Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Conservation of a native dairy cattle breed through crossbreeding with commercial dairy cattle breeds in Sweden

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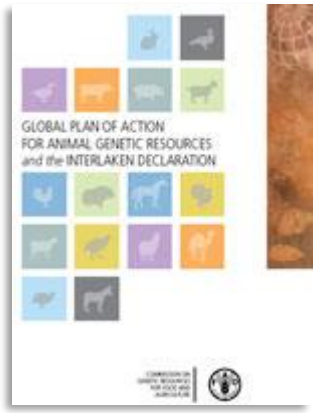
Conservation of animal genetic resources

- Convention on Biological Diversity (1993)
- "Global plan of action for animal genetic resources *and the* Interlaken declaration" (FAO, 2007)
- Plan of action for conservation of Swedish livestock breeds 2010-2020 by Jordbruksverket
  - Includes 9 native cattle breeds



Convention on Biological Diversity

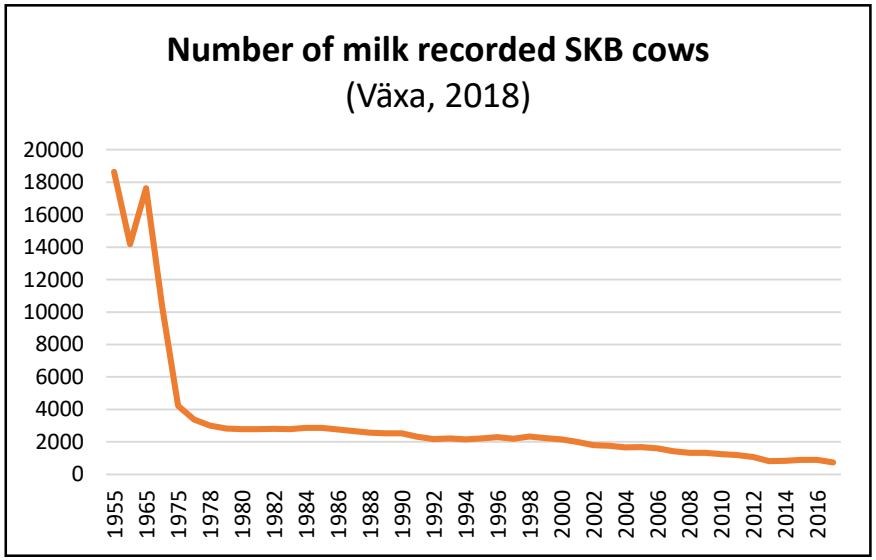
Jordbruksverket
Swedish Board of Agriculture

Swedish Polled Cattle (SKB)

”Svensk Kullig Boskap”

- 1937-38: Merging of herdbooks Swedish Mountain Cattle (*Fjällras*) and Swedish Red Poll (*Rödkulla*) to SKB in milk recording
- 1955: 18,631 milk recorded cows
- 1975: 4,219 milk recorded cows
- 2010: 1,254 milk recorded cows
- **2017: 735 milk recorded cows**

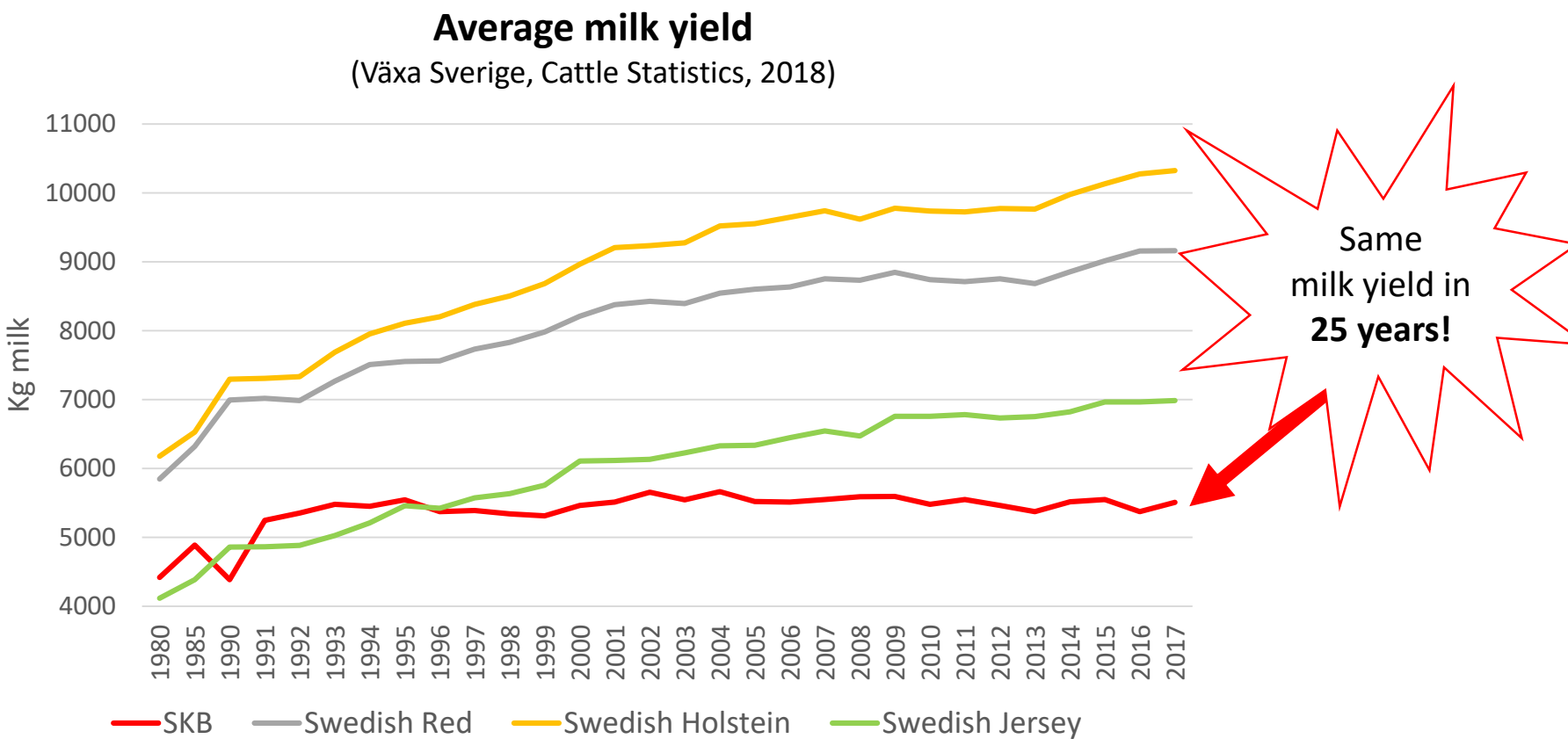
(Svensk Fjällrasavel)



Swedish Polled Cattle (SKB)

- Commercial dairy breed – ”Not at risk” (Bett et al., 2008)
- 400-500 kg liveweight
- Sturdy ”mountain” breed
- ~5,500 kg milk, 4.3% fat and 3.6% protein
  - Good cheese properties
- Currently semen from 13 bulls available from VikingGenetics/Växa
  - Born 1994-2007
  - Not much genetic improvement the last 30 years (?)

Swedish Polled Cattle (SKB)



Crossbreeding strategy

Terminal (sustained) crossbreeding

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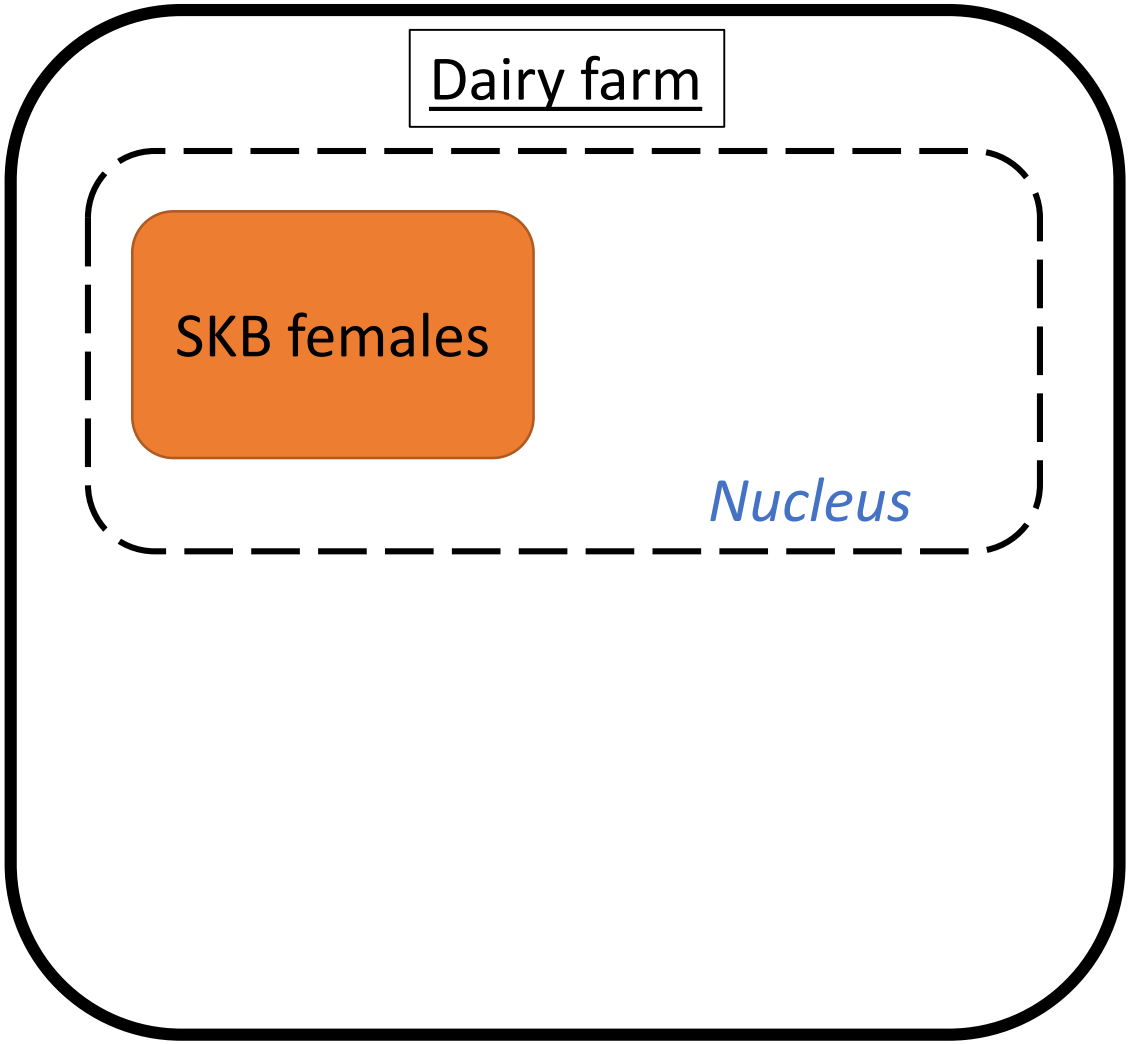

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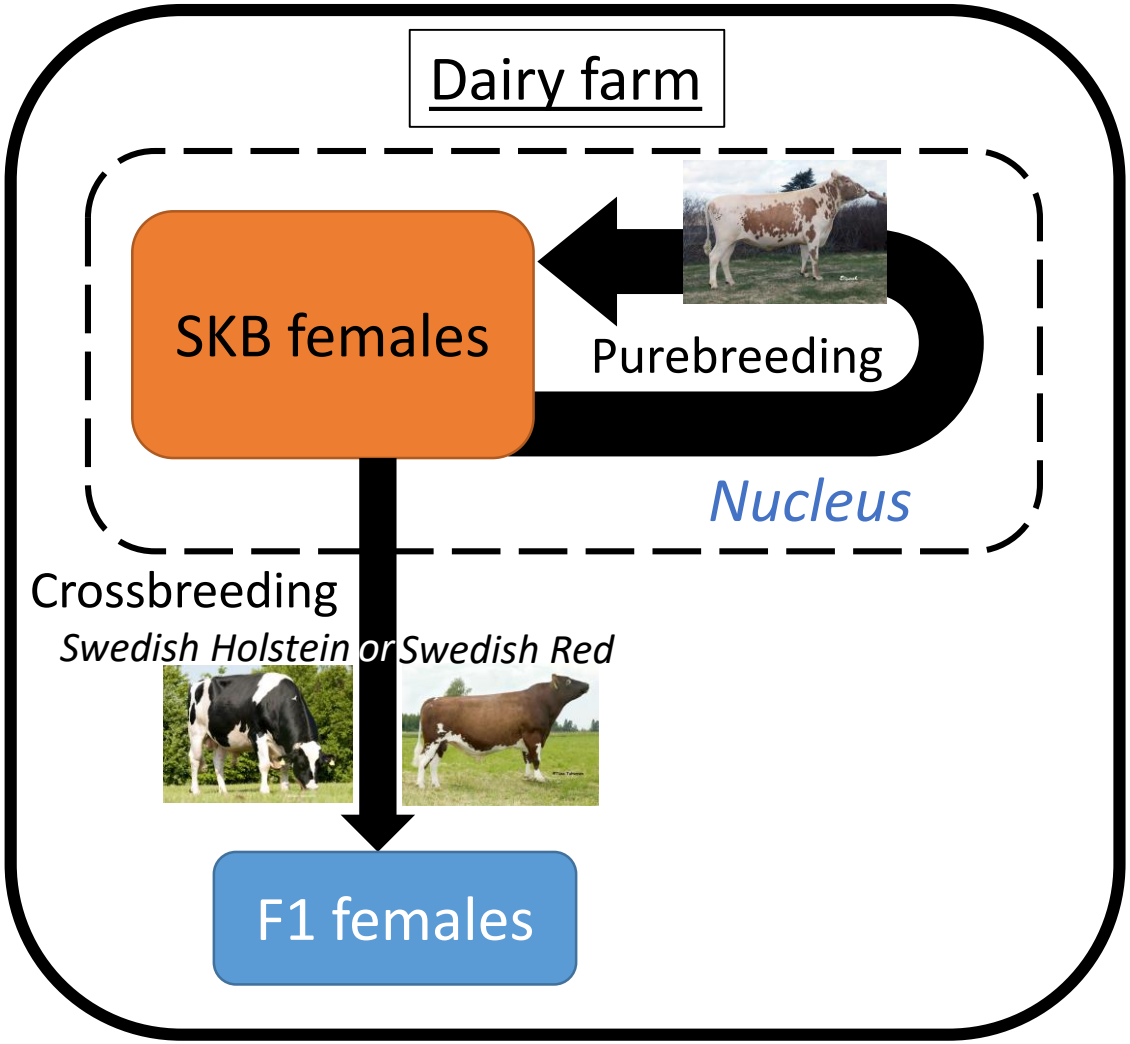

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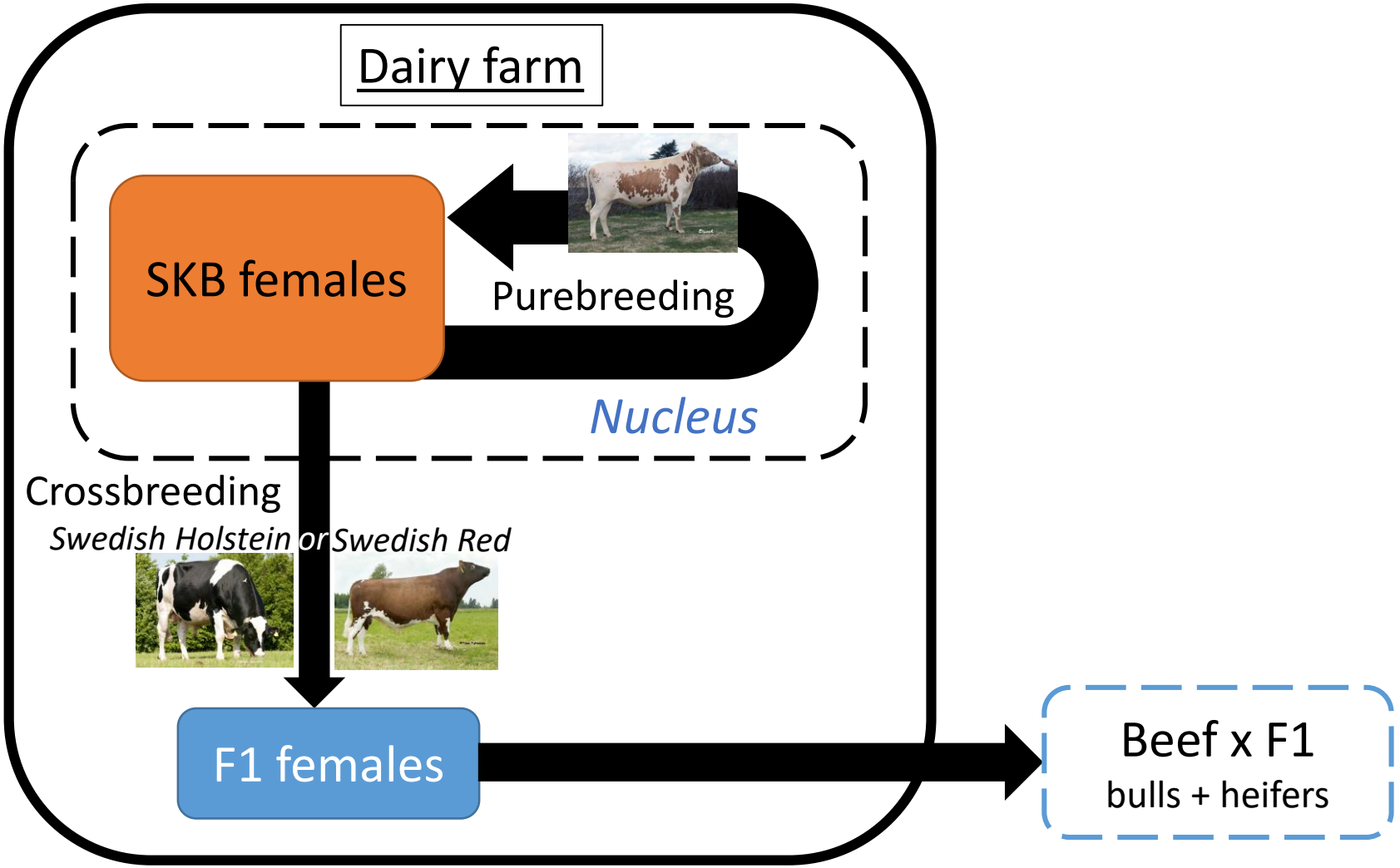

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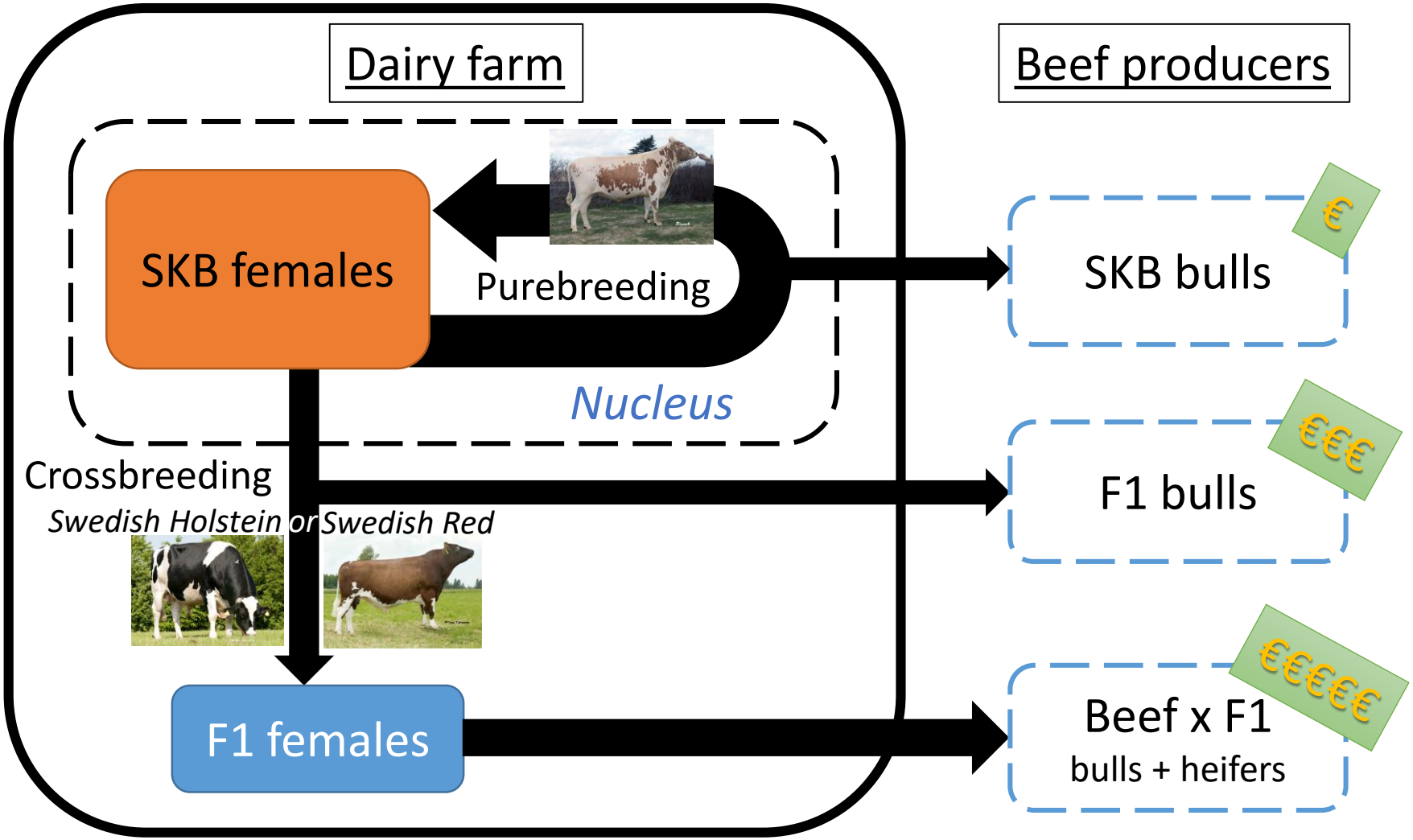

Simulation of herd dynamics and economy

Three scenarios
Only SKB cows
SKB + Swedish Holstein x SKB (SHX) cows
SKB + Swedish Red x SKB (SRX) cows

- Input parameters (breed traits) based on means of data from Swedish milk recording (2011-2016)
  - Data from few SKB cows (production records on 1037 cows)
  - Some assumptions on reproduction parameters and diseases

- Beef semen was used in all scenarios to minimize surplus of replacement heifers

SimHerd Crossbred

Østergaard et al. 2018

- Stochastic herd simulation using a SimHerd model (Østergaard et al. 2010)
- Simulates week-to-week state of production, reproduction, diseases etc. on animal level
- ***This model***: Breed effects and heterosis included but no simulation of genetic progress

SimHerd
Improves Your Decisions

Results – herd dynamics

at state equilibrium

- 100 cows in the herd

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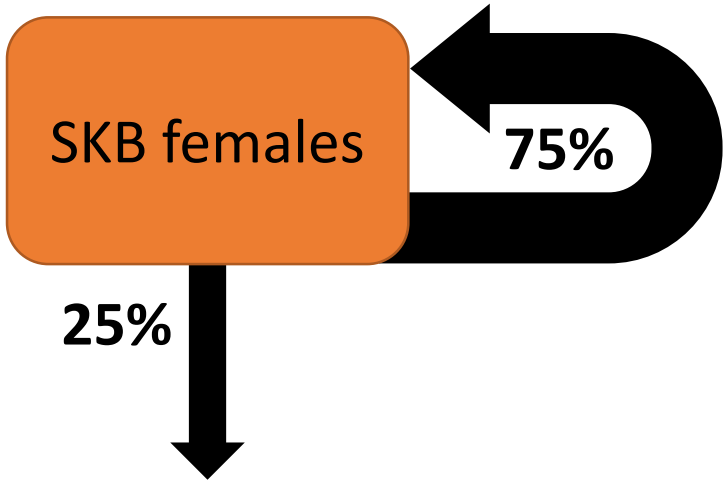
at state equilibrium

- 100 cows in the herd
- 75% of purebred females selected for purebreeding
  - Fertility + mortality (+ reproduction technologies)



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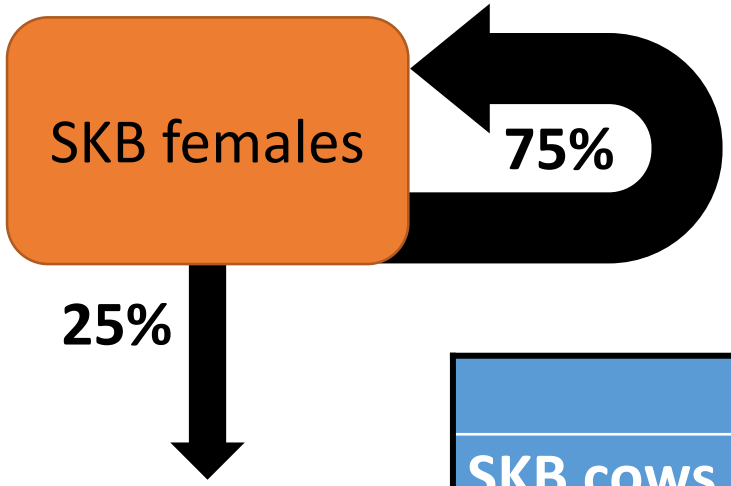

	SKB	SKB + SHX	SKB + SRX
SKB cows	100	72	69
F1 cows	0	28	31

Results – herd dynamics

at state equilibrium

	SKB	SKB + SHX	SKB + SRX
305-d kg ECM yield per cow	6,121	+601	+505
Replacement heifers (all ages)	76	-6	-8
SKB bull calves sold	36	-10	-11
F1 bull calves sold	0	+8	+8
Beef x dairy crosses sold	22	+4	+7

Results – herd economy (in €)

at state equilibrium

	SKB	SKB + SHX	SKB + SRX
Income			
Milk production	233,287	+21,168	+18,015
Live calves	1,759	+1,610	+1,965
Total	248,798	+21,636	+18,599

Results – herd economy (in €)

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Total	248,798	21,636	18,599
Costs			
Feeding, cows	81,454	+5,949	+5,266
Feeding, young stock	20,979	-1,519	-2,230
Total	129,330	+3,874	+2,055

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Profit			
Total	119,468	+17,762	+16,544
Per cow	1,173	+181	+169

+11-13%

Opportunities

- Increased profit in the herd → **”survival”, herd investments**
- Selection among breeding females → **genetic improvement**
- Sustainability → purebred nucleus of **native breed remains essential**
  - The system requires enough replacement animals in the nucleus

Challenges

- Breeding structure
  - Are there enough breeding animals for this strategy?
  - Inbreeding risk?
- Farmers
  - Willingness to crossbreeding
- Breed organizations
  - Supportiveness
- Practical issues on-farm
  - Feeding and rearing etc.

Concluding remarks

- Sustained crossbreeding may be a feasible strategy for conservation of a native dairy cattle breed
  - *Still need for in-depth research (e.g. Genetics)*

- Crossbreeding may not be enough – but it may be a part of the solution

- Could be relevant for any European country. Not only Sweden.

- Guidelines by FAO (2010)

FAO (2010) BREEDING STRATEGIES FOR SUSTAINABLE MANAGEMENT OF ANIMAL GENETIC RESOURCES. FAO Anim Prod Heal Guid 3.


Thank you!
Picture by Glassbonden, Vännäs, Sweden

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