Genomic selection as a farm tool

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THE FARMER

Faces this CHALLENGE…

….strives for CONTINUITY

Meanwhile, technology develops fast

- Technological solutions are offered to unburden dairy producer
- Technological devices offer optimal control → information
- Information can be used to farm at optimum efficiency
- Efficient breeding → Genomic testing

Genomics

Robotics

Sensor technology

Dairy Farm Duursma

Period	2011	2012	2013	2014	2015	2016
Kg milk	1740000	1827000	1997000	2244000	2470000	2250000
Ha	110	95	89	88	78	81
Milk/ha	15818	19232	22438	25500	31667	28.000
Cows	172	184	210	248	250	240
Employees	2,4	2,4	2,4	2,1	2,6	2,6
Milk/employee	725000	761250	832083	1068571	950000	940000

Dairy Farm Duursma

Situation

- High costs
- High intensity milk/ha
- High intensity milk/employee
- Presure on phosphate/nitrogen/cows?

Strategy

- Growth to reduce costs per produced milk
- Focus on Feed and Cow management:
- Innovation:
  - Automatic Feeding,
  - Heat detetion
  - Genomic selection

Why use genomic tests at my farm?

Genomics = more information and insight = more control

- Know from a calf what you used to know of a 3rd lactating cow
- By reliable information earlier in life, strategic decisions can be made on selection and mating
- Insight into where my herd is on a genetic level

History genomic selection

1990
First attempt to map genes

2001
Birth of Genomic Selection

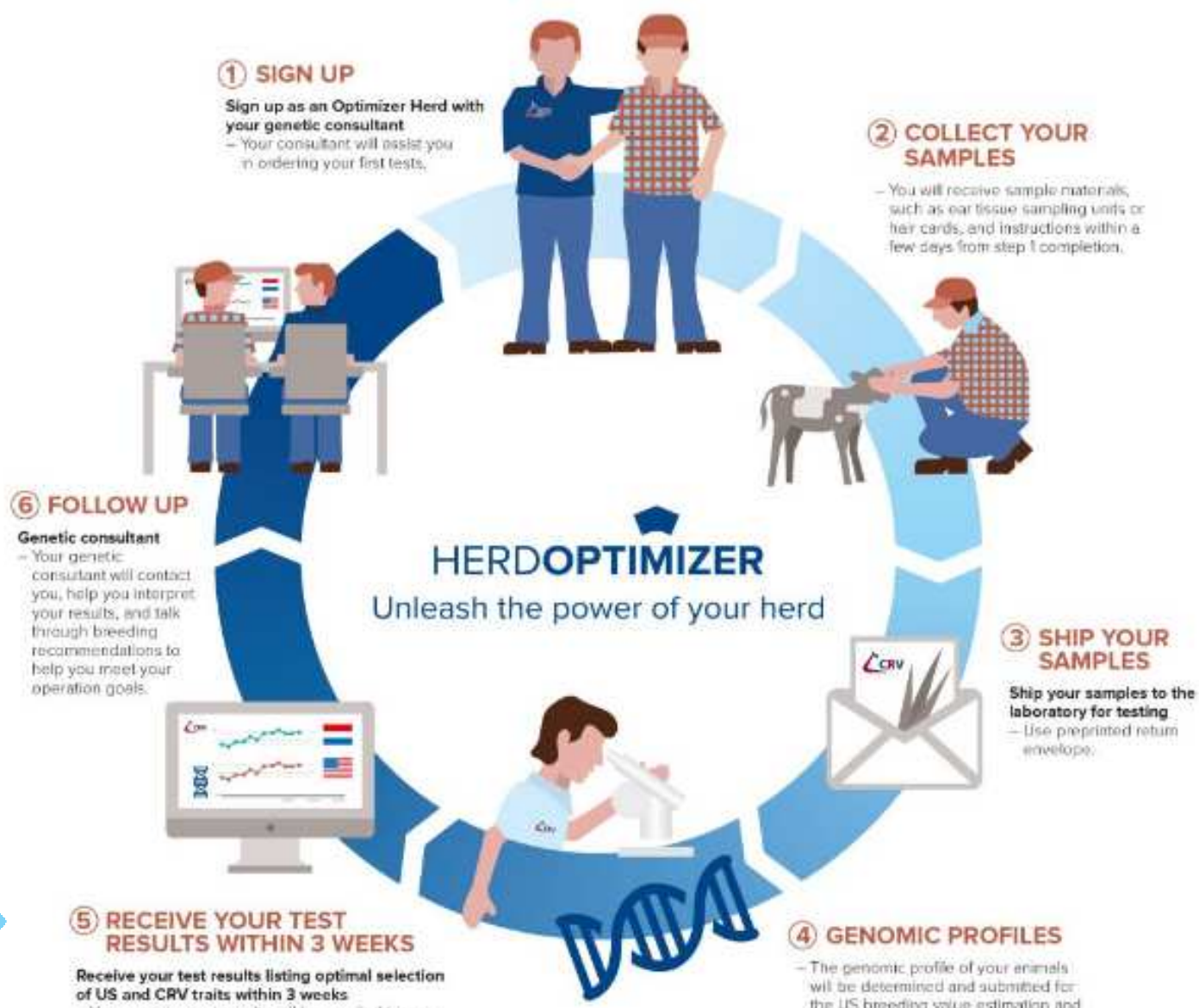
2006
CRV adopts GS in their breeding program

2009
GS gets widely adopted by the AI industry

2012
First females get tested commercially

Genetic trend

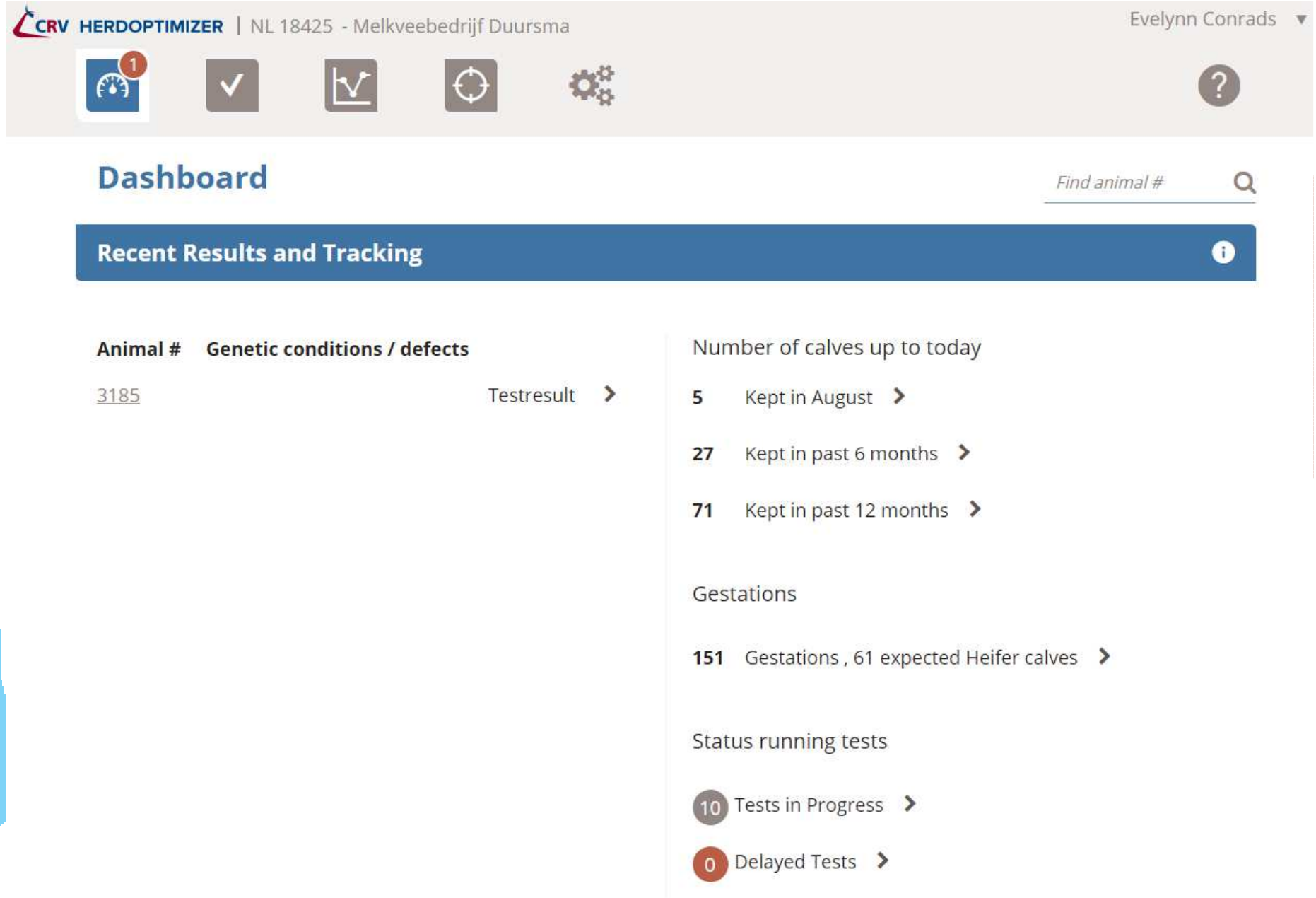
Genomic selection, how does it work?



Introduction HerdOptimizer

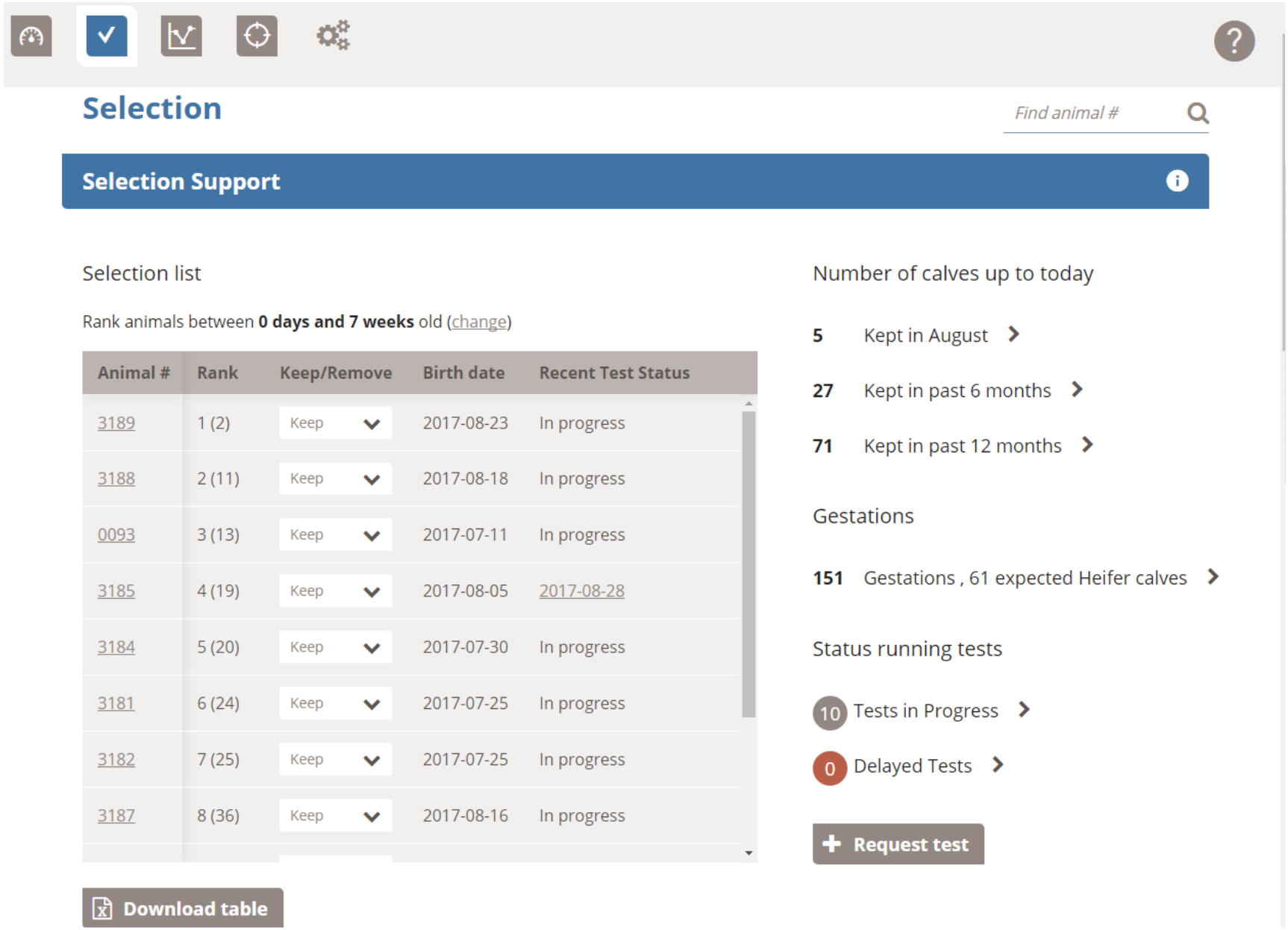
- Which bull to use? Which calf to keep? How does my herd evolve?
- The information lies in the DNA.
- Genomic Herd Management is reality thanks to HerdOptimizer

HerdOptimizer dashboard

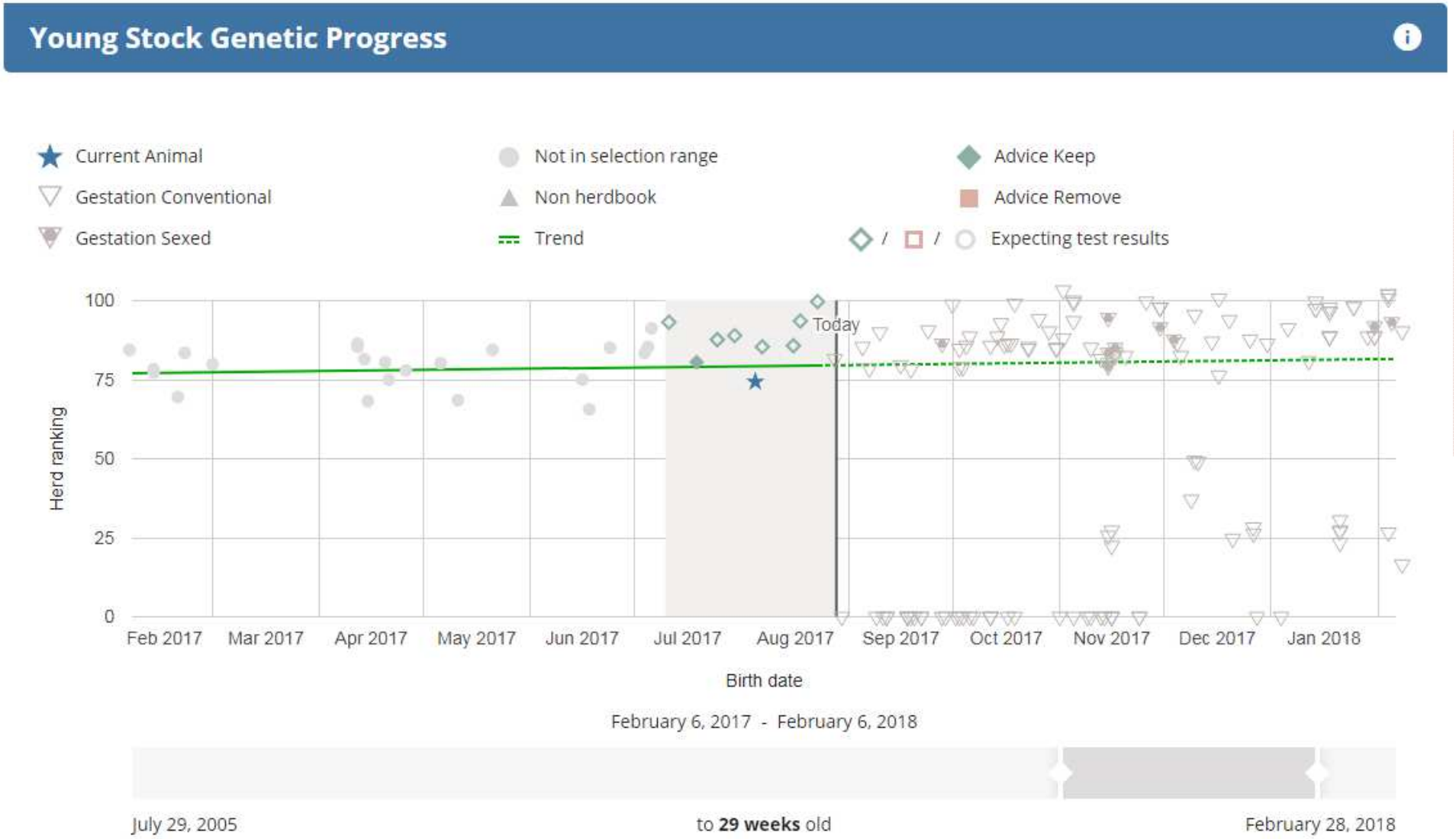


Animal results

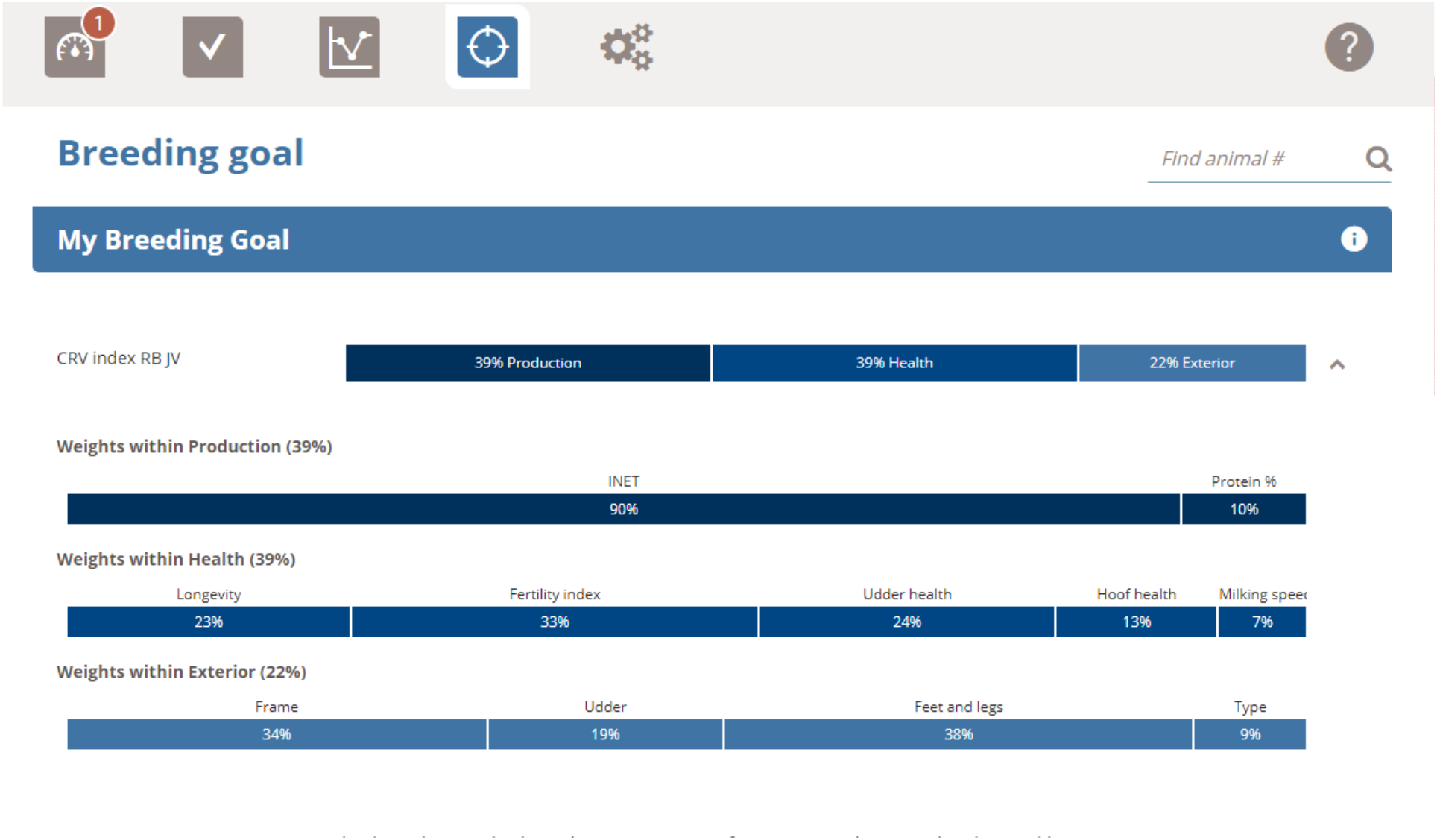
Selection support: selection list



Selection support: Young stock genetic progress



Breeding goal



Mating advice

Mating Advice

Filter on animal #

Animal #	Lactation #	Days in lactation	Number of inseminations	Advice / NAAB code	2nd advice / NAA
2666	1	43	0	Beef bull	SPITFIRE 941758
2363	2	207	3	Beef bull	RODY 941757
2684	1	64	0	Beef bull	MALCOLM RF 941084
2964	0	0	1	WEBMAIL 941670	
2912	0	0	1	RANGER 941769	MAROON 941770
2359	2	173	3	Beef bull	MAGISTER 941687

Evaluation

Find animal #

Breeding Values

Breeding values | Gestations | Averages

Black & White ... | Herd | Compare animal to: Herd | Options

Filter on animal #

Animal #	Rank	Parities	NVI	Milk kg	BL hlth	BL Eff.	INET	Prot %
2984	1	0	301	1359	6	7	406	0.10
3189	2	0	295	971	7	9	319	0.17
3135	3	0	314	1018	6	2	323	0.14
3114	4	0	315	176	8	9	241	0.30
3115	5	0	325	285	8	11	227	0.22
3116	6	0	328	389	4	9	273	0.26
3120	7	0	267	728	5	5	326	0.17
3107	8	0	253	270	6	4	305	0.33
2392	9	1	257	1527	5	10	354	0.03
2982	10	0	246	1236	3	6	369	0.18

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- What does that mean for my breeding strategy?

Breeding Strategy

Needs:

- 80 high potential females per year for replacement
  - 25 % of 320 cows
- Rest of calves shoud add value and leave farm quick

Genomic selection used for:

- Selection of animals that stay for replacement
- Selection of animals for breeding the next generation
  - Added information for mating
- Selection of animals for breeding the added value through Belgian Blue
- Two groups of animals:
  - Animals on which BB is possible
  - Animals on which holstein is

Dairy Farm Duursma

Period	2011	2012	2013	2014	2015	2016
% calves	85,6	84,1	82,1	78,5	73,3	77,4
€ calves	136	162	138	188	191	205
€ average	172	167	153	115	115	125
€ Sales/100 kg	4,1	3,46	3,96	5,07	4,66	3,65
€ average	3,72	2,95	3,13	3,61	3,00	1,96
€ difference	0,38	0,51	0,83	1,46	1,66	1,69

Genomics as a farm tool

- Impact on farm level depending on breeding strategic choices
  - Selection / breeding / sexed semen / embryo/IVF
- Impact on AI´s and Herdbooks
- Impact on farmers level will grow as confidence and experience will grow (1700 farms in Holland and Flanders)