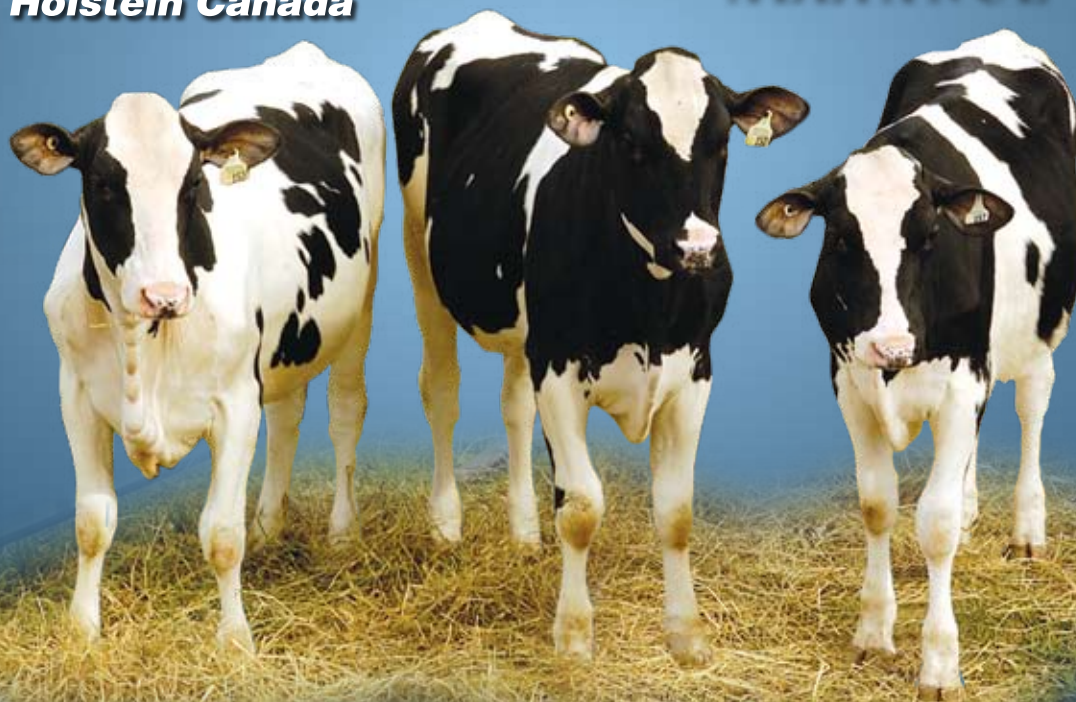


GENO TEST

Genomic testing to help you make better management decisions



A genomic testing service for dairy producers offered by
Holstein Canada and Semex Alliance
(Westgen, Gencor, Eastern Breeders and CIAQ)







GENOMICS 101

Genomics is the study of DNA, the molecules that carry the genes of each individual. For many in the dairy genetics industry genomics is anticipated to provide the greatest advancement since the advent of frozen semen. Genomic testing is a tool which increases the accuracy of predicting an animal's genetic merit. The gain in accuracy is largest for younger animals (Table 1). This applies for any trait in which traditional genetic evaluations exist and leads to new opportunities for making genetic progress. Canadian dairy producers are well positioned to take advantage of genomics.

OPPORTUNITIES FOR PRODUCERS WHO USE GENOMIC TESTING

Genomics is a fast and convenient way to more accurately predict the genetic potential of an animal. With heifer rearing costs in Canada pegged at \$2000 or more, being able to make better selection, culling or marketing decisions at an earlier age can significantly impact on overall herd profitability.

Genomic results provide additional information for producers to make better selection decisions with an emphasis on accelerating genetic progress. Selecting better sires, perhaps even using sexed semen on the best heifers are but two examples. Your next generation of females provides the best opportunity for improving the overall genetic level of your herd.



TABLE 1 - AVERAGE GAIN IN **LPI** RELIABILITY USING GENOMICS

| Holsteins August 2010 | Average LPI Reliability % | | |
|--|---------------------------|---------|---------|
| | Traditional | 50K SNP | 3K SNP* |
| Heifers | 37 | 65 | 62 |
| Young cows (1 st or 2 nd lactation) | 54 | 69 | 67 |
| Foreign cows with MACE in Canada | 43 | 67 | 65 |

Source: Canadian Dairy Network

* Note: the actual gain in reliability using 3K depends on the information available on the ancestors of the animal tested

ECONOMIC BENEFITS OF IMPROVEMENTS IN LIFETIME PROFIT INDEX (LPI)

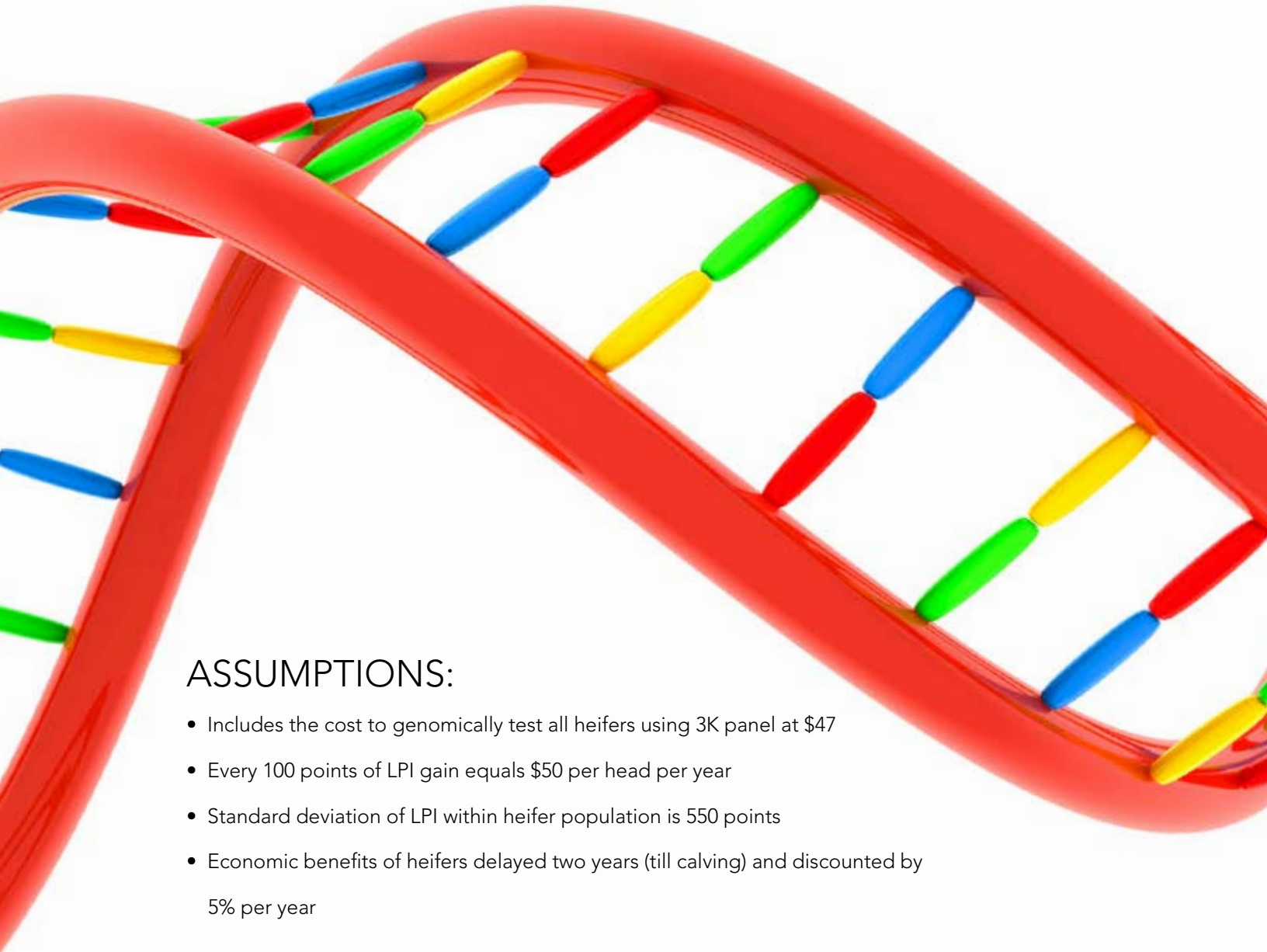
Genomics provides a much more accurate tool for selecting heifers thus increasing the rate of genetic progress. Lifetime Profit Index (LPI) provides an overall measure of the economic value an animal will contribute and considers factors such as, production, durability, health, and fertility. Using genomics to select heifers will increase the rate of LPI progress made versus traditional selection methods.

Table 2 estimates the net economic benefit of using genomics to select replacement heifers. Two main factors affecting the benefits include the number of heifers available and the number selected for replacement.



TABLE 2 - NET ANNUAL PRESENT DAY ECONOMIC BENEFITS OF USING GENOMICS FOR HEIFER SELECTION FOR A 100 HEAD MILKING OPERATION

| Number of heifers available for genotyping over 12-month period | Heifer replacement rate | | | | |
|---|-------------------------|----------|---------|-----------|-----------|
| | 25% | 30% | 35% | 40% | 45% |
| 60 | \$14,040 | \$11,900 | \$9,560 | \$7,390 | \$5,180 |
| 50 | \$12,150 | \$9,560 | \$6,900 | \$4,220 | \$1,320 |
| 40 | \$9,100 | \$5,900 | \$2,510 | (\$1,880) | (\$1,880) |



ASSUMPTIONS:

- Includes the cost to genomically test all heifers using 3K panel at \$47
- Every 100 points of LPI gain equals \$50 per head per year
- Standard deviation of LPI within heifer population is 550 points
- Economic benefits of heifers delayed two years (till calving) and discounted by 5% per year

The benefits of using genomic testing for heifer selection are the greatest when there is a large number of heifers to choose from and a low replacement rate. The use of sexed semen can substantially increase the number of heifers available and therefore benefits from genomics. The economic benefits in table 2 take into consideration the lactations of the selected heifers but not the additional genetic progress that these superior heifers will transmit to their progeny.



KEY OPPORTUNITIES WITH GENOMICS

A tool to assist in making better management and marketing decisions

Increased reliability and accuracy of genetic evaluations

Achieve faster genetic progress in your herd

Select the right heifers earlier

Optimize heifer matings

Genomic testing can also supply information on parentage, breed makeup, and actual rather than estimated inbreeding levels. The science of genomics will continue to evolve and there are many future opportunities including parentage discovery, traceability, and identifying new traits of economic importance. What we are experiencing today with genomics is just the beginning.



GENO TEST

GENOMIC TESTING SERVICE

Holstein Canada and Semex partners are pleased to offer genomic testing of females for all dairy producers. GenoTest includes 3K and 50K SNP testing as well as the option to submit DNA samples using hair or nasal swabs. An application for genomic testing can be printed from the Holstein Canada or Canadian Dairy Network websites.

WHAT GENOMIC TEST (3K or 50K) SHOULD YOU USE?

The 3K test evaluates 3,000 SNP while the 50K looks at 50,000. The 3K test provides slightly less accuracy (~90% of 50K) but costs significantly less. With 3K, the remaining 47,000 SNP are imputed (filled in) using knowledge about the transmission of SNP in related animals. The accuracy of 3K depends on the information available from the ancestors. For example: if the sire is tested with 50K and the dam 3K the accuracy of 3K will be slightly less than if the dam was tested with 50K.

GENOTEST FEES PER ANIMAL: SEPTEMBER 2010

| Genomic Test | DNA Sample | |
|--------------|------------|-------------|
| | Hair | Nasal Swab* |
| 3K SNP | \$47 | \$42 |
| 50K SNP | \$160 | \$155 |

* additional \$5 fee for nasal swabs thus making the total cost the same as hair

Foreign animals (not owned by Canadian clients) can be submitted for genomic testing through a Canadian client for an additional fee of \$10.

| USE 3K TEST | USE 50K TEST |
|---|--|
| Herd genotyping to assist in selection, mating, and marketing decisions | Elite females considered for sale or merchandising outside of Canada |
| Pre-screening of females for embryo transfer or other considerations | |

Note: Canadian-owned animals tested on either panel will obtain official genomic evaluations in Canada, as well as any animal submitted for genotyping within the GenoTest program. All animals in North America genotyped using the 50K panel will receive genomic evaluations in both the United States and Canada.



SHOULD YOU USE HAIR OR NASAL SWABS FOR **DNA** COLLECTION?

It is up to you to decide which method you prefer. Many producers are comfortable with using hair for DNA collection. Hair can sometimes pose challenges with younger animals and also during the DNA extraction process at the lab.

Nasal swabs are a relatively new technology, but have proven to be an effective method of DNA collection for dairy cattle. Nasal swabs provide an option that usually works better with young animals (<6 months of age) or where there has been difficulty with hair collection.

Nasal swab kits cost \$5 each and can be ordered from Holstein Canada or Semex Partners. Nasal kits have a 2-year shelf life and can be stored in a wide range of conditions.

Holstein Canada will supply nasal kits to producers in packages of 10 for \$50 plus applicable taxes. Individual kits can be ordered for \$6 each.

Nasal kits can be ordered by email: customerservice@holstein.ca and directly from: www.holstein.ca (**Genetics > Genomics > Genomic Testing tab**) or by calling customer service (**519-756-8300**). Nasal kits can also be purchased through a Semex partner.

DOES MY ANIMAL NEED TO BE REGISTERED TO TAKE ADVANTAGE OF GENOTEST?

- Yes, genomic testing requires a unique registration number and pedigree information provided by the registration process
- In the future genomic testing could facilitate animal registration or recording
- Another opportunity includes using genomics to discover parentage providing some of the ancestors have been previously genotyped



Nasal swab kit



Tail hair sample

WHAT INFORMATION WILL YOU GET WITH GENOTEST?

- 4-6 weeks after the DNA sample is received at Holstein Canada results will be posted in a confidential online message board of the owner on the Holstein Canada website.
- On a monthly basis the Canadian Dairy Network (CDN) will release all newly genotyped animals on its website.
- After each official genetic evaluation release (April, August and December) all animals tested will be updated on the Holstein Canada and CDN websites.
- Semex partners have developed a new program, GenoPlan, to assist you with making the best use of genomic evaluations you will be receiving. The program can also help you decide which animals to genotype in your herd. For information or to participate in GenoPlan, call the Semex partner in your area.

Note: it is recommended that producers allow six weeks prior to an official genetic release for samples to be included in that genetic evaluation.

Send DNA samples (hair or nasal swab) for GenoTest to: **Holstein Canada
c/o Genomic Testing
P.O. Box 610
Brantford, Ontario
N3T 5R4**



TESTIMONIALS

Claynook Farms Ltd. c/o Dennis Wagler
New Hamburg, Ontario

“Nasal swabs proved to be very effective and convenient for DNA collection in our young calves. The 3K genomic test gives us a cost effective option to assist us in our breeding decisions.”

Ferme Justina & fils Inc. c/o Mrs. Élyse Champagne
La Visitation, Québec

“I was pleased to take part in the nasal swab pilot project. In the tie stall environment in which my cows and heifers are housed, I thought it was a great DNA collection method since it can be done quickly and it is easier than hair collection.”



Holstein Canada

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