Additional file 2

Reindeer husbandry

Statistical analyses

**Table A2.1**. Model performance of two regression models aimed to test the presence of temporal trends in number of harvested reindeer (Fig. 3, main manuscript).

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Focus variable | Model a | Correlation b | df | AIC | Δ AIC | wi |
| Number of harvested reindeer | GLS | √ | 4 | 803.46 | 0.00 | 1.00 |
|  | linear |  | 3 | 856.17 | 52.71 | 0.00 |

a GLS = Generalized Least Squares model. Year was the predictor variable in all models.

b AR1 temporal autocorrelation structure

NOTES: df = degrees of freedom. AIC = Akaike Information Criterion; Δ AIC = difference in AIC compared to the best-fit model; wi = Akaike weights.

Herd structure

**Table A2.2.** Reindeer herd structure (females >1 year, males >1 year and calves) in different regions of the reindeer husbandry area in Sweden during three periods: 1950-1964, 1995-2005, and 2006-2015. Mountain herding districts (currently 15 in Norrbotten, 6 in Västerbotten and 12 in Jämtland) are those where the reindeer use summer pastures in the mountains, while reindeer in the forest districts (currently 10) graze in the forest area year around. The concession area (currently 8 herding districts) represents a form of reindeer husbandry practiced in Norrbotten, close to the Finnish border

|  |  |  |  |
| --- | --- | --- | --- |
|   | Females | Males | Calves |
| Region | 1950-1964a | 1995-2005b | 2006-2015b | 1950-1964a | 1995-2005b | 2006-2015b | 1950-1964a | 1995-2005b | 2006-2015b |
| Norrbotten county, mountain, northern | 50% | 64% | 63% | 25% | 11% | 9% | 25% | 25% | 28% |
| Norrbotten county, mountain, southern | 53% | 63% | 65% | 24% | 13% | 10% | 23% | 24% | 25% |
| Västerbotten county, mountain | 49% | 66% | 68% | 23% | 11% | 10% | 28% | 23% | 23% |
| Jämtland county | 56% | 71% | 73% | 6% | 8% | 7% | 38% | 21% | 20% |
| Forest herding districts | 49% | 68% | 70% | 23% | 9% | 8% | 28% | 22% | 22% |
| Concession area | 49% | 68% | 69% | 18% | 9% | 9% | 33% | 23% | 22% |
| **Average** | **51%** | **66%** | **67%** | **19%** | **10%** | **9%** | **30%** | **24%** | **24%** |

a Source: Kungliga utrikesdepartementet (1967), p.274. Different years for different herding districts. For Jämtland County, only one district (Tännäs) was included in 1964, but assumed to be representative for the county.

b Calculated from original data from the Swedish Sami Parliament (obtained in January 2016).

Slaughter strategy



**Figure A2.1.** Number of harvested reindeer (divided into females, males and calves) during the slaughter seasons 1996/97 - 2014/15. The percentage of harvested calves is indicated on top of each year’s column. Values were calculated from original data from the Swedish Sami Parliament (obtained in January 2016). Number of harvested female reindeer did not undergo any significant trend (Linear regression model: p-value of the coefficient estimate β > 0.05), while number of harvested males significantly decreased (β = -317.90, SE = 103.22, p-value = 0.0068) and number of harvested calves significantly increased (β = 654.61, SE = 208.80, p-value = 0.0060). The regression models did not violate any regression assumption.

Body condition, as reflected by carcass weight of calves harvested in autumn



**Figure A2.2.** Average carcass weight (kg) of calves harvested in October-December (±standard deviation), in Sweden during the slaughter seasons 1996/97 - 2014/15. Values were calculated from original data from the Swedish Sami Parliament (obtained in January 2016, outliers <10 kg or >33 kg were removed from the dataset). Average calf carcass weight showed a slight statistically significant increase (Linear regression model: β = 0.04, SE = 0.02, p-value = 0.0403).

Governmental support for rationalization and technical development

**Table A2.3.** Governmental support distributed from 1977 to 1993 for the promotion of development of reindeer husbandry divided into: Rationalization support, Operational support, Tool support. Data are presented in million Swedish crowns (SEK), standardized to the year 2015 using the historical Cost-of-Living Index (CLI, retrieved on September 4, 2017 at [www.scb.se](http://www.scb.se)).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Rationalization support | Operational support | Tool support | Project support |
| 1977 | 0.53 | 1.02 | 0.70 |  |
| 1978 | 0.35 | 0.75 | 0.63 |  |
| 1979 | 0.57 | 0.43 | 0.42 |  |
| 1980 | 0.42 | 0.19 | 0.66 |  |
| 1981 | 1.02 | 0.63 | 0.38 |  |
| 1982 | 0.90 | 0.44 | 0.72 |  |
| 1983 | 1.88 | 0.37 | 0.35 |  |
| 1984 | 1.22 | 1.59 | 0.50 |  |
| 1985 | 1.64 | 0.45 | 0.87 |  |
| 1986 | 0.73 | 0.41 | 0.70 |  |
| 1987 | 0.90 | 0.28 | 0.65 |  |
| 1988 | 0.52 | 0.78 | 0.65 |  |
| 1989 | 1.29 | 0.99 | 0.47 |  |
| 1990 | 1.55 | 0.75 | 0.46 |  |
| 1991 | 1.50 | 0.81 | 0.52 |  |
| 1992 | 1.21 | 0.56 | 0.33 |  |
| 1993 | 0.19 | 0.24 | 0.09 |  |
|  |  |  |  |  |
|  |  |  |  |  |
| 1997 |  |  |  | 0.91 |
| 1998 |  |  |  | 2.32 |
| 1999 |  |  |  | 5.41 |
| 2000 |  |  |  | 7.46 |
| 2001 |  |  |  | 4.97 |
| 2002 |  |  |  | 5.46 |
| 2003 |  |  |  | 3.27 |
| 2004 |  |  |  | 0.97 |
| 2005 |  |  |  | 3.60 |
| 2006 |  |  |  | 4.32 |
| 2007 |  |  |  | 4.64 |
| 2008 |  |  |  | 4.39 |
| 2009 |  |  |  | 21.15 |
| 2010 |  |  |  | 11.40 |
| 2011 |  |  |  | 11.73 |
| 2012 |  |  |  | 6.62 |
| 2013 |  |  |  | 12.54 |
| 2014 |  |  |  | 4.85 |

Source: Statistics Sweden 1977-2015. Jordbruksstatistisk årsbok (Yearbook of Agricultural Statistics)

Income from reindeer harvest



**Fig A2.3.** Reindeer meat prices (SEK per kg) 1955-2015, income (million SEK) from reindeer harvest 1981-2015, with and without a price support that has been payed to herders from 1973 onwards. Prices for reindeer meat from 1960 to 1977 were obtained from a graph covering 1960-1972 in Vol 6(4) 1972 of the journal “Rennäringsnytt” (Reindeer Husbandry News), and from written text for 1973-1977 in Vol 7-11. Data from 1978-1996 were obtained from Statistics Sweden (1999). Figures from 1997 and onwards were calculated from original data from the Swedish Sami Parliament (obtained in January 2016). Data are presented in million Swedish crowns (SEK), standardized to the year 2015 using the historical Cost-of-Living Index (CLI, retrieved on September 4, 2017 at [www.scb.se](http://www.scb.se)). Prices are payed based on the weight of the whole carcass, including bones.

Reindeer meat prices and total income from reindeer harvest have varied substantially (total income depending on slaughter volume, see Fig. 3 in the main manuscript), but showed no general trend during the study period (GLS models with AR1 temporal autocorrelation structure: all p-values > 0.05).

Owner structure

**Table A2.4.** Proportion of reindeer herding enterprises (“household” in the data from 1965) with different reindeer herd size from 1965 until 2015.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | <100 | 100-199 | 200-299 | 300-399 | 400-599 | ≥600 |
| 1965a | 26% | 30% | 18% | 10% | 9% | 7% |
| 1985b | 35% | 24% | 18% | 10% | 9% | 4% |
| 1995c | 33% | 21% | 15% | 11% | 10% | 10% |
| 2005c | 37% | 16% | 15% | 7% | 12% | 13% |
| 2015c | 42% | 16% | 12% | 10% | 10% | 11% |

a From Kungliga utrikesdepartementet (1967), p. 220-222 (does not include Jämtland County except for the Frostviken norra/Voernese herding district)

b From Lantbruksstyrelsen/Rennäringsenheten (1985), Table 11, p. 22 (divided into herd size ≤100, 101-200, 201-300, etc.)

c Calculated from original data from the Swedish Sami Parliament (obtained in January 2016)

References

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Swedish Meteorological and Hydrological Institute website (<http://www.smhi.se/kunskapsbanken/meteorologi/nollgenomgangar-1.22895>; accessed on May 9, 2016)

Notes

In the sources regarding reindeer numbers and harvest, a year is generally considered as beginning with July 1 and ending with June 30 the following year. Therefore, for those data e.g. the year 1997 generally refers to the period July 1, 1996 – June 30, 1997.

In case of conflicting data, we have used the most recent available source.