Evaluation demystifier

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Overview of gen^etic evaluation

- Holy trinity
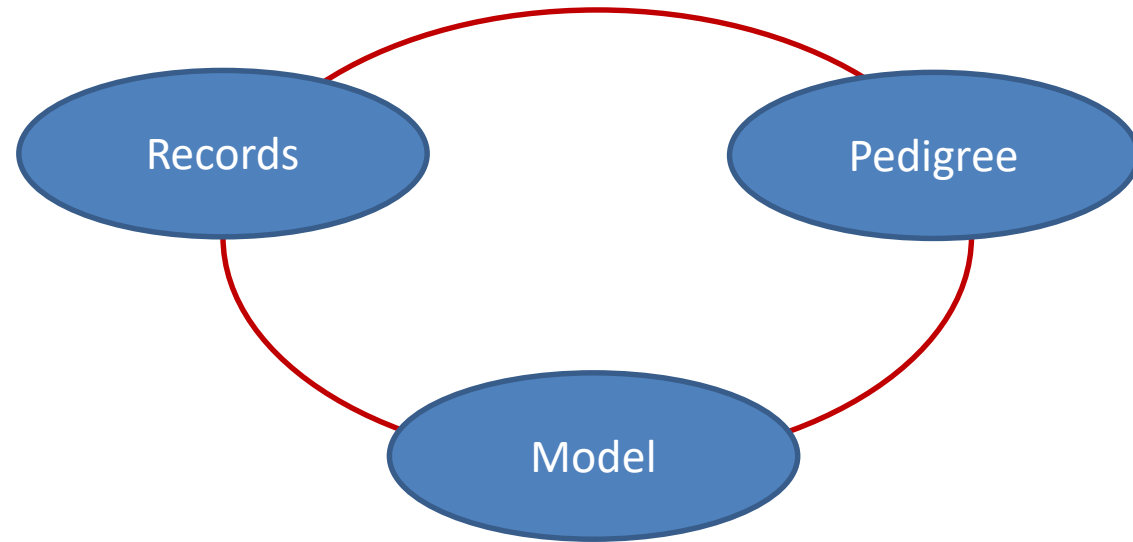
- Output: breeding values & accuracies

Keystones of g. evaluation

Records

- A.k.a Phenotypes
- Have to be related somehow to farm profit
- Can be any shape: kg, count, Euros, scores, wave length, pixels, genotype…
- Unbiased recording within flocks
- Timeliness is a big bonus

Keystones of g. evaluation

Pedigree

- A.k.a Ancestry
- Allows to connect records through bloodlines
- Needs to be as accurate/deep as possible
- Genotyping is a big bonus

Keystones of g. evaluation

Model
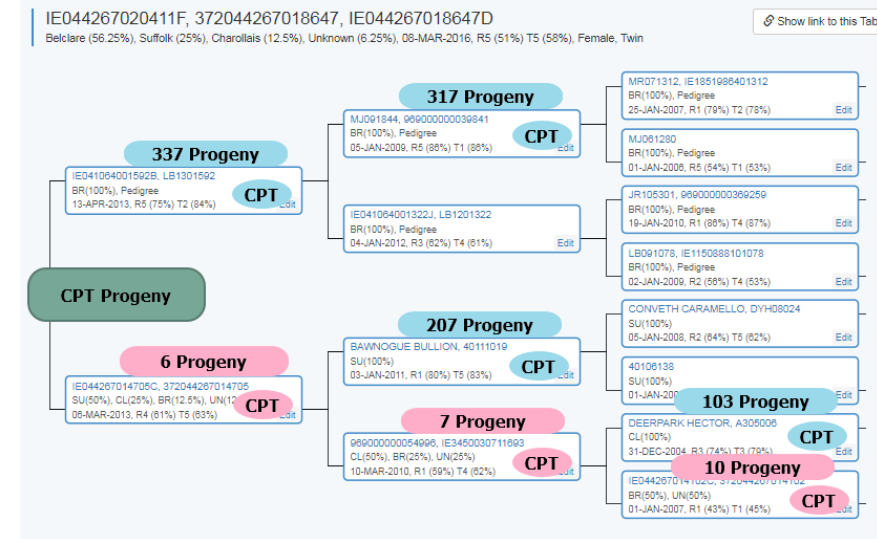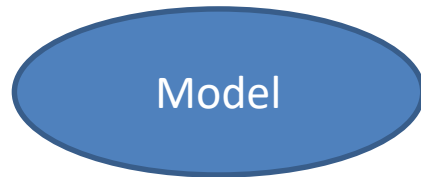
- A.k.a The computer
- Uses Records and Pedigree
- Allows to statistically separate environment & genetic for each records
- Ran weekly on all 'clean' records and all pedigree
- Big computer is a big bonus

Who gets breeding values?

	🐑 (blue)	🐑 (black)	🐑 (purple)	🐑 (grey)	🐑 (yellow)	🐑 (green)	🐑 (spotted)
Pedigree	☑	☑	☑		☑		
Records	☑	☑			☑	☑	
Genotypes	☑			☑	☑		
Model	☑	☑	☑	☑		☑	☑
Breeding value & accuracy?	✓	✓	✓	✓	✗	✗	✗

Basic principles of g. evaluation

Nothing changes if nothing changes

More (accurate) phenotypes = more accuracy of breeding values

Progeny records & Genotypes are the big influencers to follow

Old rams breeding values won't change any more unless model changes

If something changes then something must have changed (but can be hard to track down)

New rams breeding values will change as records come in the evaluation

Star rating will change even if the breeding value does not change

Life cycles of breeding values
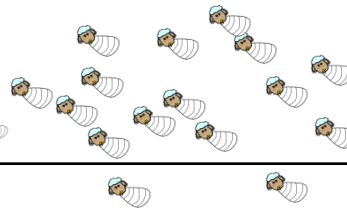
| Stage in life	Birth	Lamb ram	Active ram		Proven ram
Record type		+Own records	+Progenies	+Grand progenies	No more
Breeding value type	Parent average	Direct breeding values	Direct breeding values	+Maternal breeding values	Final breeding values
Accuracy	Min.	+	++	+++	+++

Testing the g. evaluation
Part 1. Old rams
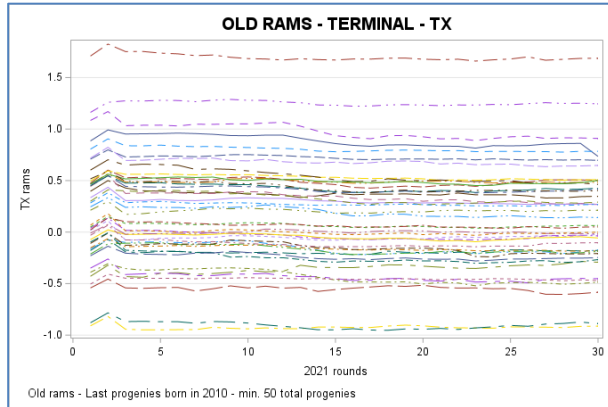
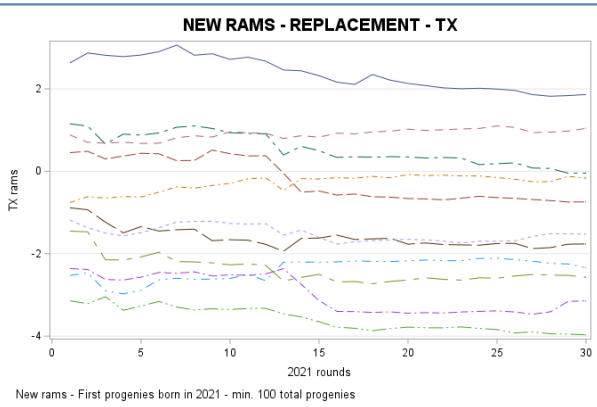**Old rams (last progenies born in 2010) breeding values remain stable**
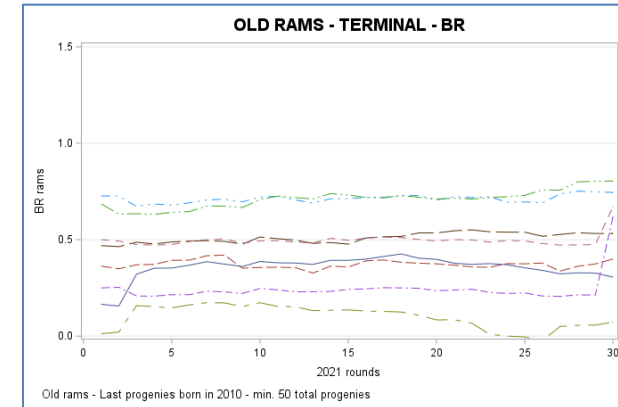
*Using 30 evaluations ran in 2021
*Breed solutions are a product of an across-breed evaluation.
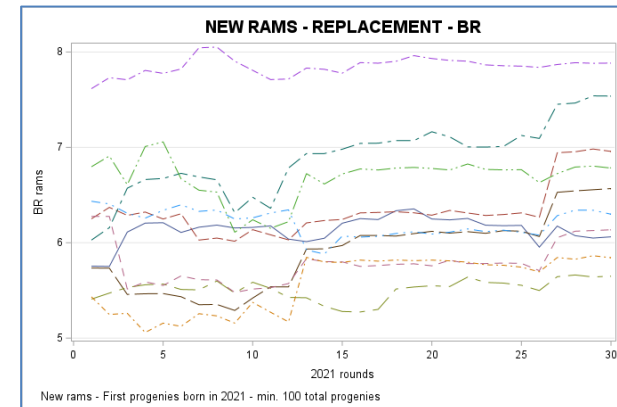*Small changes in breed solutions affect all rams but not the star rating
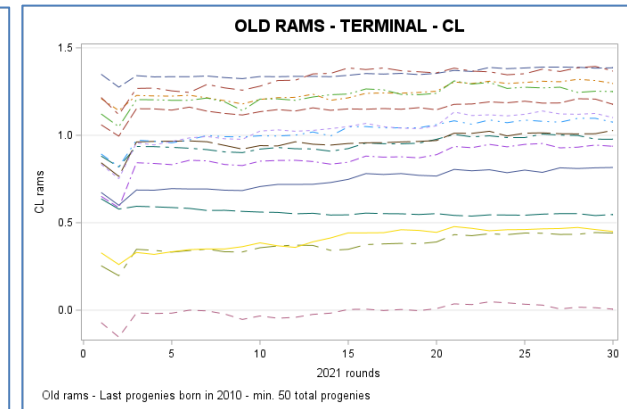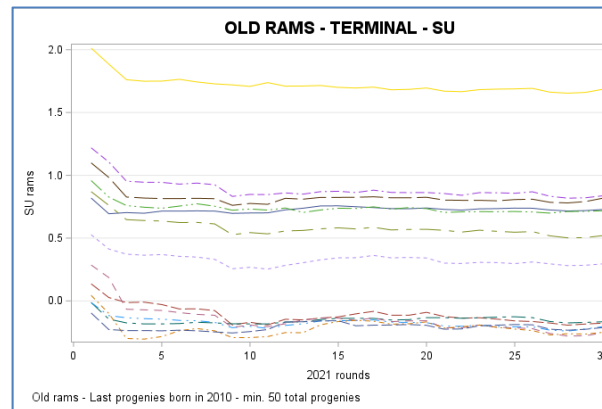
Testing the g. evaluation
Part 2. New rams

NEW RAMS - REPLACEMENT - TX

New rams - First progenies born in 2021 - min. 100 total progenies

NEW RAMS - REPLACEMENT - BR

New rams - First progenies born in 2021 - min. 100 total progenies

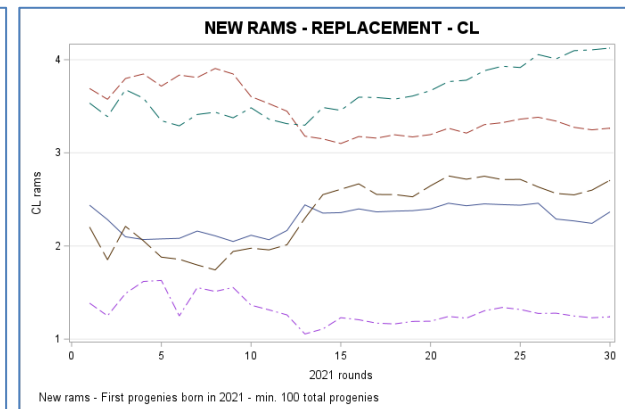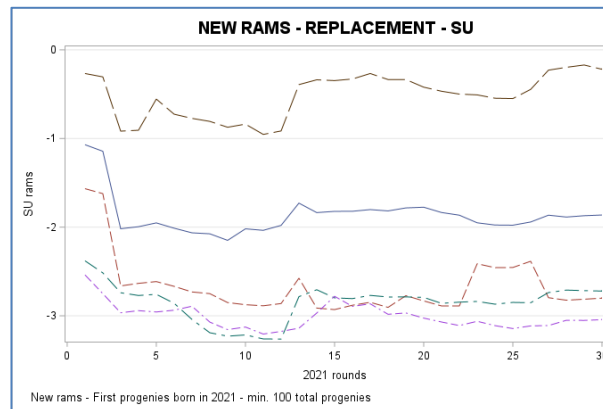*New rams (first progenies born in 2021) will move as their records hit in the evaluation
*Team of rams strengthen predictability

*All new rams were genotyped before the start of 2021
*Using 30 evaluations ran in 2021

NEW RAMS - REPLACEMENT - SU

New rams - First progenies born in 2021 - min. 100 total progenies

NEW RAMS - REPLACEMENT - CL

New rams - First progenies born in 2021 - min. 100 total progenies

10

It's all about the base(s)
Part 1. Breeding values

Eval. 2020		**B.V. fixed base**									
	...	2005	2006	...	2016	2017	2018	2019	2020		

Eval. 2021		**B.V. fixed base**									
	...	2005	2006	...	2016	2017	2018	2019	2020	2021	

Eval. 2022		**B.V. fixed base**									
	...	2005	2006	...	2016	2017	2018	2019	2020	2021	2022

It's all about the base(s)
Part 2. Star rating

Eval. 2020					Stars mobile base / breed				
	...	2005	2006	...	2016	2017	2018	2019	2020

Eval. 2021						Stars mobile base / breed				
	...	2005	2006	...	2016	2017	2018	2019	2020	2021

Eval. 2022							Stars mobile base / breed				
	...	2005	2006	...	2016	2017	2018	2019	2020	2021	2022

Observing the stars movements
Part 1. Terminal

TERMINAL STAR THRESHOLDS - TX

- Comparing 2 evaluations: Full eval. *vs* Eval 4 years ago*
- Same evaluation model = no change in stars due to model improvement
- Showing star thresholds by breed
- Approx. star movement/year: +0.05 to 0.15
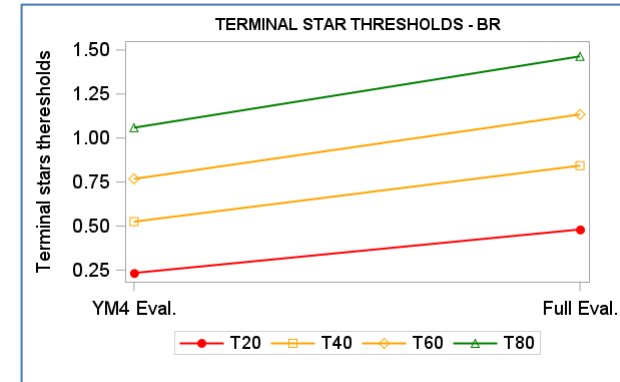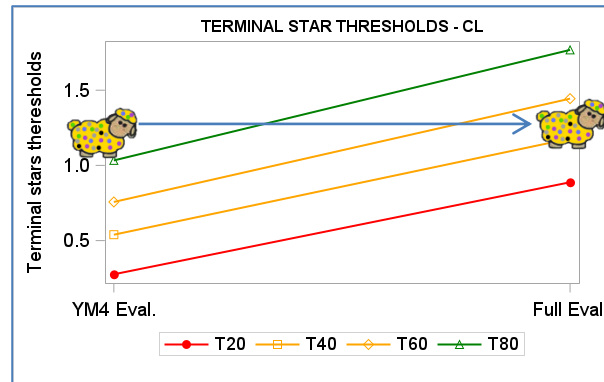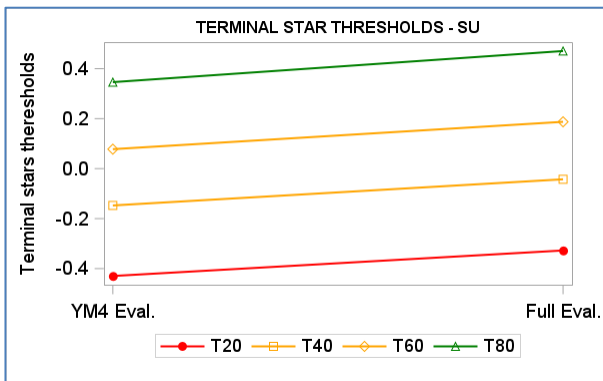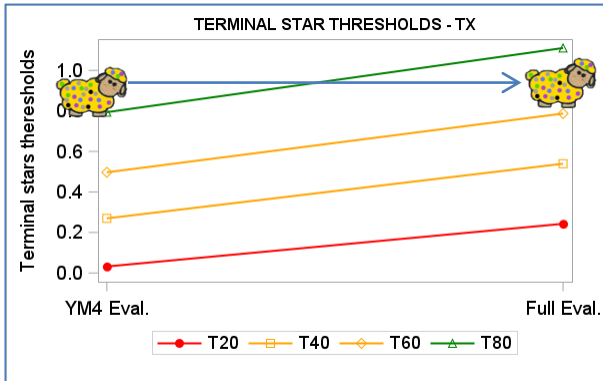
TERMINAL STAR THRESHOLDS - SU

TERMINAL STAR THRESHOLDS - CL
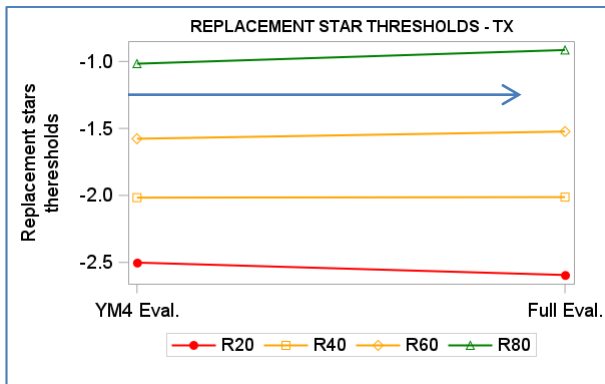

TERMINAL STAR THRESHOLDS - BR

REPLACEMENT STAR THRESHOLDS - TX

- Comparing 2 evaluations: Full eval. *vs* Eval 4 years ago*
- Same evaluation model = no change in stars due to model improvement
- Showing star thresholds by breed
- Approx. star movement/year: +0.01 to 0.23

REPLACEMENT STAR THRESHOLDS - SU

REPLACEMENT STAR THRESHOLDS - CL

REPLACEMENT STAR THRESHOLDS - BR
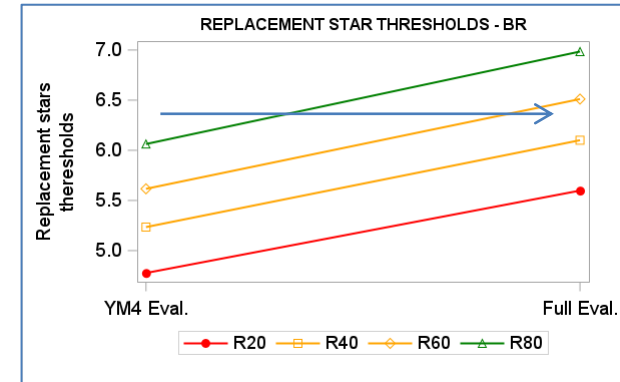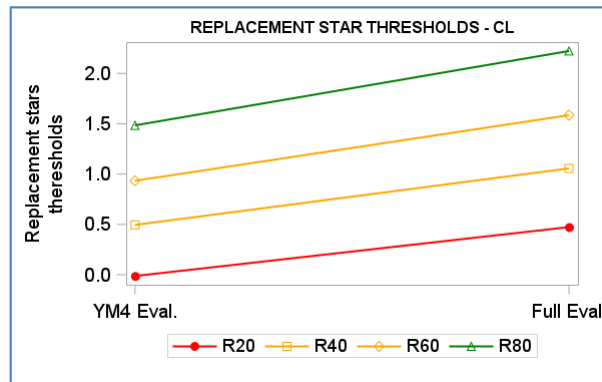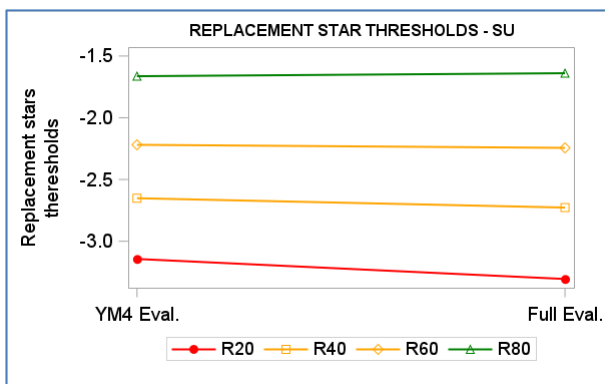
Comparing Terminal star movements
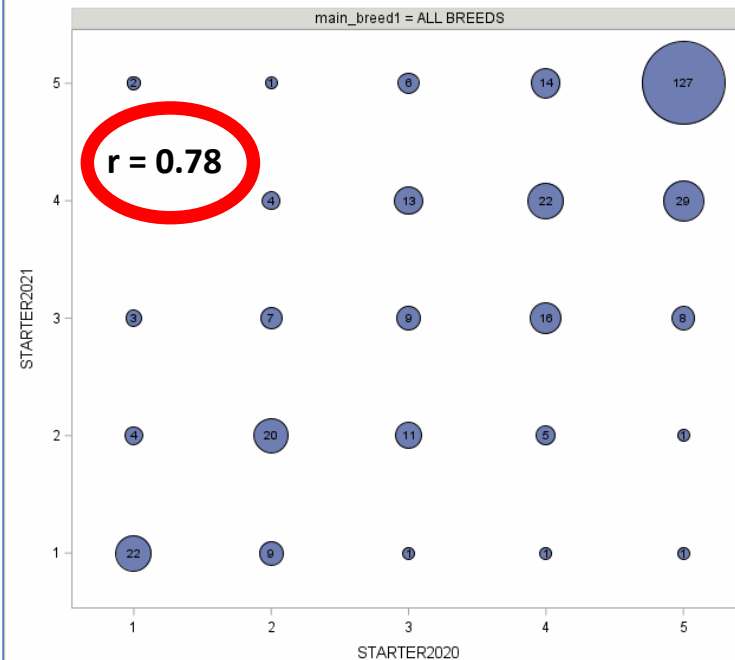

TERMINAL STARS - 2015 vs 2016
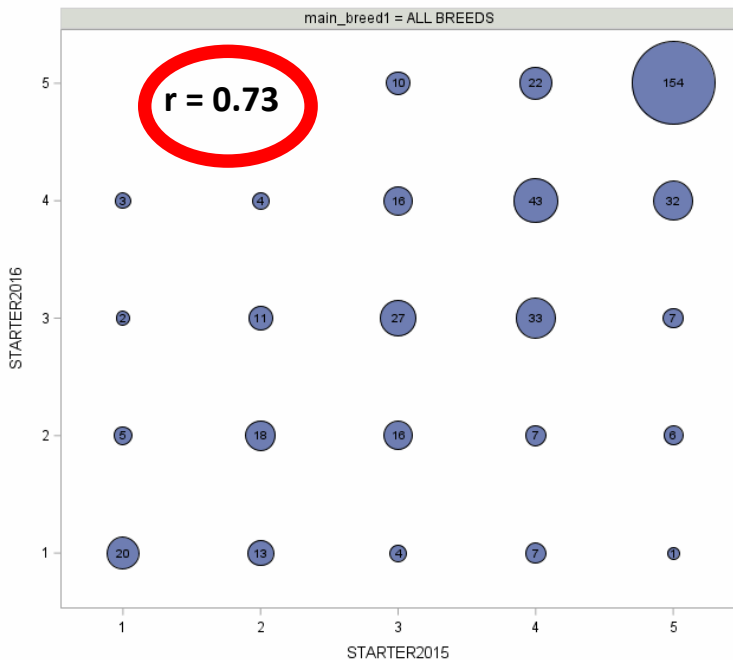
Comparing star movements from parent average (PA) to progeny (PROG)

← Stars 2015 = PA
   Stars 2016 = PROG

   Star 2020 = PA →
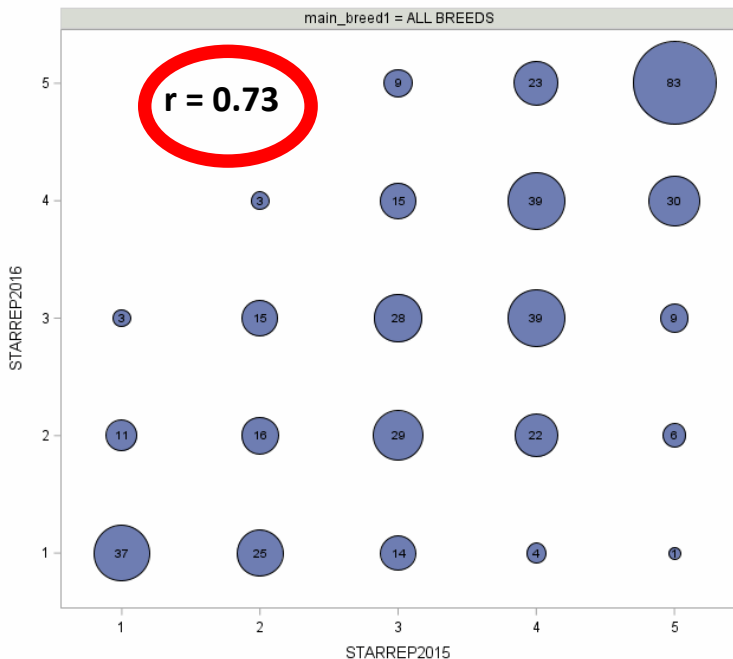Star 2021 = PROG

TERMINAL STARS - 2020 vs 2021

r = 0.73

r = 0.78

Comparing Replac. star movements

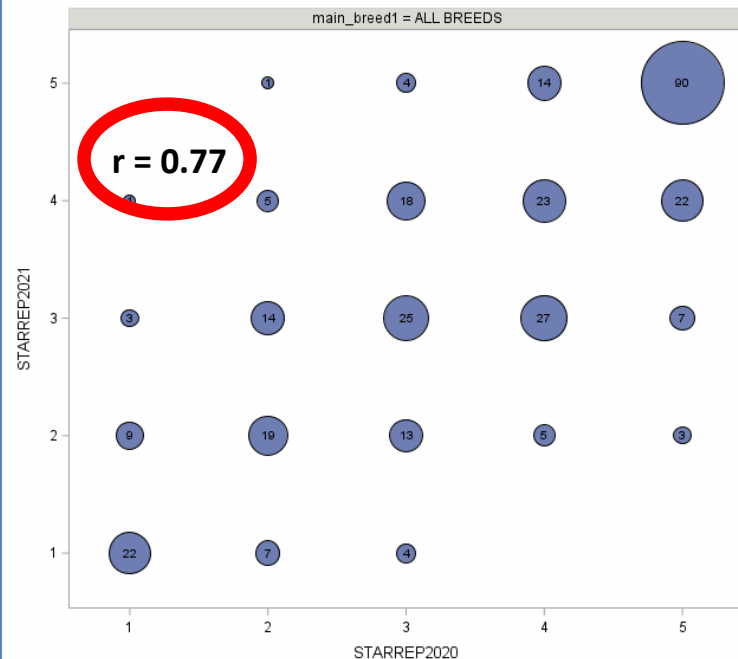REPLACEMENT STARS - 2015 vs 2016

r = 0.73

Comparing star movements from parent average (PA) to progeny (PROG)

← Stars 2015 = PA
   Stars 2016 = PROG

Star 2020 = PA →
Star 2021 = PROG

REPLACEMENT STARS - 2020 vs 2021

r = 0.77

Take home messages

- Breeding values depends on records, genotype, pedigree, and model used

- Breeding values are displayed using the star rating system

- Star rating evolves every year and is a reflection of the genetic gain & selection pressure in each breed.

- Recording improve with time => more stable breeding values

- The genetic & genomic evaluation will always adapt to new traits / methods with the goal to improve farm profit.

SMARTER PARTNERS

Thank you for your attention

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