

Supplementary Material, Kumm and Hesse, Land

Table S1.

Areas of agricultural land and forest grazing, number of cattle and cattle herds, and number of sheep, goats and horses (1000s of hectares and heads) in Sweden in 1901, 1927 (approximately when the area of arable land was largest), 1951 (when the fastest reduction of agriculture land, cattle and horses began), 1968 (when the fastest reduction of agriculture land, cattle and horses ended), 1995 (Sweden's entry into the EU) and 2022.

	1901	1927	1951	1968	1995	2022
Arable land	3 540	3 716	3 647	3 011	2 767	2 538
Semi-natural pasture	1 432	742	724 ¹	377 ²	425	417
Hay meadow		526				18
Forest grazing		752				29 ³
Total excl. forest grazing	4 972	4 984	4 361	3 388	3 192	2 973
Total incl. forest grazing		5 736				3 002
Cattle incl. calves	2 594	2 899	2 452	2 065	1 777	1 449
Of which dairy cows			1 586 ⁴	723 ⁴	482	297
Of which suckler cows				40 ⁴	157	213
Cattle herds	508 ⁵	427 ⁵	307	126 ⁶	42	15
Cattle/herd	5	7	8	16	42	97
Sheep (adult ewes and rams)	651 ⁷	444	124	145	195	264
Goats	66	55	7	3 ⁸		
Horses	539	633	404 ⁹	69	83	355

Source: [21] when no other source is indicated below

¹Culture pasture (189) + semi-natural grassland (535)

²1970

³Including grazing at summer farms

⁴[18]

⁵Total number of farms of which nearly all had cattle at the beginning of the 1900s (in 1951, when cattleless farms had started to become common, out of a total of 378,000 farms, 308,000 had cattle)

⁶Average for 1966 and 1970

⁷Estimated based on the number sheep incl. lambs

⁸1990

⁹1956

Figure S1.



Example suggesting that natural afforestation of abandoned agricultural land can take a long time and produce patchy low-producing low-quality forest. The field in the picture taken in 2021 had not been cultivated since the 1990s. A large part of the land is only thick unused grass where it is difficult for tree seedlings to establish. Such lands can be converted to silvipastoral agroforestry through thinning and grazing. In doing so, the landscape becomes more appealing and beef or lamb production is rewarded at the same time that the value of timber production is just as high if the most valuable trees are preserved.

Photo: Mari Nälsén.

Figure S2.

Valuation of landscapes by 8 surveys with online panels consisting of randomly selected Swedes aged 18-75 [37]. Years 2014-2021.

2014. Suppose that the white house is your residence. A small plot belongs to the house, but the surrounding land is owned by a farmer. Rank the four surrounding land use options from best to worst with consideration to your living environment.



Arable land



Treeless pasture



Silvipastoral agroforestry



Natural afforestation

Best %	Second best %	Second worst %	Worst %
10	15	33	42
19	36	30	15
49	29	16	6
23	20	21	37

Source: Web-based survey with 1,000 responding persons from TNS Sifo's online panel [37] consisting of randomly selected Swedes aged 18-75. June 2014.

2016. Suppose that you live or often travel overlooking these landscapes. Evaluate the five options on a five-point scale from Low value = 1 to High value = 5 based on your preferences.



Treeless pasture

Score on 5-point scale where 5 is best

3.8



Silvipastoral agroforestry with old oaks

4.5



Silvipastoral agroforestry with old birches

4.3



Silvipastoral agroforestry with young oaks and birches

3.9

Source: Web-based survey with 1,000 responding persons from TNS Sifo's online panel [37] consisting of randomly selected Swedes aged 18-75. November 2016.

2019:1. Suppose that you live or often travel overlooking these landscapes. Rank the five landscapes from the best to the worst based on your preferences.



Silvipastoral agroforestry with old birches



Silvipastoral agroforestry with birch groves



Treeless pasture



Silvipastoral agroforestry with planted birch

Best %	Second best %	Second worst %	Worst %
46	29	19	7
28	44	21	7
20	12	21	46
5	15	39	40

Source: Web-based survey with 1,000 responding persons from TNS Sifo's online panel [37] consisting of randomly selected Swedes aged 18-75. October 2019.

2019:2. Suppose that you live or often travel overlooking these landscapes. Rank the five landscapes from the best to the worst based on your preferences.



Silvipastoral agroforestry

Best or second best %	Worst or second worst %
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34

11



Treeless pasture

31

12



Natural forest regeneration

19

20



Birch planting

11

23



Spruce planting

6

38

Source: Web-based survey with 1,000 responding persons from TNS Sifo's online panel [37] consisting of randomly selected Swedes aged 18-75. October 2019.

2021:1. Suppose that you live or often travel overlooking these landscapes. Rank the three landscapes from the best to the worst based on your preferences. Half of the respondents received the following climate-related additional information: "When the trees in the pasture grow, they absorb carbon dioxide, which climate compensates for parts of the livestock's greenhouse gas emissions".



Treeless pasture

Without climate information			With climate information		
Best %	Second best %	Worst %	Best %	Second best %	Worst %

41	19	40	20	17	63
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Silvipastoral agroforestry with a spruce grove

27	66	8	26	70	4
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Silvipastoral agroforestry with two spruce groves

33	15	52	54	13	33
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Source: Web-based survey with 1,000 responding persons from TNS Sifo's online panel [37] consisting of randomly selected Swedes aged 18-75. November 2021.

2021:2. Suppose that you live or often travel overlooking these landscapes. Rank the two landscapes from the best to the worst based on your preferences. Half of the respondents received the following climate-related additional information: "When the trees in the pasture grow, they absorb carbon dioxide, which climate compensates for parts of the livestock's greenhouse gas emissions".



Treeless pasture



Silvipastoral agroforestry with birch groves

Without climate information		With climate information	
Best %	Worst %	Best %	Worst %
27	73	15	85
73	27	85	15

Source: Web-based survey with 1,000 responding persons from TNS Sifo's online panel [37] consisting of randomly selected Swedes aged 18-75. November 2021.

Figure S3.



Silvopastoral agroforestry with birch grove that was left behind when overgrown farmland was restored to pasture 40 years ago when the then dense self-seeded birch forest was 20 years old.



Silvopastoral agroforestry with self-seeded birch groves on land that was grazed forest until the 1950s and was finally felled in the 1990s, after which it became self-sown dense birch-dominated young forest. This was mechanically corridor cleared at the age of 15 after which grazing started. The left-over groves were thinned after 5 years to provide more pasture and faster value growth of the left-over trees.