

Impact of merging different commercial lines on the genetic diversity of the Landrace pigs

30 August 2018

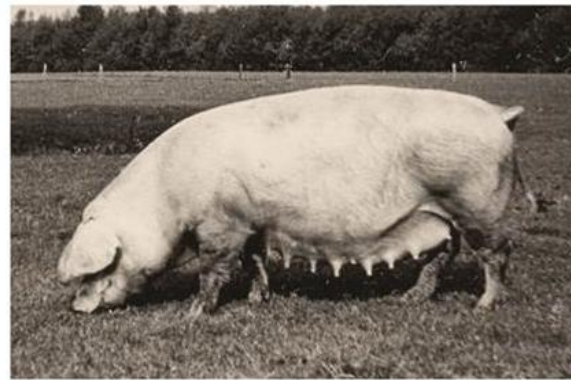
69th EAAP – Dubrovnik Croatia

Ina Hulsegge, Mario Calus, Rita Hoving, Marcos Lopes, Hendrik Jan Megens, Kor Oldenbroek



Consolidation affecting the Landrace pig breed

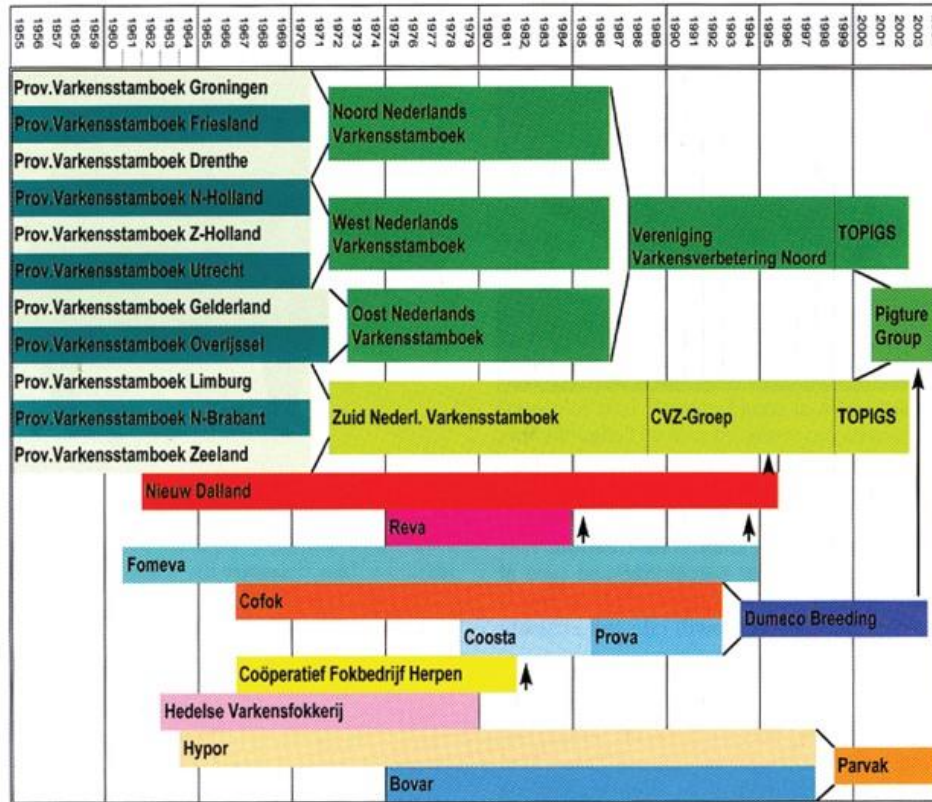
- Commercial pig production is changing worldwide
- Consolidation of breeding companies:
 - Through mergers and take-overs
 - Results in global loss of populations
 - Will further narrow the genetic base for pig production



Objectives

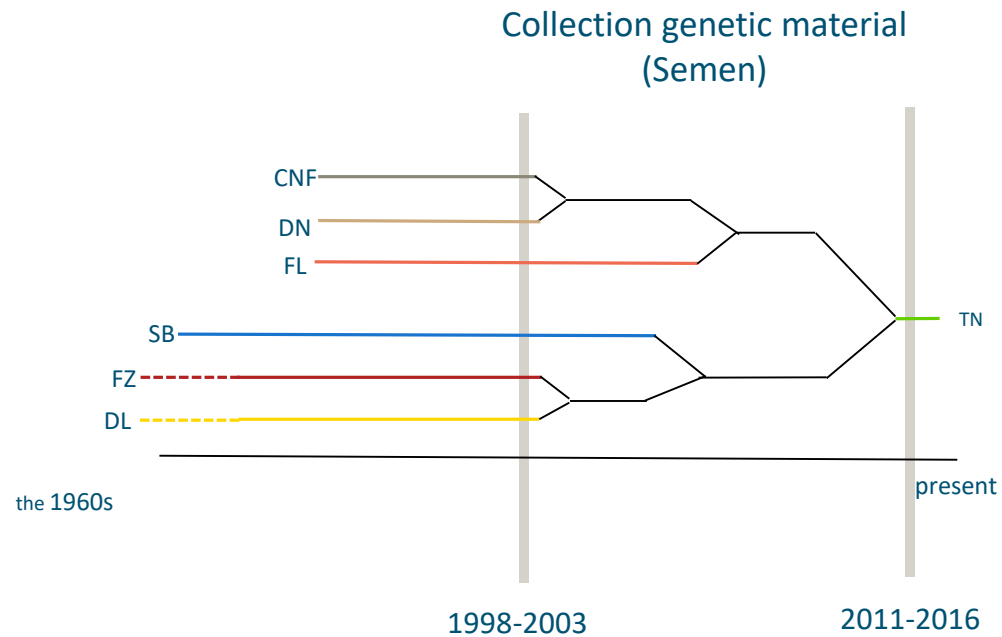
- What are the implications for genetic diversity of merging of lines within a breed and the discontinuation of lines?
- Estimate the loss of genetic diversity as a result of merging and discontinuation of lines

History Landrace lines in the Netherlands

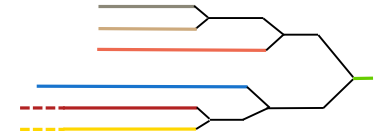


Van everzwijn tot vleesvarken : de geschiedenis van de varkensfokkerij in Nederland
 Slaghuis, H and van der Berg, R. (2010)
 Nationaal Veeteeltmuseum

Collection in Dutch genebank

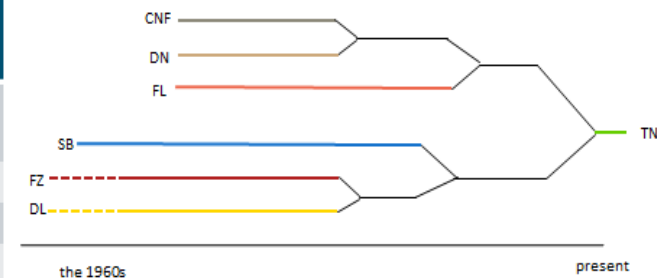


Data

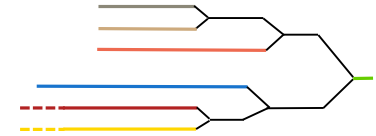


- Samples Dutch Landrace in Dutch Genebank
 - 6 discontinued lines + current line (TN)
- Genotyped PorcineSNP80 BeadChip

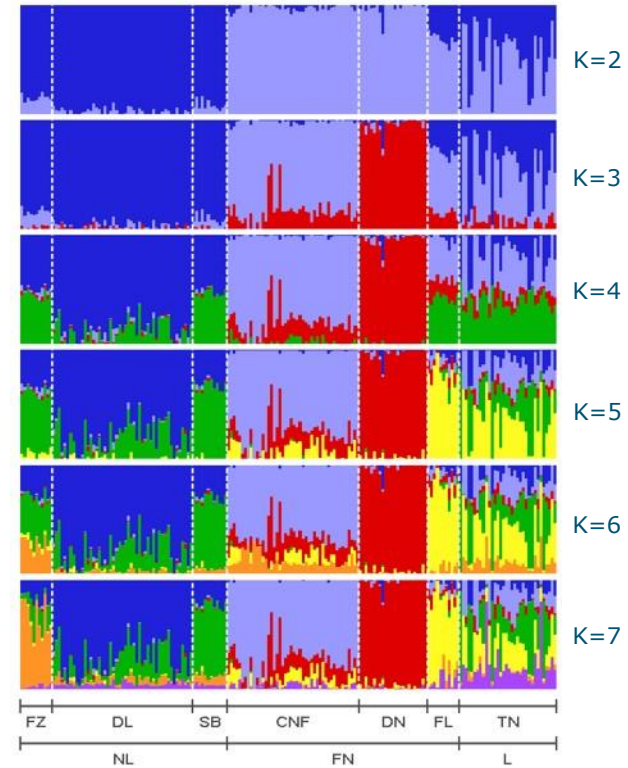
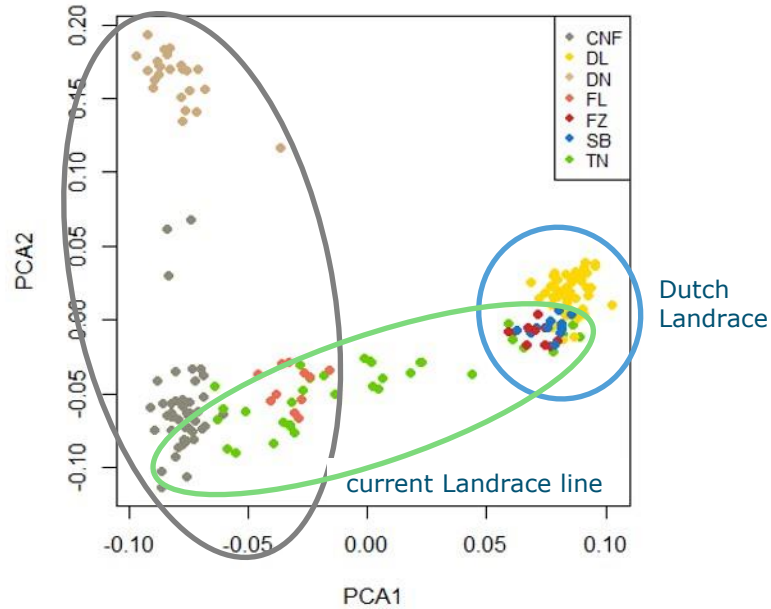
Breeding line		Breeding company	Semen collection year	# animals	
Cofok Norwegian and Finnish landrace	FN	CNF	Cofok	2000 - 2002	46
Dumeco N-line		DN	Dumeco	1998 -2002	24
Finnish landrace		FL	Stamboek	2002	11
Dumeco L-line	NL	DL	Dumeco	1998 - 2002	49
Fomeva Z1-line		FZ	Fomeva	2000	11
Dutch landrace	TN	SB	Stamboek	2002-2003	12
Topigs N-line		TN	Topigs	2011-2016	34



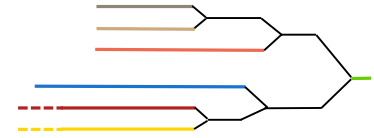
Population structure



Norwegian/Finnish Landrace

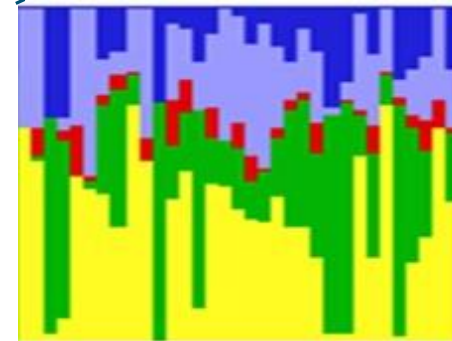
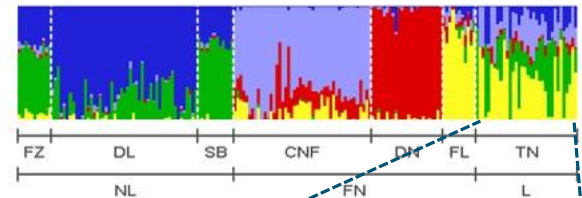


Population structure

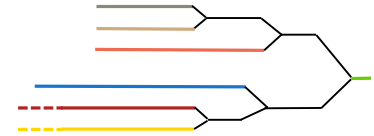


- 5 clusters (lines FZ and SB not separated)
- TN admixture population
- The contribution of different Dutch and Norwegian/Finnish lines varies per individual pig

Cluster	Average membership proportion
1) CNF	0.205
2) DN	0.043
2) FL	0.350
4) FZ/SB	0.290
5) DL	0.112



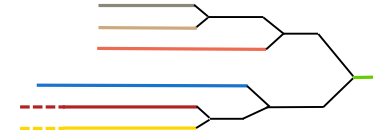
Genetic diversity



Breeding line	F	Contribution	Unique diversity
CNF	0.170	15.74%	0.005
DN	0.249	17.79%	0.008
FL	0.158	14.70%	0.007
DL	0.143	12.45%	0.007
FZ	0.186	13.28%	0.004
SB	0.121	10.84%	0.004
TN	0.051	15.18%	0.003
Core set	0.007		-

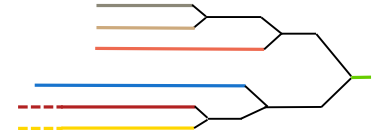
Total diversity: 0.993
 Diversity discontinued lines: 0.990
 Diversity current line: 0.894

Loci under selection



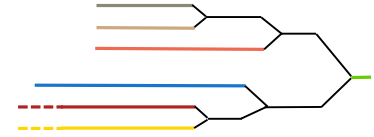
Pairwise comparison	Number of outlier SNPs	Candidate genes
CNF - TN	37	ABCD2, AP3S1, CIB4, DTNA, DUSP5, BTG3, CXADR, ENSSSCG00000033288, ENSSSCG00000034526, ENSSSCG00000036487, ENSSSCG00000039497, ENSSSCG00000039899, ENSSSCG00000040409, FEM1C, GDE1, LIMCH1, MS4A2, OOSP2, TICAM2
DN - TN	12	ASS1, CSMD3, CD48, GOT1, GLO1, ENSSSCG00000033737, FUBP3, KIF21B, KSR1, NSF, WNT3
FL - TN	3	GFPT2
DL - TN	18	BECN1, CNTD1, AQP1, ENSSSCG00000038016, GARS, MINDY4, MTURN, OPTC, OTP, PRELP, SPNS2, SPNS3, TBCA, UST
FZ - TN	2	MOCS1, DCP1B, ENSSSCG00000039585
SB - TN	1	SLC9A9

Discussion



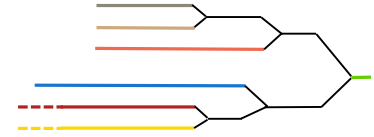
- Consolidation, selection, and change in breeding goals might affect genetic diversity
- Genetic diversity essential for future opportunities (changing markets, consumer preferences, products, etc)
- Genetic variation should be conserved before merging and discontinuation of breeding lines

Conclusions



- Consolidation reduced the number of lines within the Landrace breed
- The current Dutch Landrace has a high admixture level and relationships with the six discontinued lines
- Strongly recommended to conserve selection lines in a gene bank before merging them

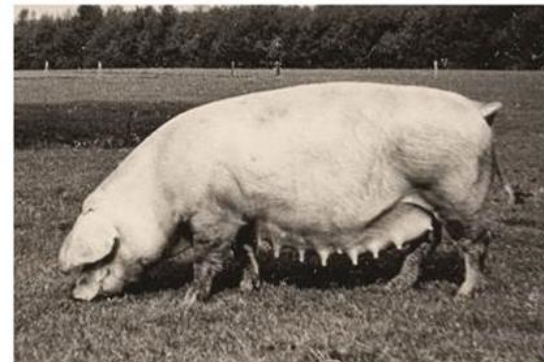
Acknowledgement



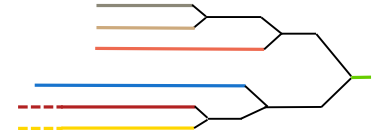
- Centre for Genetic Resources, the Netherlands
- Topigs Norsvin

- Photo + picture:

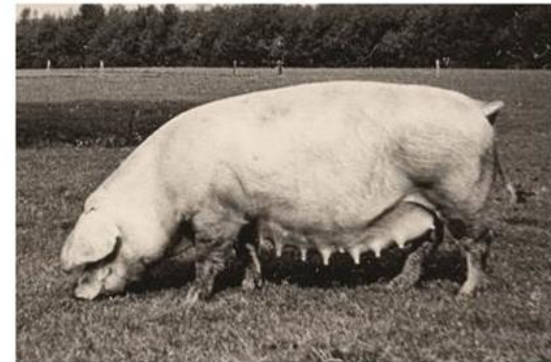
- Slaghuis, H and van der Berg, R.
- Nationaal Veeteeltmuseum



Thank you for your attention



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2015-2019.
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Innovatie van behoud en gebruik van genetische
diversiteit.