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BIOECONOMY RESEARCH

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The success story of the conservation of the endangered Norwegian cattle breeds

ERFP Assembly, Lyon, 27 August 2023

Nina Svartedal and Anna Holene, Norwegian Genetic Resource Centre, NIBIO.



Photo: Michael Angeloff, NIBIO

Endangered cattle breeds native to Norway

- Herd books established appr in 1900.
- The breeds merged with Norwegian Red Cattle (NRF) during 1960's.
- The breeds were abandoned by Norwegian farmers 1960-1990
- The breeds almost extinct in 1990



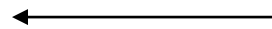
Field registration in 1990



Breed	Breeding cows in 1990
Western Fjord Cattle	49
Western Red Polled Cattle	52
Eastern Red Polled	11
Døla Cattle	25
Telemark Cattle	115
Black Sided Trønder and Nordland Cattle	Appr 800

Population sizes (breeding cows) 2022

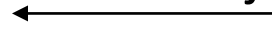
Black Sided Nordland and Trønder Cattle



Telemark Cattle



Western Fjord Cattle



Western Red Polled Cattle



Eastern Red Polled Cattle



Døla Cattle



Endangered – 2174



Endangered - 506



Endangered – 1292



Endangered 307



Endangered - 574



Endangered - 350

Obviously, a success story – seven key factors for the success

1. Pedigree database “The Cow Register”
2. Breeding societies
3. New ai-bulls every year – for genebanking and for use by the farmers
4. Sustainable breeding in small populations
5. Breeding advice - available for free
6. New areas of use
7. Production subsidies



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Eier: Lars og Nina Svartedal Prod.nr: 30150245
Gård: Svartedal
Adresse: Gløneveien 257
1816 SKIPTVET

Individnummer: 1901 Kjønn: Ku Rase fra Kuregisteret: 99% DF
Født: 21.06.2019 Rase fra Kukontrollen/SFK: 100% DF
Navn fra Kuregisteret: Hjertros Død:
Navn fra Kukontrollen/SFK: Hjertros Innaviskoeffisient: 0.0604
Pec-verdi: 0.9368

Innaviskoeffisient og Pec-verdi (pedigree completeness) er basert på slektskapsinformasjon fra 12 generasjoner bakover.

Far: 47022 Åbjersbråten DyrelD: Født: 01.05.2015 Rase: 100% DF Eier: Geno SA avd Øyer Testingsas	Farfar: 6716 Kaurstad DyrelD: Rase: 100% DF	FFF: 6703 13 Nerlien DyrelD: Rase: 100% DF
	Farmor: 0509 Murulin DyrelD: 05171061 0477 Rase: 100% DF	FMF: 6719 Pål DyrelD: Rase: 100% DF
Mor: 0106 Brandlin DyrelD: 04030474 0106 Født: 13.06.2017 Rase: 98% DF Eier: Kjell Ivar Knutsen	Morfar: 6729 St.Hans DyrelD: Rase: 100% DF	MFF: 1483 okse e. Rosenskjønn 1483 DyrelD: Rase: 100% DF
	Mormor: 0076 Maiguill DyrelD: 05430157 0076 Rase: 95% DF	MMF: 47013 Brandstut DyrelD: Rase: 94% DF
		MMM: 4053 Lys DyrelD: Rase: 96% DF

Merknader:

Antall oksekalver: 2
Antall kvigekalver: 0

The Cow Register – a pedigree database for the endangered native cattle breeds

- Established in 1990.
- The hub of the conservation work.
- Owned and managed by Norwegian Genetic Resource Centre.
- Includes all animals/owners of the breeds
- It is voluntary and free of charge to register.
- Three important functions:
 1. Monitoring population status and trends
 2. Tool for the breeders in avoidance of inbreeding
 3. Control of grants for pure breed breeding animals (2021: 185 000 Euro)

Breed societies – important networks

1. finding animals for sale and bulls for ai-production.
2. communicating sustainable breeding practice in small populations.
3. communicating “traditional knowledge” on adequate production systems.



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Ai-bulls in the gene bank

Breed	Tot number of ai-bulls in the gene bank 2021
Døla	55
Black Sided Trønder and Nordland	129
Telemark	90
Western Fjord	72
Western Red Polled	64
Eastern Red Polled	49



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Recruiting of Ai-bulls, step by step

1. Breed societies recommend candidates based on
 - Breed type of mother and calf
 - Mother cow is typical and well-functioning
2. Norwegian Genetic Resource Centre **checks the calf's kinship** with the rest of the ai-bulls.

Example:

- The Døla bull calf *Streifar* is suggested as a new ai-bull.
- Kinship among all ai bulls of Døla is 0,096.
- *Streifar's* kinship to the ai bulls of Døla is 0,056.
- *Streifar* is recommended as a new ai-bull. 😊

3. Geno – breeding association for NRF
 - accepts the recommended bull calf
 - cover all expenses for semen production
 - Offers the semen for sale to the breeders

Sustainable breeding in small populations

Breeding goals:

- Increase population size
- Avoid high rate of inbreeding

How?

- Use “all” animals in breeding – both cows and bulls
- Avoid close kinship matings



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Simulated mating lists from the Cow Register – a tool for the breeders

Mating list 1) testing a farm bull a mating herd

 Paringsliste ved bruk av gårdsokse Dølafe 27459140 1564 OKSE				
Eier:	Hans Gubhage	Prod.nr:	34330066	
Gård:	Gubhage			
Adresse:	2690 SKJÅK			
Individnummer:	1564	Kjønn:	Okse	Rase fra Kuregisteret: 100% DF
		Født:	15.10.2022	Rase fra Kukontrollen/SFK: 100% DF
Navn fra Kuregisteret:	OKSE	Død:		
Navn fra Kukontrollen/SFK:	OKSE	Innavlskoeffisient:	0.0895	
		Pec-verdi:	1.0000	
<i>Innavlskoeffisient og Pec-verdi (pedigree completeness) er basert på slektskapsinformasjon fra 12 generasjoner bakover.</i>				
Fiktivt avkom				
Ku	Født	Eier	Pec	Innavlskoeff
25080130 0020 Páske	27.03.2021	Hans-Kristian Willadsen	0.9873	0.0627
25080130 0026 Gullsnor	21.03.2022	Hans-Kristian Willadsen	0.9873	0.0990
25080130 0031 Ronja	01.04.2022	Hans-Kristian Willadsen	1.0000	0.0719
25035590 0074 Gullhorn	22.03.2020	Hans-Kristian Willadsen	0.9474	0.1241
27363970 0100 Svarta	24.06.2020	Hans-Kristian Willadsen	1.0000	0.0521
05160384 0390 Myrkøy	11.01.2018	Hans-Kristian Willadsen	1.0000	0.0509
25015460 0606 Maisol	01.05.2022	Hans-Kristian Willadsen	0.9873	0.0576
06334549 1006 Kranslin	19.04.2014	Hans-Kristian Willadsen	0.9873	0.0554
25097100 4001 Solsnu	21.06.2022	Hans-Kristian Willadsen	1.0000	0.0587

Mating list 2) testing a cow mating available ai-bulls

 Paringsliste ved bruk av seminokse Dølafe 25035590 0074 Gullhorn					
Eier:	Hans-Kristian Willadsen	Prod.nr:	30160281		
Gård:					
Adresse:					
Individnummer:	0074	Kjønn:	Ku	Rase fra Kuregisteret:	100% DF
		Født:	22.03.2020	Rase fra Kukontrollen/SFK:	100% DF
Navn fra Kuregisteret:	Gullhorn	Død:			
Navn fra Kukontrollen/SFK:	Gulla	Innavlskoeffisient:	0.0496		
		Pec-verdi:	0.7879		
<i>Innavlskoeffisient og Pec-verdi (pedigree completeness) er basert på slektskapsinformasjon fra 12 generasjoner bakover.</i>					
Fiktivt avkom					
Stamboknr	Navn	Født	Rase	Pec	Innavlskoeff
47001	Kviteson	01.03.2002	97% DF	0.9302	0.0656
47002	Branden	06.04.2002	94% DF	0.9062	0.1190
47003	Tricoloren	31.07.2003	100% DF	0.7463	0.0760
47004	Astrix	26.04.2004	97% DF	0.9243	0.0621
47005	Brutus	06.03.2005	100% DF	0.9123	0.0730
47006	Sebastian	24.08.2005	94% DF	0.8873	0.0174
47008	Jupiter	12.03.2007	100% DF	0.9360	0.0393
47009	Babur Rustom	12.04.2007	97% DF	0.8809	0.0961
47010	Bjarne	12.08.2008	98% DF	0.9360	0.0544
47011	Dullen	04.09.2008	100% DF	0.8873	0.0739
47012	Drøs	11.12.2009	100% DF	0.8873	0.0307
47013	Brandstut	01.04.2010	94% DF	0.9123	0.0317
47014	Sjøvikens Sinnataggen	30.08.2010	98% DF	0.9302	0.0637

Inbreeding Trends in Norwegian Cattle
Breeds at Risk

Inbreeding rates and effective population sizes 1991-2020

NIBIO REPORT | VOL. 7 | NR. 154 | 2020



Anna Holene¹, Peer Berg² & Nina Sæther¹

¹Division of Survey and Statistics, Department of Land Resource Surveys, NIBIO

²Department of Animal and Aquacultural Sciences, Norwegian University of Life Sciences (NMBU)

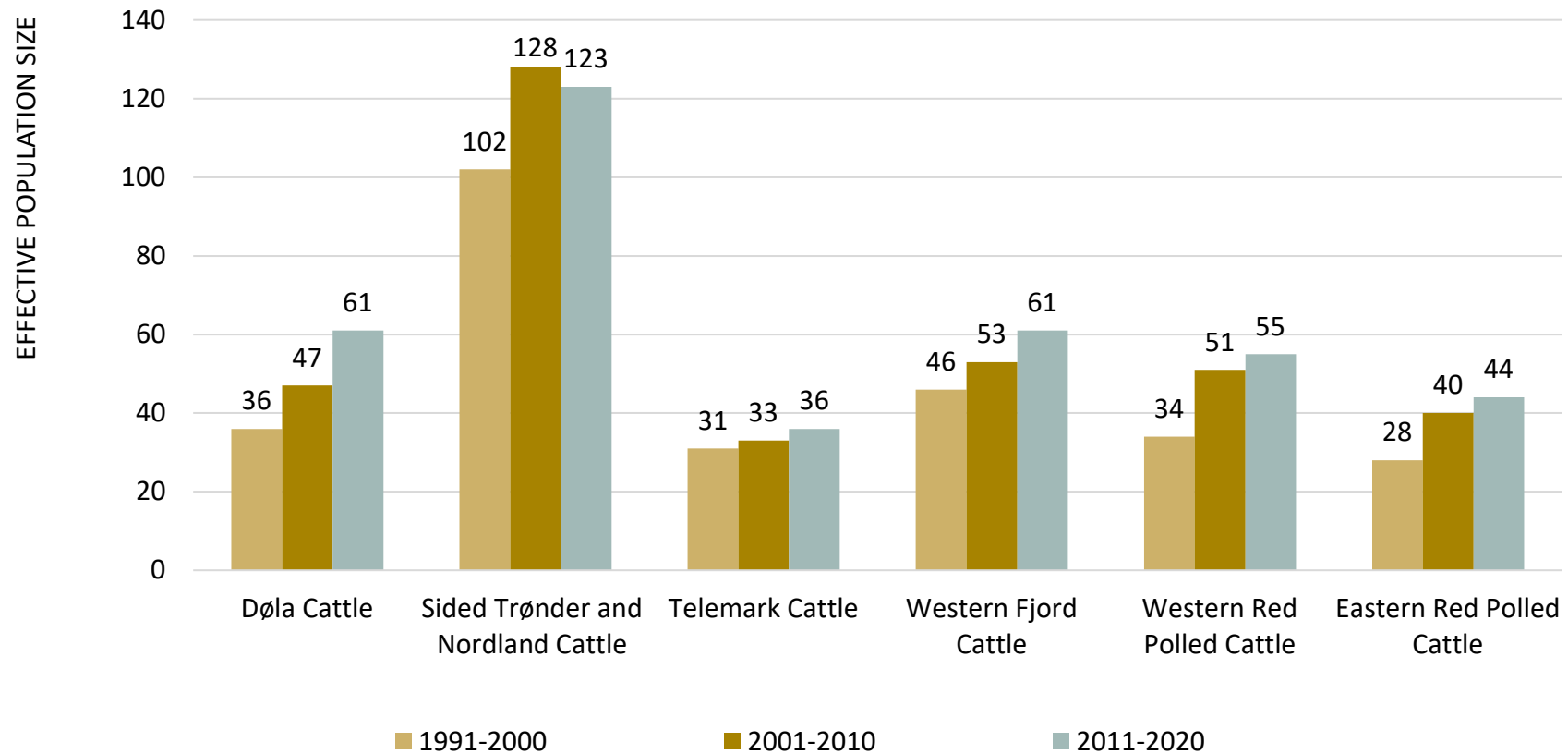
Documenting the effective population sizes based on pedigree information

Estimating the effective population sizes in 2020 in six native breeds with extremely small population sizes in 1990.

[NIBIO Brage: Inbreeding Trends in Norwegian Cattle Breeds at Risk \(unit.no\)](https://unit.no)

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Effective population sizes 1990-2020



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The endangered native cattle breeds are traditional dairy breeds

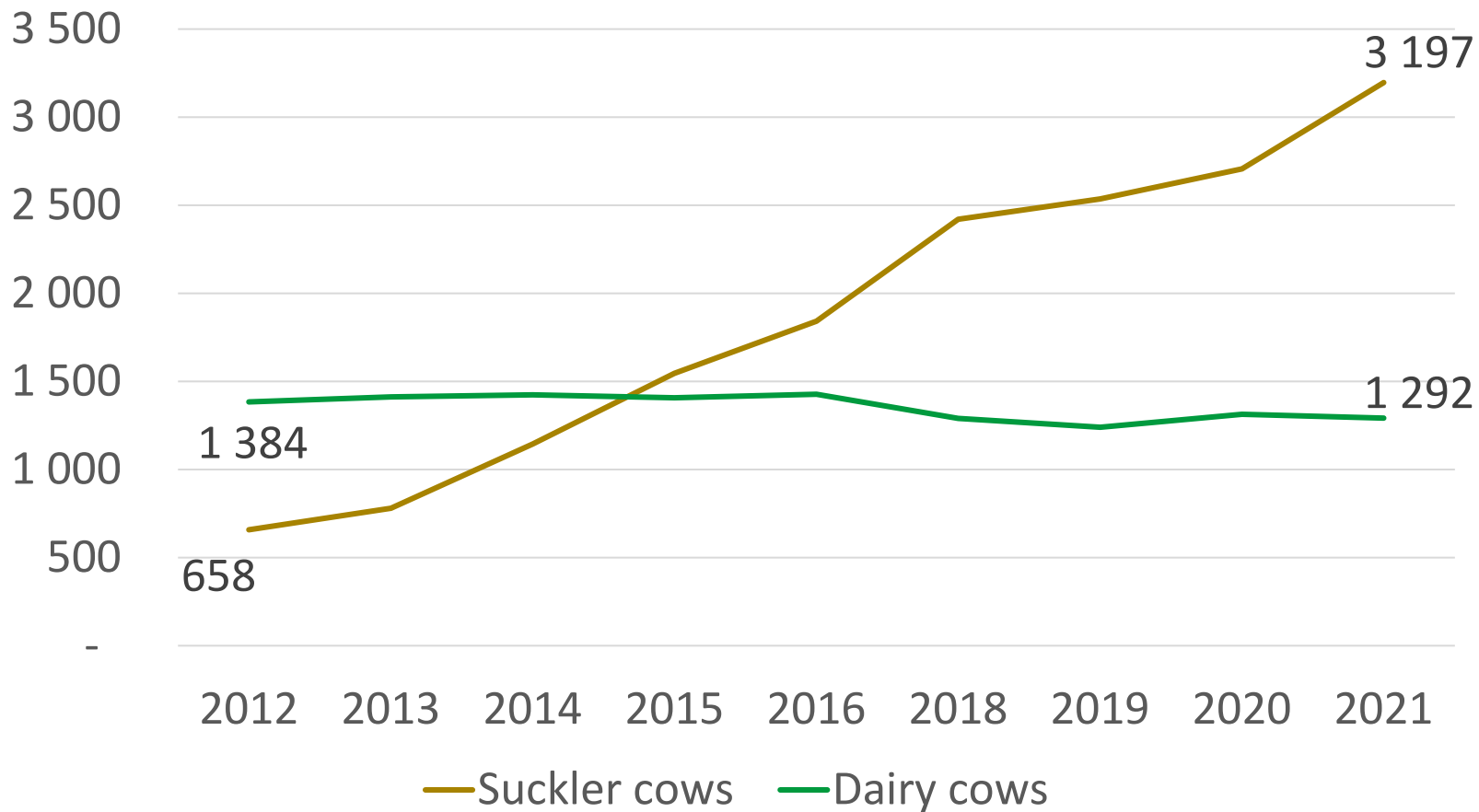


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The increase in population size is explained by increase in number of suckler cows



**Financial support
directly to the breeders
2000-2021**

Important
acknowledgement and
motivation for the
farmers.

Year	Subsidy per breeding cow or breeding bull per year, in Euro
2000-2001	62
2002-2003	56
2004-2006	88
2007	98
2008	118
2009-2012	127
2013	176
2014	196
2015	196
2016	216
2017	294
2018	319
2019	339
2020	339
2021	339
2022	371

Thanks for your attention!



Hjertros and her son Julius, a
Døla cattle bull calf born
April 12, 2023



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