

# A selection index to select cows for farm profitability in a commercial grazing herd of Uruguay

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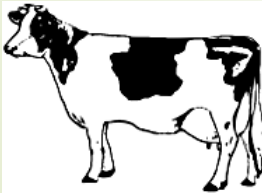
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# URUGUAY

A small-big country  
between Brazil and  
Argentina



11.993.000



767.000



**3.3 million**



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# Milk production in Uruguay

- 3610 dairy farms.
- 2130 millions of milk produced per year.
- 75% milk is exported.
- 87% herd Holstein (mainly USA Holstein genetic)
- Calving all year around
- Average Annual diet of a cow (kg DM/cows/day): 9.5 kg DM of grass, 4.2 kg DM of concentrate and 3.1 kg DM roughage.
- Perennial pastures last 3-4 years: Fescue, Dactylis, Lucerne, White Clover as main species.
- Average cost of production: 0.30cents/lit  
Average Return on Investment: 5%





# Milk production at *Pedregal Farm*

- Milking Platform : 500 has.
- Milking Cows: 1300 cross-breed cows.
- Seasonal calving: May-July
- Annual milk production: 7 millions lts  
8.15% milksolids
- Milk solid (kg/cow): 421.
- Annual Cow Diet: 46% Grass, 23%  
Roughage, 31% Concentrate
- Average Cost last 5 years (U\$ kg milk  
solid): U\$ 3.55
- Average Price last 5 years (U\$ kg Milk  
solid): U\$ 5.6

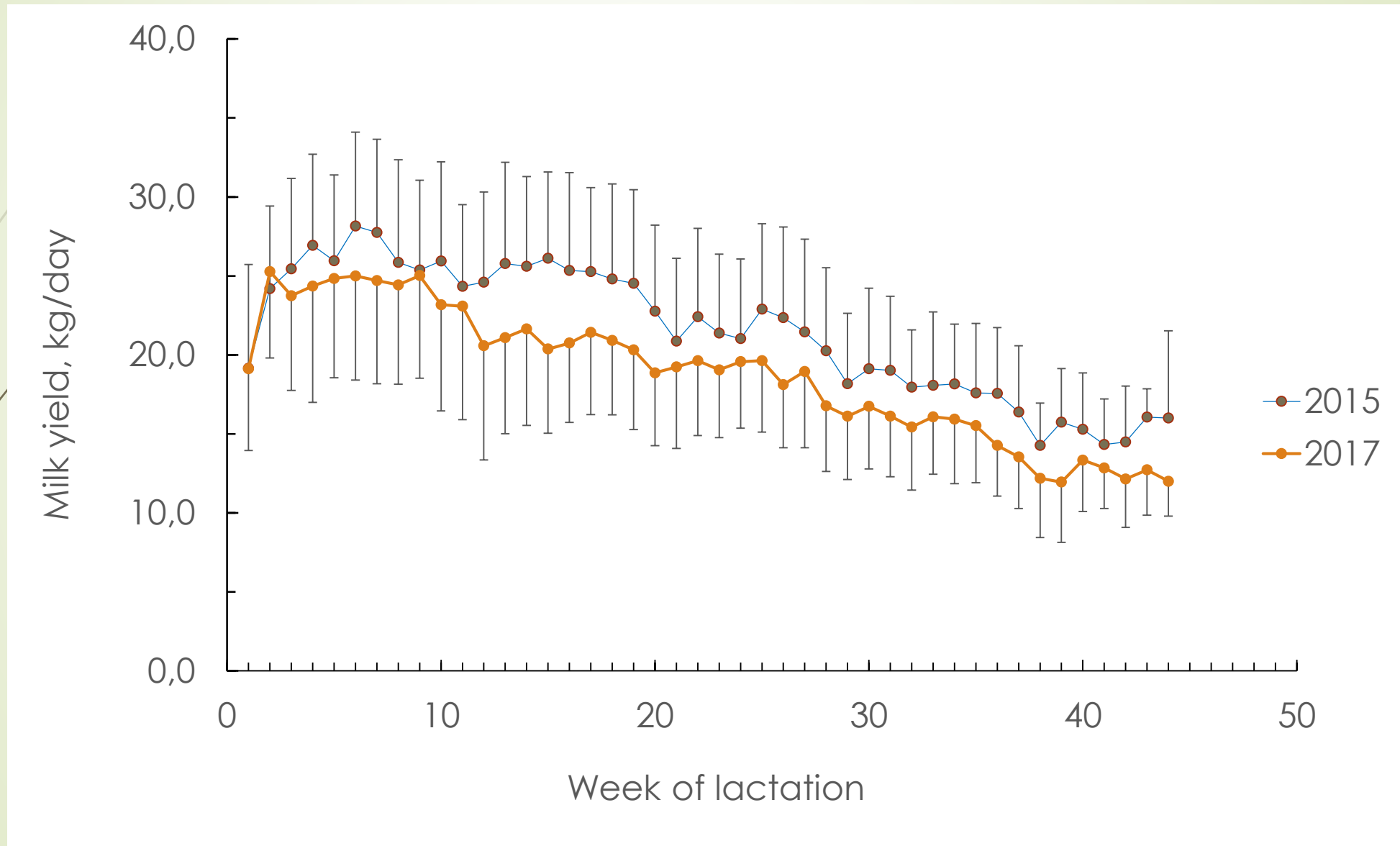


# We are looking for a “resilient” cow

- ➔ Liveweight / size compatible with 10 hs of grazing and 4-6 km of walking in spring (mature LW 470-510 kg).
- ➔ Good productive potential in an environment where 50-60% of the diet is grass (400-440 kg milksolid with milk solid % above 8%).
- ➔ High Fertility (90% pregnancy rate after 3 months AI).
- ➔ Longevity (40-50% of cows arriving to 5<sup>th</sup> Lactation).
- ➔ Easy to milk and low somatic cell counts (good udders not easy with cross breed cows)



# The need to have a resilient cow



# Why to crossbreed cows in this farm?

	USA Holstein	NZ Friesian	NZ J x Holstein	SRW x Holstein
Liveweight (kg)	555 a	507 b	482 c	516 b
Feed Conversion Efficiency <small>((kg fat+kg Prot)/DM req) x 1000</small>	88 c	95 b	96 a	94 b
Milk value (\$ U/ltr)	4.82 c	5.11 b	5.62 b	5.18 b
Pregnancy rate after 60 days of AI (%)	59 c	65 b	72 a	61 b



Laborde et al., 2014

# Objective

► To develop a selection index to rank Holstein-Friesian (HF), Jersey (J) and HFxJ crossbred cows for farm profit in a commercial herd under grazing conditions of Uruguay with a seasonal calving





# Material and methods



In the year 2017 the herd was comprised of 127 HF, 9 J and 1,207 HFxJ crossbred cows



Herd-tested, in average, four times during the year



Total lactation yields of milk, fat and protein were calculated for each cow-lactation using orthogonal random regression polynomials of order 3



Live weight (LW) recorded once in each lactation.

# Material and methods



Somatic cell score calculated as  $SCS = \log_2(SCC)$  and an average value was obtained for each cow-lactation



Mating records were used to calculate days from start of mating period to conception (SMCO)



Cows were scored each year for udder depth (UD), udder support (US), front teat placement (FT) and rear teat placement (RT) by a qualified inspector



4,081 lactations from 2,371 cows recorded 2015 - 2017



The cows were the progeny of 97 sires.

# Genetic evaluation

Breeding values (BV) for MILK, FAT, PROT, LW, SMCO, SCS, UD, US, FT and RT

## Multi-trait repeatability animal model

- Fixed effects
  - year, lactation number, breed group and deviation from herd median calving date
- Random effects
  - animal, cow permanent and residual error



# Descriptive statistics

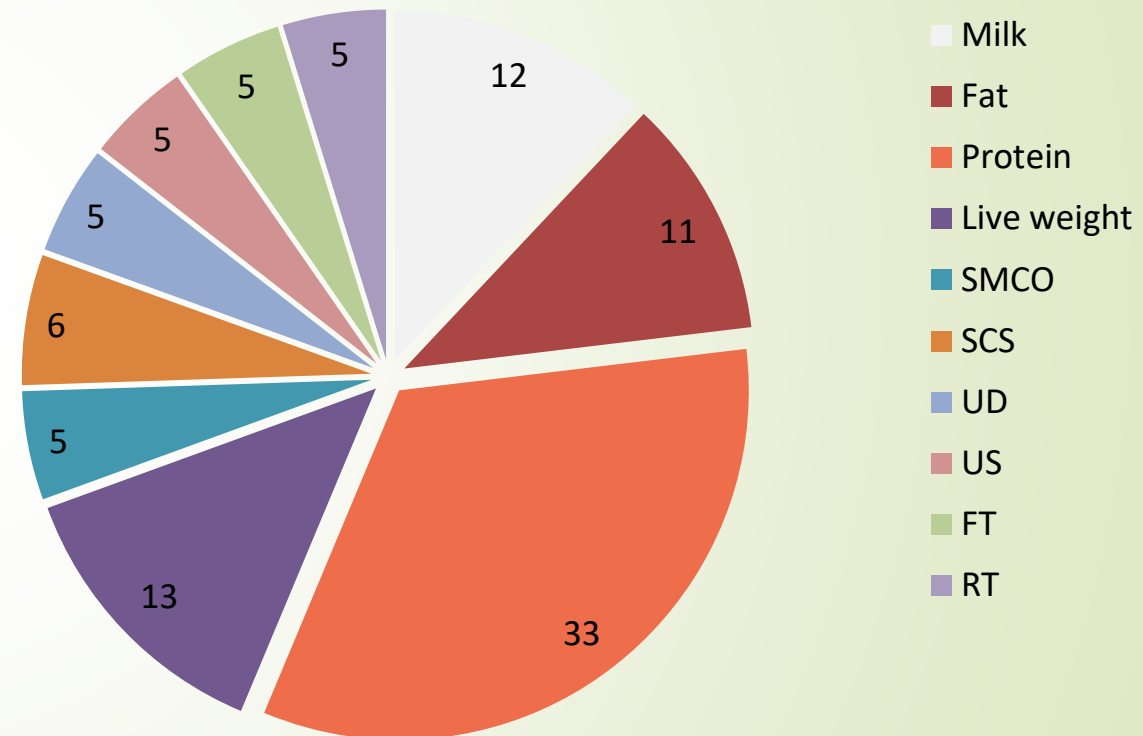
Trait	N	Mean	SD	Min	Max
Lact number	5854	2.63	1.56	1	9
Lact length	5594	274	57	51	305
Milk, kg	5347	5659	1463	160	12230
Fat, kg	5332	212	56	9	409
Protein, kg	5332	211	51	9	384
SCS	5330	2.89	1.51	0.16	8.51
Live weight, kg	4053	470	61	239	728
SMCO	5105	67	64	1	180
Udder depth	5465	5.3	1.0	1	8
Udder support	5466	4.8	1.4	1	8
Front teat	5466	3.9	1.3	1	7
Rear teat	5466	4.5	1.2	1	9



# Selection index

Estimated BV		EV, \$/unit
Milk, kg	×	-0.074
Fat, kg	×	2.13
Protein, kg	×	7.25
Live weight, kg	×	-1.48
SMCO, d	×	-3.6
SCS	×	-36.8
UD	×	30.9
US	×	19.7
FT	×	21.1
RT	×	20.1

Relative Economic Weights



# In Summary

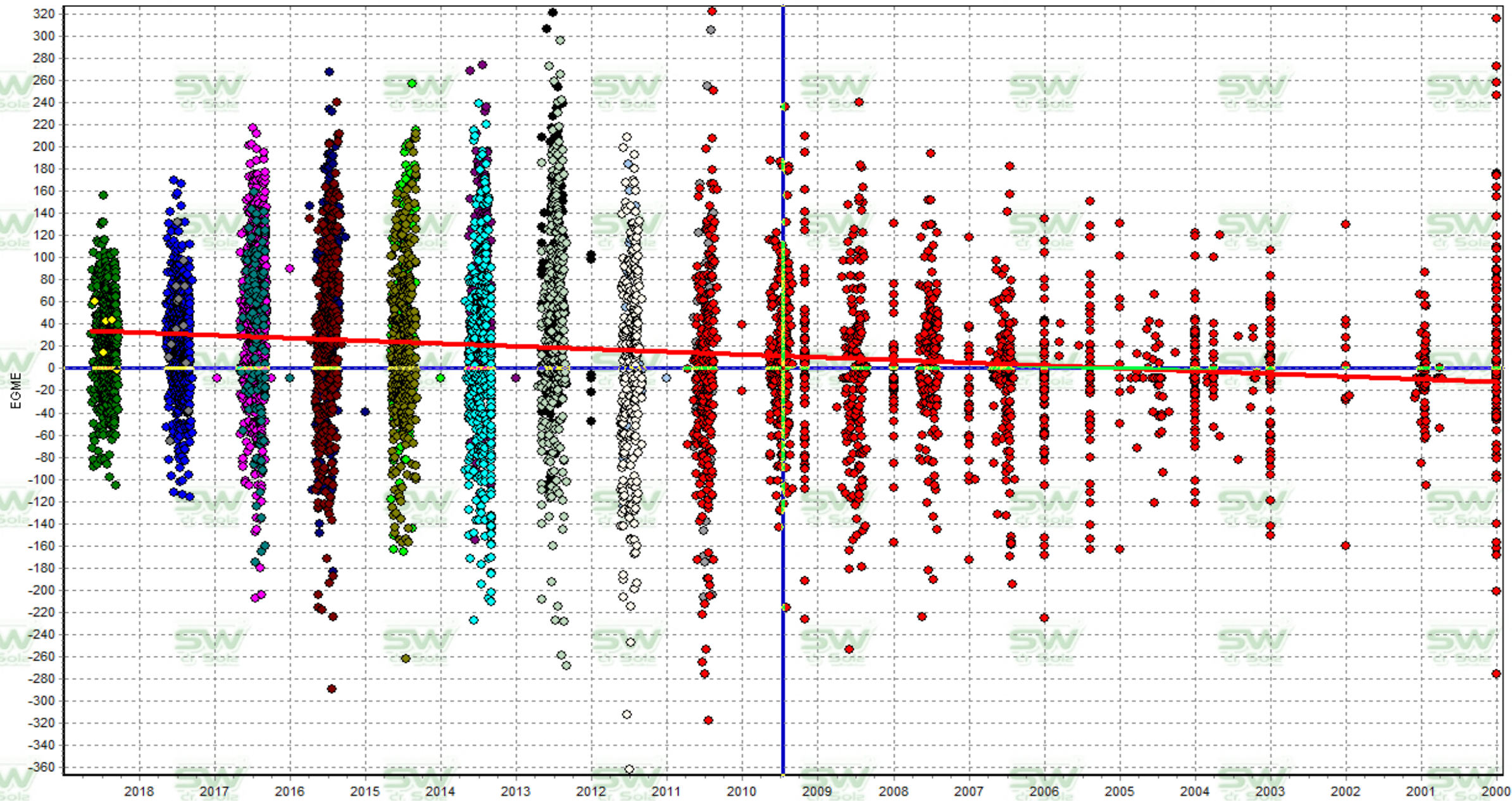
**The Economic Genetic Merit Index developed has been used to:**

- ➔ To cull cows with the lowest genetic merit.**
- ➔ To sell heifers daughter of cows with the lowest genetic merit**



## Evaluación Genética ... (Establecimiento: Daniel Laborde)

EGME



# Thanks!



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# Genetic parameters

Trait	$h^2$	$\sigma_g$	Milk	Fat	Prot	LW	SMCO	SCS	UD	US	FT
Milk, kg	0.32	450									
Fat, kg	0.26	14	0.51								
Protein, kg	0.26	13	0.89	0.64							
Live weight, kg	0.24	25	0.50	0.16	0.43						
SMCO, d	0.04	3.9	0.04	-0.08	0.00	0.14					
SCS	0.14	0.45	-0.04	-0.03	-0.04	0.24	0.19				
UD	0.29	0.45	-0.07	0.06	-0.10	-0.28	0.00	-0.21			
US	0.25	0.68	0.17	0.08	0.12	0.05	0.02	0.15	0.13		
FT	0.27	0.64	0.11	0.02	0.09	0.05	-0.02	0.17	0.16	0.43	
RT	0.29	0.66	-0.01	0.01	0.00	-0.13	-0.06	0.21	0.21	0.45	0.44