bovinos Nelore
Profa. Dra. Lucia Galvão de Albuquerque (Unesp/FCAV - Jaboticabal)

Minicurso (Informações no site da Funep)

12 e 13 de agosto de 2013

Local: Centro de Convenções da Unesp/FCAV

Investimento	Até 15/07	Após
Estudante	R$ 200,00	R$ 250,00
Profissional	R$ 300,00	R$ 350,00
Minicurso	R$ 150,00	R$ 150,00

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One Sample, One Stop: Turning 'Off-The-Shelf' SNP Chips into Informational Powerhouses

Illumina Introduces the Next Generation of iSelect® Custom Genotyping

SAN DIEGO --(Business Wire)--

Illumina, Inc. (NASDAQ:ILMN) today announced its next generation of iSelect custom genotyping products that allow researchers to design custom arrays containing from 3,000 up to 1,000,000 markers, with the flexibility to add supplemental content to their array designs. The additional marker and add-on content capabilities enable researchers to draw on the latest advances from genome-wide association studies, next-generation whole-genome sequencing, and exome sequencing studies for variant confirmation, fine mapping, and target validation. Next generation iSelect also delivers the flexibility in plexity, pricing, and content that applied markets need to transition to the latest genomic tools.

"Next generation iSelect custom genotyping will facilitate more data generation, and at a lower price that will make our Infinium® assay available to a market segment not able to access it previously," said Christian Henry, General Manager of Life Sciences at Illumina. "We are especially excited about the product's new add-on content capabilities, which will allow customers to design new content for their existing custom arrays using markers found through ongoing GWAS and sequencing efforts. This feature is unique to Illumina's custom high-density arrays and provides a significant benefit to customers who want to add newly discovered content after the initial design period is completed."

Illumina Introduces Low-Cost Bovine BeadChip for Genotyping of Dairy Cattle

Optimized Content and Price to Enable Wider Use of Genomic Selection

Press Release Source: Illumina, Inc. On Thursday September 29, 2011, 6:00 am EDT

SAN DIEGO--(BUSINESS WIRE)-- Illumina, Inc. (NASDAQ:ILMN - News) today announced the launch of the Infinium BovineLD (low density) BeadChip. With approximately 7,000 SNPs and a 24-sample format, this BeadChip supports a broad range of applications including genomic selection, parentage and traceability. Using this product, customers can compare data to that generated with Illumina's higher-density bovine arrays, extending the application of genomic information to more animals than ever before. The BovineLD BeadChip complements the

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One Sample, One Simple
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GeneSeek Genomic Profiler-LD

GENESEEK® Genomic Profiler™

NEW! 26,100 SNPs

Offers the industry leading tool for accurate, high density imputation

- **SNPs specifically chosen for high minor allele frequency values and uniform genome coverage for accurate imputation to higher chip densities**
- **The average SNP spacing is 102 kb (the Illumina LD chip has average spacing at 383 kb for comparison)**
- **All commonly utilized USDA parentage SNPs**
- **More than 20 disease and trait markers with published effects**

One Simple
ive Solution

filer™

GP) low density
try and features
lensity BeadChip
erformance trait

mprehensive
e:

he original 7,000
ion efficiency.

NPs.

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re included below.

- Arthrogryposis (Curly Calf, AM)*
- Fawn Calf Syndrome or Contractural Arachnodactyly*
- Hypotrichosis_KRT71 (Hairless)*
- Idiopathic Epilepsy (IE)*
- Neuropathic Hydrocephalus (NH)*
- Pulmonary Hypoplasia (PHA) (Dexter, Shorthorn, Maine-Anjou)*
- Tibial Hemimelia (TH)*

*additional royalty fees will be applied for these optional licensed tests

led in 1998 and has developed into a service provider. GeneSeek provides arch and development, and commercial

USDA (BARC,
DC, Ruminant
of SNPs and
omic Profiler.

illumina CSPro CERTIFIED SERVICE PROVIDER

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BovineHD

~777K SNPs

80K GGP-HD

BovineSNP50

~50K SNPs

BovineLD

~7K SNPs

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About GeneSeek

- Started in 1998, with two Principals, in Lincoln Nebraska
- Vision: Affordable, flexible DNA Analysis for agribusiness
- Began with 1 student intern; Now ~~18~~ ~~30~~ ~~65~~ 90 FTE (and robots)
- Began 600 sqft, currently ~~3000~~ ~~4000~~ ~~8000~~ ~~15000~~ 30000
- >1M DNA samples processed this year, ~$30M Revenue

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CONTACT: Steve Quinlan, Chief Financial Officer, 517/372-9200

Neogen acquires Igenity from Merial

LANSING, Mich., May 1, 2012 – Neogen Corporation (Nasdaq: NEOG) announced today that it has acquired the assets of the Igenity animal genomics business from Merial Limited. Igenity will operate as a part of Neogen's GeneSeek subsidiary, which already has a significant place in the worldwide animal genomics business.

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CONTACT: Steven J. Quinlan, Vice President & CFO, Neogen Corporation, 517/372-9200

Neogen acquires Scidera Genomics

LANSING, Mich., Jan. 2, 2013 – Neogen Corporation (Nasdaq: NEOG) announced today that it has acquired the assets of Scidera Genomics, LLC, an animal genomics business based in Davis, California. The company, formerly operated as MetaMorphix, Inc., or MMI Genomics, was a pioneer in the development of cattle, poultry, swine, and canine genetic testing.

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NEWS RELEASE

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FOR IMMEDIATE RELEASE

CONTACT: Jamie Bishop
402/420-0909, jamie@bishopmktgrp.com

GeneSeek's lab triples in size to enhance service to cattle producers

LINCOLN, Neb., June 19, 2014 — GeneSeek, a Nebraska-grown leader in agrigenomics, will dedicate its new facilities in Lincoln on June 26, with the help of Nebraska Governor Dave Heineman, Lincoln Mayor Chris Beutler and other dignitaries.

GeneSeek's new facilities feature more than 30,000 square feet of laboratory and office space customized specifically for the core business of providing high quality, cost effective genomic services — compared to its previous 13,000 crowded square feet. The company moved into the new lab in May 2014 and is in full operation at the new facility.

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Taking DNA Sequencing to the Masses

By ANDREW POLLACK
Published: January 4, 2011

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