The Genomic Era has Arrived for the Canadian Charolais Association

First Official EPD run that includes Genomic information will be

July 2018

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Purpose of the Addition of Genomics

To improve the accuracy of EPD's and allow for much improved Genetic Evaluation of young animals

METHOD

- Angus Genetics Inc. (AGI), our service provider will apply the single step procedure developed by the University of Georgia (UofG) incorporating DNA data to EPDs

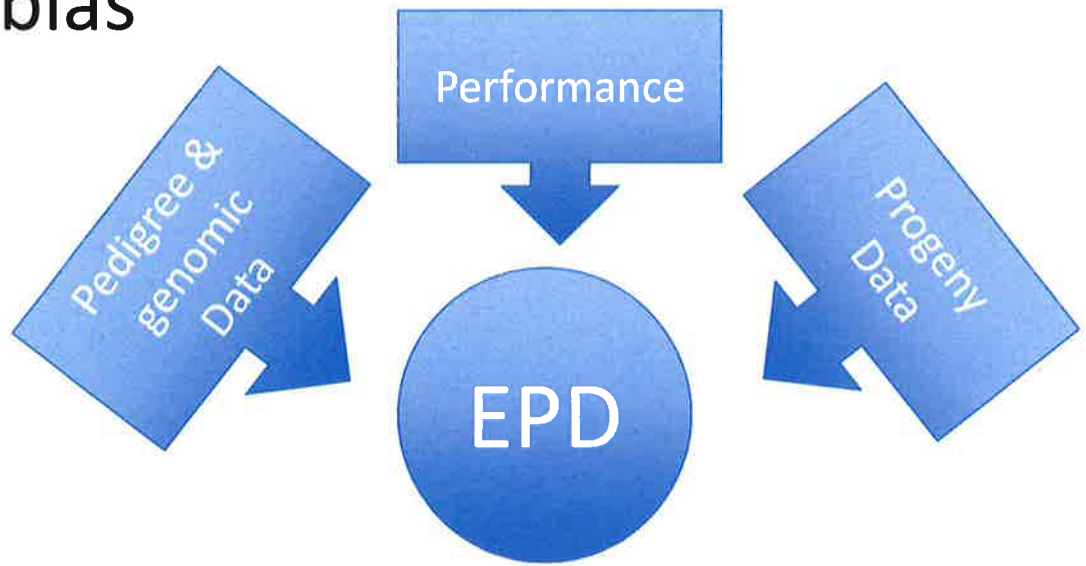
- (CCA provided pedigree, performance and progeny data to UofG to help with the research of this new methodology)

- The Single Step method has been adopted by

American Angus	July 2017
Canadian Angus	Sept 2017
American International Charolais	Jan 2018
Canadian Charolais	June 2018

Single-Step incorporates all sources of information

- ✓ Accounts for relationship between genotyped animals and genomic prediction information
- ✓ Eliminates periodic calibration
- ✓ Reduces bias



Re-ranking and movement will not be "miniscule"

- 5 years in the making
- Benefits to breeders
  - current
  - complete
- Genotypes and Phenotypes required

Accuracy

Genomically tested animals
Comparison of EPD accuracy and EPD changes between Spring 2018 and GEPD evaluation

GEPD = Genomic Tested
EPD = No Genomics Included

Significant improvement in Accuracy for Birth and Growth traits

Trait	Number Animals	Accuracy GEPD	Accuracy EPD	Diff
CE	1081	0.36	0.22	+ .14
BW	1365	0.65	0.40	+ .25
WW	1365	0.42	0.25	+ .17
YW	1365	0.33	0.18	+ .15
MILK	1365	0.25	0.14	+ .11
CWT	1365	0.16	0.10	+ .06
REA	1365	0.17	0.08	+ .09
Fat	1365	0.16	0.10	+ .06
Marb	1365	0.15	0.07	+ .08
LY	1365			

Improvement in all traits

Accuracy con't

- Accuracy improvement is most significant when there are no or few progeny.
- Accuracy improvement lessens when more progeny are added as expected and eventually converge

Example: BW Accuracy

# of Progeny	EPD	GEPD	Diff
0	.31	.61	+.30
20	.56	.73	+.17
30	.61	.74	+.13
430	.88	.89	+.01

Example: WW Accuracy

# of Progeny	EPD	GEPD	Diff
0	.19	.38	+.19
20	.43	.53	+.10
30	.47	.55	+.08
277	.78	.78	0

Change in EPD's

Changes between Spring 2018 EPD and GEPD –
Number of animals 1081 All others 1365
the average is less than 1 for all traits:-0.04 to +0.51

Trait	# of Animals	Average	Minimum	Maximum
CE	1081	0.34	-5.7	6.8
BW	1365	0.07	-4.7	3.8
WW	1365	0.42	-13.5	17.8
YW	1365	0.51	-25.1	31.8
MILK	1365	-0.04	-8.5	10.2
CWT	1365	0.2	-12.0	13.0
REA	1365	0.01	-0.26	0.32
Fat	1365	0.00	-1.03	1.55
Marb	1365	-0.01	-1.26	1.54
LY	1365	0.00	-1.29	0.87

Individual Animals can change significantly

Range of changes between GEPD and EPD

Birth Weight (BW) lbs

Change lbs.	# Animals	%
-1.0 and lower	68	5
-0.99 to +0.99	1204	88
+1 and higher	100	7

Median Change = 0

Weaning Weight (WW) lbs.

Change lbs.	Number Animals	%
+5 and higher	119	9
+4.99 to -4.99	1186	87
-5 and lower	60	4

Median Change +0.2

Yearling Weight (YW) lbs.

Change	Number of Animals	%
+10.0 & higher	88	6
+5.0 to +9.99	142	11
+4.99 to -4.99	932	60
-5.0 to -9.99	162	12
-10.0 & Lower	42	3

Median Change +0.2

Impact – Progeny Equivalents

Approximate number of progeny required to have the same degree of information as adding Genomics to EPD's

	Progeny Equivalents
CE	10
BW	25
WW	15
YS	8
Milk	10
REA	6
Fat	6
Marb	6

Impact

Genetic test early

A Genomic tested animal has almost as much GEPD accuracy at birth as waiting until performance test information

Impact of Genomic Test Early

288 Calves with no progeny and no growth evaluation had the following change in Accuracy

Accuracy Spring 2018

Trait	Number	EPD	GEPD	All 1327 GEPD
BW	288	.20	.60	.65
WW	288	.16	.38	.42
YS	288	.13	.30	.33
Milk	288	.10	.23	.25

New Information from the Single Step Method

- Identifies differences that the pedigree alone cannot detect
- It was always assumed that full-sibs were 50% related which they are on average but the evaluations of other breeds have shown that the range of relationships are as low as 35% to 65% or higher

New Information from the Single Step Method (con't)

The methodology works to understand the ancestral source of DNA – Instead of 25% from each grandparent it has identified that 30% or more may come from a single grandparent and much less from others

Summary

- The Research has proven that the Single Step Method of applying Genomics to EPD's is a valuable tool for speed and improvement of Genetic Evaluation
- The Genomic information will be updated in real time each time there is an EPD run and Accuracies are expected to continue to improve as more Genomics tested animals are added
- Genomics will provide Charolais breeders and their customers the most accurate genetic evaluation possible.

Genomic Project CCA

Thanks to:

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Sean McGrath, Analyst – Breed Improvement CCA

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Respectfully Submitted

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