

NZ Animal Evaluation Limited

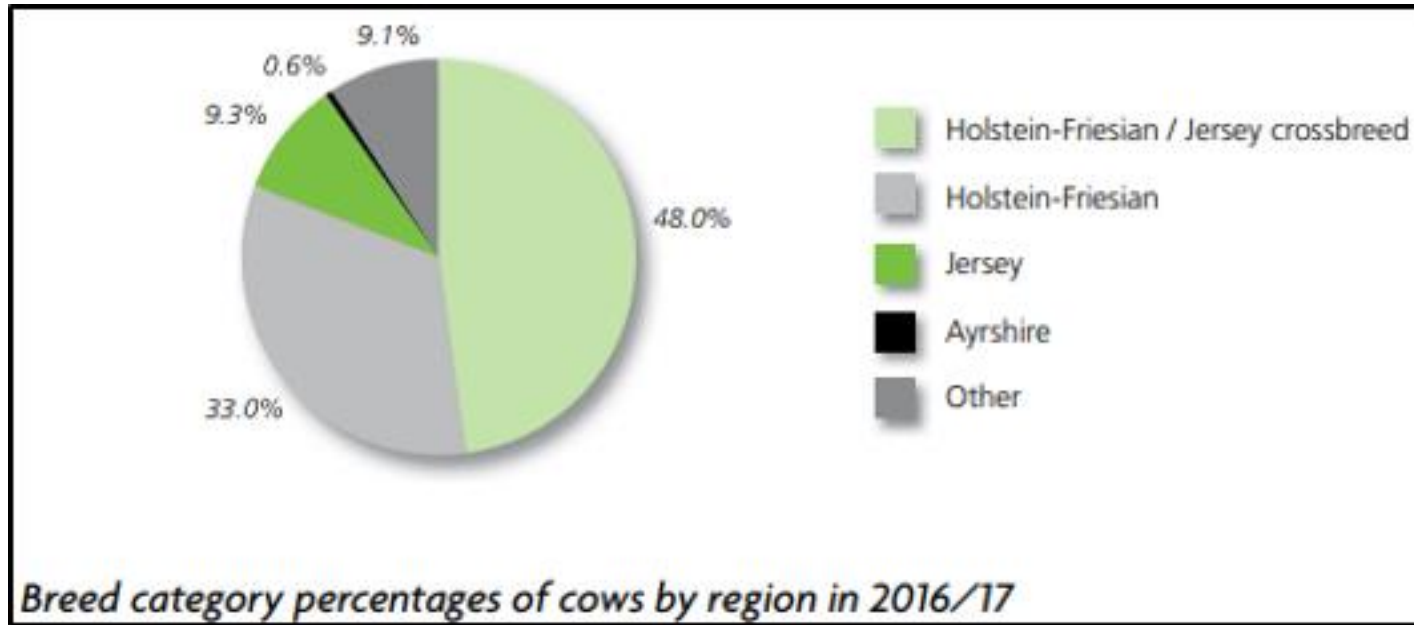
Practical experiences – Mendelian Sampling Test

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Context

NZ dairy herd highly admixed



- Consists of pure breeds, F1, and advanced cross-breeds
- Contemporary groups can (sometimes) be straight bred, but more typically mixtures of straight Holstein-Friesians, straight Jerseys and crosses

NZ's current across-breed AE model

- Breeds accounted for in A-matrix as genetic groups.
- Holstein-Friesians treated as 2 “breeds”
 - NZ Holstein Friesians
 - Overseas Holst-Friesians (genetically diverged & imported heavily in 1980's)
- Fixed effects for heterosis and recombination between “breeds”
- Heterogeneity of variances correction in pre-processing.

What we did

- Extracted EBV outputs from current across breed evaluation system
- Ran Mendelian sampling tests separately for JER and HOL Bulls
 - Did not consider crossbred (HOL x JER) bulls
- Used only LIC and CRV Ambreed bulls
 - Structured progeny test and genomic testing

What we found

- Straightforward to build files and run test
- Mendelian sampling means differed between JER and HOL – exceed thresholds and change in sign
- Genetic variances fluctuate

What we found - HOL

Holstein

Year Born	N Bulls	Fat	Fat	Fat	Pro	Pro	Pro	Milk	Milk	Milk
		Gen Var	Sampling Mean	Outlier	Gen Var	Sampling Mean	Outlier	Gen Var	Sampling Mean	Outlier
2002	268	309759	-306		346729	-364		620800	-342	
2003	254	309123	-314		306703	-371	FAILED	706000	-360	
2004	237	348253	-339		363997	-396		803100	-405	
2005	202	330105	-318		340777	-361		837900	-393	
2006	226	338342	-337		411227	-426	FAILED	777400	-387	
2007	156	308588	-322		328640	-377		926900	-424	
2008	148	360268	-340		361182	-387		951800	-410	
2009	162	382423	-359		433623	-429	FAILED	934700	-415	
2010	154	325453	-326	FAILED	389175	-408		959600	-405	
2011	174	385148	-352		338699	-380		1015000	-422	
2012	166	399533	-356		319196	-365		1073000	-427	
2013	181	517803	-382	FAILED	345538	-390		1099000	-430	
Linear Trend			3.40			0.36			4.62	

What we found - JER

Jersey

Year Born	N Bulls	Gen Var	Sampling Mean	Outlier	Gen Var	Sampling Mean	Outlier	Gen Var	Sampling Mean	Outlier
2002	156	435178	384		242741	336		553663	329	
2003	151	448197	388		326469	375	FAILED	487793	309	
2004	145	316452	321	FAILED	188825	268	FAILED	373893	280	
2005	155	322747	331		175454	265	FAILED	377425	285	
2006	161	322222	339		257225	314		332748	262	
2007	107	360175	356		296603	362	FAILED	371701	261	
2008	111	343421	348		286821	352	FAILED	334745	226	
2009	112	302412	329		244177	314		344828	226	
2010	87	316889	323		199694	277		376790	231	
2011	109	218874	256		123438	219	FAILED	252677	186	
2012	96	231531	258		138394	231	FAILED	223005	169	
2013	87	237511	246		203173	293		206241	160	
Linear Trend			-5.25			-3.67			-6.83	

Why?

- Are the tests appropriate for across breed evaluations (where there is inherently more variability)?
- Has it been truly tested in this context?
- Are “real” changes in extent of cross-breeding in production population and inbreeding w/in Jerseys driving changes in variance rather than any fundamental issues with the national evaluation?
- Are Holstein or Jerseys getting “variance” from other sources e.g. heterosis (non additive), other breeds?
- Genomic pre-selection is clearly a factor, but why do the signs differ between breeds

Conclusion

- Concern whether the test is appropriate for NZ's across breed evaluation
- Many unanswered questions that justify further research by Interbull before making it a requirement for our context
- We're currently exploring alternative AE models that account for breeds, heterosis, and heterogeneous variances in different ways