

NordGen

THREE MOUNTAIN CATTLE BREEDS

Their cultural heritage and genetic resources

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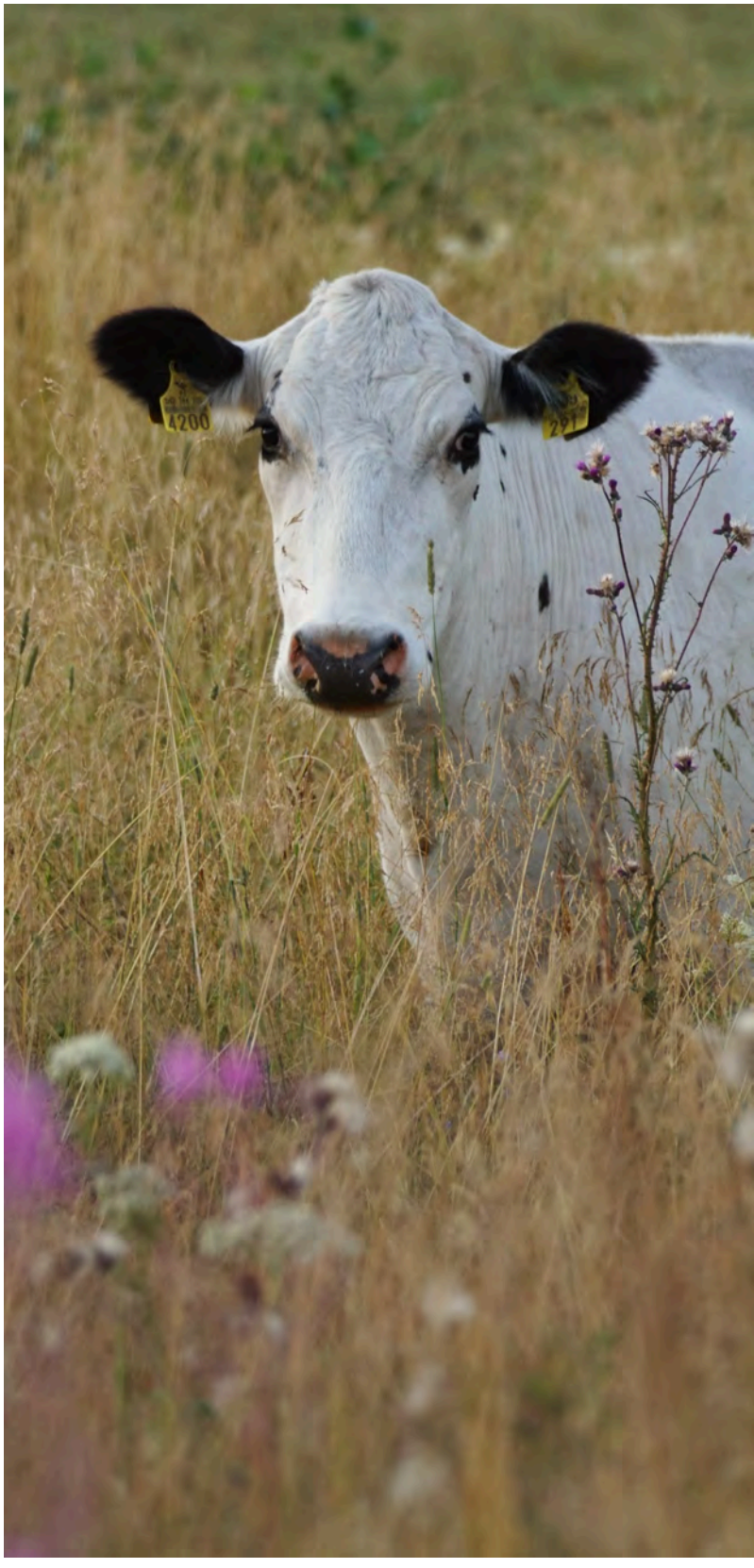
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This publication is also available online in a web-accessible version at:
https://publication.nordgen.org/Three-Mountain-Cattle-Breeds

For the reader

Traditional cattle breeds are an important part of our history and cultural heritage, but they are also increasingly relevant for future food production in a time of climate change and rapid biodiversity loss. The Nordic Mountain Cattle breeds of northern Finland, Norway, and Sweden have shared a long history. Through long-term adaptation to harsh Arctic conditions, these breeds have supported human survival in the region. Their adaptations are unique and remain clearly visible in the genomes of animals living today.

Some of these traits may become particularly valuable in future agricultural crises, for example in situations where environmental conditions become more extreme or fodder supplies are limited. International climate research has discussed scenarios in which a significant weakening or disruption of the Atlantic meridional overturning circulation (AMOC) could lead to substantial changes in climate conditions in Northern Europe. In this perspective, locally adapted native breeds may gain increased importance for agriculture due to their resilience and long-term adaptation to harsh and variable environments.



Despite their significance, the characteristics of Nordic Mountain Cattle breeds have long been poorly documented and underutilised, and their shared history and interrelations have not previously been comprehensively described. For this reason, the project *Three Nordic Mountain Cattle Breeds – Their Cultural Heritage and Genetic Resources* (3MC) was initiated in October 2019.

The aim of the project was to raise awareness of the importance of these three Nordic Mountain Cattle breeds by revealing their shared history and background. This was achieved through continuous dialogue with stakeholders, the production of a museum exhibition, the development of a game application, media outreach, and the publication of scientific articles. The knowledge generated by the project was aimed to support national conservation strategies and promote the sustainable use of the breeds, for example through tourism, animal-assisted activities, and the maintenance of traditional pastures.

During its implementation, the project evolved beyond its original communication approach into a broader collaborative effort. The active involvement of collaborators, local communities, and members of the public – many of whom contributed memories, materials, and perspectives – played an important role in shaping the project outcomes. In this sense, the project incorporated elements of citizen science, with participants contributing to the documentation and interpretation of the cultural heritage of Nordic Mountain Cattle.

Collaboration with museums further expanded the project into a wider knowledge and communication platform. Museums contributed to the research by providing access to historical material and archaeological samples, while also serving as important mediators of knowledge through exhibitions and public engagement.

This publication aims to give an overview of the approach, activities, and knowledge generated within the 3MC project and summarises its outcomes following the project's conclusion in September 2022.



Background

Traditional *mountain cattle* breeds are a vital part of the Nordic region's history and cultural heritage. For thousands of years, native cattle in northern Fennoscandia – notably the Northern Finncattle (also known as *Lapinlehmä*), the Swedish Mountain Cattle (*Fjällko*), and the *Sidet Trønder og Nordland* cattle (STN) of Norway – have co-existed with local communities in Arctic conditions. Through centuries of adaptation, these animals evolved unique traits that enabled both the cattle and the people who depended on them to survive in harsh climates and marginal pastures. For example, Nordic Mountain Cattle can thrive on variable forage and mountain pastures, and withstand long, cold winters – qualities that could prove crucial for future sustainable food production in the face of climate change and declining global biodiversity.

Despite their importance, specific characteristics, shared history, and previously reported genetic relationships, these three transboundary Nordic cattle breeds had not been thoroughly characterised or utilised prior to the 3MC project. Much of their story – from historical herd migrations to traditional knowledge of breeding and husbandry practices – was at risk of being lost as older generations pass on and archives remain unexamined. Recognising this gap, the project was conceived not as an attempt to address all aspects of this complex field within a single initiative, but as a novel and exploratory effort to bring together diverse sources of information for the first time. By combining historical, cultural, and genetic perspectives primarily for communication and awareness-raising purposes, the project aimed to open new pathways, demonstrate the value of an integrated approach, and lay the groundwork for more targeted and in-depth work to follow.

Objectives

The 3MC project was launched in October 2019 and ran until September 2022, uniting experts across Finland, Norway, and Sweden. The primary goal of 3MC was to raise public awareness of the importance of the three Nordic Mountain Cattle breeds by uncovering and communicating their shared history, cultural significance, and genetic heritage. By doing so, the project sought to highlight the value of these endangered native breeds and to support efforts for their long-term conservation and sustainable use in agriculture, tourism, and environmental management.

Interdisciplinary approach

To achieve its objectives, 3MC took an interdisciplinary approach, combining natural sciences (genetics and animal breeding) with social sciences and humanities (archaeology, history, cultural studies) to build a comprehensive understanding of the breeds' past and present roles. The work was structured into six work packages (WPs), each focusing on a different aspect of the project's mission – from communication and coordination to historical research, cultural heritage, genetic analyses, and educational tools. Collaboration across these WPs ensured that scientific findings, cultural insights, and historical data were integrated into a coherent narrative about the mountain cattle breeds.

Work packages (WPs)

The 3MC project was divided into six work packages:

WP1: Communication

WP2: Coordination and management

WP3: History and archaeology

WP4: Cultural heritage

WP5: Genetics and breeding – *Genomic research on breed origins*

WP6: Game based learning tool



Photo credit: Petri Saravuoma.

WP1: Communication

Led by: Sara Landqvist and Netta Lönnqvist, Nordic Genetic Resource Center, Sweden.

Aim

Continuous, proactive communication was a core element of the 3MC project, underpinning all activities and ensuring that key messages reached diverse audiences across the Nordic region. WP1 aimed to maximise public awareness of the historical, cultural, and contemporary importance of Nordic Mountain Cattle breeds through a coordinated multi-channel approach. Communication was organised at two levels – internal (to facilitate cooperation among project partners) and external (to publicise project goals and findings). NordGen, as the lead partner, directed WP1 and employed a dedicated communications officer (50% FTE, June 2020 – Sept 2022) to support these efforts.

Activities

From the project's launch in late 2019, WP1 emphasised continuous information-sharing rather than limiting outreach to the dissemination of a few peer-reviewed articles. Activities included regular news updates on partner websites, press releases, social media content, media engagement, and exhibition materials, often developed in collaboration with other WPs to ensure timely dissemination of results. The onset of COVID-19 required a rapid pivot from in-person events to digital outreach and media engagements. Despite these challenges, the team maintained a high level of communication activity throughout the project's duration, aligning major outreach pushes with key project milestones (e.g. project launch, calls for public contributions, research breakthroughs, exhibition openings, and the game app release).

Results

WP1 delivered a high level of public engagement with native cattle breeds in the Nordic countries. Key communication achievements are summarised below (see Appendix for full communication outputs):

- Extensive media coverage across Finland, Sweden, and beyond – 40+ news and feature articles, six opinion articles, and over a dozen radio and TV segments – highlighting project milestones and findings.
- Multi-channel outreach via NordGen and partner platforms, including more than 25 web news releases and social media campaigns, ensuring consistent visibility.
- Museum and community engagement through a cross-border travelling exhibition (launched April 2022) and public events such as seminars, fairs, public talks, and community reminiscence events, directly reaching local communities in the core area of the mountain cattle once pandemic restrictions eased.
- Innovative digital engagement such as the *Nordic Cows* mobile game (developed under WP6) and on online exhibition to educate and involve youth in heritage breed conservation.

Communication outputs in summary (2019–2022)

Overall, the project achieved sustained Nordic-wide visibility, strong local anchoring through museum collaboration, and effective integration of scientific, cultural, and public-facing communication. The communication concept reached an estimated audience of approximately 50 million people (based on Meltwater media analysis), significantly increasing awareness of Nordic Mountain Cattle.

Key indicators are summarised below (see Appendix for full details):

- National and regional news articles and features: **40+**
- Opinion and debate articles: **6**
- Radio and television appearances: **10+**
- Institutional news articles and web publications: **25+**
- Museum exhibitions and associated public events: **6+**
- Peer-reviewed scientific articles **5+**

~50 million

People reached by the communication concept

40+

National and regional news features

10+

Radio and television appearances

6+

Museum exhibitions and associated public events

5+

Peer-reviewed scientific articles

WP2: Coordination and management

Led by: Mervi Honkatukia, Nordic Genetic Resource Center, Norway.

Aim

Central coordination of the project's activities, partnerships, and reporting across all three countries, ensuring that work remained on schedule, on budget, and aligned with the project objectives.

Activities

WP2 handled the day-to-day administration, financial management, and inter-partner communication for the project. Regular consortium meetings (held virtually) kept the Finnish, Swedish, and Norwegian teams coordinated, even during COVID-19 disruptions. WP2 was responsible for preparing and submitting all required progress reports to the Interreg Nord programme and ensuring that each work package met its milestones and compliance obligations. Effective coordination under WP2 allowed the project to adapt to challenges (e.g. pandemic-related delays) and was cited by partners as a key factor in the project's overall success.



”

We must be creative when planning future projects. Cooperation is the key to projects with a real impact, and NordGen is a good hub for that.

*Project Coordinator **Mervi Honkatukia** highlighting the importance of partnership in a cross-border project (NordGen News, 11 March 2021).*



WP3: History and archaeology

Led by: Hilja Solala, Tampere University and Auli Bläuer, University Turku, Finland.

Aim

Research on the historical development, uses, breed formation, and cross-border movements of Nordic Mountain Cattle, with a focus on their long-term relationships with human communities.

Activities

WP3 focused on analysing the past and its research questions addressed four main areas: (1) the formation of the three Nordic Mountain Cattle breeds as distinct local types by the early twentieth century; (2) the mass evacuation of Northern Finncattle (*Lapinlehmä*) to Sweden during World War II; (3) the identification and selection of the most relevant archaeological specimens for inclusion in genomic analyses; and (4) the curation of the content for public dissemination, particularly the travelling museum exhibition *Snöhvit, Punakorva, Fjellblom*.

Researchers collected and analysed material from national and regional archives, herd books, agricultural society records, newspapers, and archaeological collections, thereby preserving valuable information that had previously been fragmented or at risk of loss. Key outputs included a travelling museum exhibition developed in partnership with the Museum of Tornio Valley and launched in April 2022, at the Museum of Tornio Valley, later touring northern Sweden and Finland, as well as a peer reviewed article on breed formation and data collection to be later used for preparing an article about the wartime evacuation.

The archaeological component of WP3 was a cross-disciplinary activity that bridged historical research and genetic analyses. Working at the interface of WP3 and WP5, the archaeologist Auli Bläuer was responsible of selecting and curating suitable ancient bones for genomic study and contributed to the interpretation of their genetic results, thereby enabling genuinely interdisciplinary research and strengthening both the scientific analyses and the exhibition content.

”

By understanding the decisions that have shaped our landraces over time, we can save them for the future.

*In a NordGen interview, historian **Hilja Solala** emphasised the importance of understanding the past to secure the future (NordGen News, 12 February 2021).*

*Similarly, **Auli Bläuer** highlighted the archaeological perspective, explaining that even small fragments of ancient cattle bones are "sources of information on the coexistence of humans and animals" and can reveal major societal changes over long time spans (NordGen News, 3 June 2022).*

Results

The museum exhibition "Snöhvit, Punakorva, Fjellblom: The history, present and future of northern mountain cattle / Nordiska fjällboskap igår, idag och imorgon / Nordic Mountain Cattle – the past, present, and the future" was first launched at the Museum of Tornio Valley in Tornio, Finland, where it was opened on 8 April 2022 by Jaana Husu-Kallio, the head of the Ministry of Agriculture and Forestry in Finland. The exhibition remained on display until 21 August 2022.

After Tornio, it became a travelling exhibition, presented in several locations in Northern Finland and Sweden. In Finland, it was on display at the Lappish Vocational School in Loue (Rovaniemi) from 27 August to 30 November 2022 and later at the Local History Museum (Tervola, Rovaniemi) from 6 July to 31 August 2025.

In Sweden, the exhibition was shown at Museum Gävleborg (Länsmuseet Gävleborg, Gävle) from 27 August 2022 to 28 February 2023, followed by Norrbotten's Museum (Luleå) from 21 December 2022 to 2 April 2023.

Online exhibition

- Snöhvit, Punakorva, Fjellblom: "Narratives on the history, present state, and future of northern mountain cattle"

Publications

- Ovaska, Ulla, Solala, Hilja, and Honkatukia, Mervi 2023. Kulttuuriperintöä, geenivaroja ja ystäviä – Lapinlehmän monet merkitykset / Kulturradion, genetiska resurser och vänner – Lappkons många betydelser. In *Tornionlaakson vuosikirja 2020–2022.* Tornionlaakson neuvosto. s. 194–205.
- Solala, Hilja 2023. *From Variable Animal Populations to the Nordic Mountain Cattle Breeds – A Model of the Birth of Native Animal Breeds and Local Cattle Types in Northern Sweden, Finland and Norway at the End of the Nineteenth Century and the Beginning of the Twentieth Century*. *Faravid* 54/2023, 5–31. https://faravid.journal.fi/article/view/124845.
- Solala, Hilja, and Mervi Honkatukia (eds.) 2022. *Snöhvit, Punakorva, Fjellblom: Pohjoisten tunturikarjojen historia, nykypäivä ja tulevaisuus / Nordiska fjällboskap igår, idag och imorgon / Nordic Mountain Cattle – the past, present, and the future*. Exhibition publication. (The 3MC project 2022).

- Solala, Hilja 2022. Tieteellinen tutkimustieto auttaa säilyttämään alkuperäisiä eläinrotuja. *Alusta!* Tampereen yliopiston yhteiskuntatieteiden tiedekunnan verkkojulkaisu 1.7.2022. https://www.tuni.fi/alustalehti/2022/07/01/tieteellinen-tutkimustieto-auttaa-sailyttamaan-alkuperaisia-elainrotuja/.
- Solala, Hilja 2022. Snöhvit, Punakorva, Fjellblom. Pohjoisten tunturikarjojen historia, nykypäivä ja tulevaisuus -näyttely Torniossa. *Geenivarat. Suomen maa-, metsä- ja kalatalouden kansallisen geenivaraohjelman tiedelehti* 2022, 4. https://www.luke.fi/sites/default/files/2022-05/Luke_Geenivarat_tiedelehti%2022.5.pdf.



WP4: Cultural heritage

Led by: Charlotte Kroløkke, the University of Southern Denmark.

Aim

Documenting and analysing the cultural heritage associated with Nordic Mountain Cattle and the relationships between local communities and their cattle.

Activities

WP4 used qualitative social science methods to explore human–animal relationships. WP4 collected oral histories through interviews with farmers and community members, surveyed archival materials and museum collections, and organised public engagement activities (such as an open photo competition and a writing contest) to gather personal stories about mountain cattle. These efforts yielded a rich collection of historical photographs and numerous written memories, providing a unique resource for understanding how people's identities, traditions, and livelihoods have been intertwined with these cattle. By the end of the project, WP4 had produced three peer-reviewed publications shedding light on the concept of "human–cattle kinship" and how cultural values influence breed conservation. The research also highlighted mountain cattle as living cultural heritage, underlining that conserving these breeds means preserving part of the Nordic rural identity – a perspective that strengthened the project's overall conservation messaging (WP1). The long-term archiving of images and stories was transferred to the Museum of Tornio Valley.

”

I think my work can help in terms of seeing genetic resources as forms of cultural heritage that are valuable for the future. The cultural values that are assigned to these genetic resources are critical to understanding why preservation is needed in the first place.

*Professor **Charlotte Kroløkke** describing how cultural perspectives support conservation efforts (NordGen News, 23 Sep 2022).*

Results

WP4 resulted in the following three publications:

- Ovaska, Ulla, Auli Bläuer, Charlotte Kroløkke, Maria Kjetså, Juha Kantanen, and Mervi Honkatukia. "The conservation of native domestic animal breeds in Nordic countries: From genetic resources to cultural heritage and good governance." *Animals* 11, no. 9 (2021): 2730.
- Kroløkke, Charlotte, Anne Nørkjær-Bang, Ulla Ovaska, and Mervi Honkatukia. "A flock of one's own: Nordic human-mountain cattle kinship-making practices." *Society & Animals* 33, no. 7-8 (2024): 736-759.
- Kroløkke, Charlotte, and Mervi Honkatukia. "Parallel Lives: Human–Cow Entanglements at a Finnish Prison Farm." *Humanimalia* 14, no. 1 (2023): 281-313.



Photo credit: Riitta Lehtinen.

WP5: Genetics and breeding *Genomic research on breed origins*

Led by: Juha Kantanen, Luke, Finland.

Aim

Using modern genetic techniques to investigate the relatedness and historical development of the three Nordic Mountain Cattle breeds, and to inform future breeding and conservation strategies.

Activities

WP5 addressed key genetic questions – for example, how the Finnish, Norwegian, and Swedish mountain cattle are genetically related and how the modern breeds are related to ancient cattle of past centuries. To answer these, the WP5 analysed both modern DNA (existing data) and ancient DNA (aDNA, produced in this project) from historical cattle bone samples (some dating to ~600 years ago). By comparing genomes from past and present, the WP5 gained insights into genetic continuity and changes over time.

Results

Analysis of ancient DNA revealed that some medieval cattle samples clustered closely with modern Nordic Mountain Cattle, indicating long-term genetic continuity of these breeds. Phylogenetic comparisons of nuclear and mitochondrial DNA further clarified the relationships among the Finnish, Swedish, and Norwegian mountain cattle, and identified unique historical genetic variants (novel SNPs) not previously documented. These genetic findings provide a strong scientific basis for future conservation efforts and support increased collaboration across scientific disciplines and countries to preserve the breeds' adaptive traits and genetic diversity.

WP5 also resulted in the publication below:

- Weldenegodguad, Melak; Bläuer, Auli; Kjetså, Maria, Ginja, Catarina; Hufthammer, Anne Karin; Johansson, Anna Maria; Solala, Hilja; Kantanen, Juha; and Honkatukia, Mervi. *Genomic and mitochondrial analyses show close genetic affinities between ancient cattle and modern native breeds originating from northern Fennoscandia.* Manuscript in preparation (2026).

”

Ancient domestic animals can tell a lot about history and the life of human society that we would not otherwise know about. I hope that our cattle research will provide information that can be used to connect cattle to historically significant events.

*Professor **Juha Kantanen** about the report (NordGen News, 12 Nov 2021).*



WP6: Game based learning tool

Led by: Riitta Niiranen, the AhlmanEdu Vocational College in Tampere, Finland.

Aim

Engaging younger generations and the general public with the story of Nordic Mountain Cattle through interactive learning, by developing a dedicated mobile game application.

Activities

WP6, led by Riitta Niiranen, Ahlman EDU Vocational College (Finland), translated the project's research into a digital format to spark interest among youth. The team designed and built the "Nordic Cows" mobile game, in which players manage a virtual herd of mountain cattle across different historical eras, facing realistic challenges such as winter survival and breeding decisions. This approach provided a fun, educational way to learn about the breeds' resilience and cultural significance. The Nordic Cows game was released in 2022 on the Google Play store (Android). It served as a novel outreach tool complementing the project's communications (WP1) and continues to function as an educational resource beyond the project's end.

Results

The Nordic Cows mobile game.

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Facts gained from the projects are combined with fiction in an interesting way and it is up to the player to create a future for the cows on the farm.

Riitta Niiranen *describing the Nordic Cows game (NordGen News, 2 September 2022).*

Conclusion

The Mountain Cattle Project was a multidisciplinary and international collaboration that addressed mountain cattle breeds and related historical material. The project contributed to the documentation and accessibility of archival sources and personal recollections that may otherwise have remained dispersed or difficult to access. The genetic, historical and socio-cultural characteristics of the breeds were described and contextualised, and the project compiled information on their origins and historical role in agriculture, providing a basis for further discussion related to biodiversity and food systems.

The 3MC project resulted in a range of outputs, including exhibitions, educational tools, scientific and popular publications, and digital communication materials. These outputs make information on Nordic Mountain cattle breeds available to different audiences through cultural, educational and environmental actors. In addition, the project facilitated contacts between researchers, practitioners and organisations, which may support future research activities and Nordic cooperation in the field of farm animal genetic resources.



Overall, the 3MC project assembled and documented knowledge related to Nordic Mountain cattle breeds and created platforms for dissemination and collaboration. These outcomes provide a reference point for continued work on conservation and management of the breeds within the context of Nordic cultural heritage and animal genetic resources.



Photo credit: Matilda Latvala.

Acknowledgements

The project began as a standard research collaboration among the project partners but evolved during the COVID-19 period into a broader, cross-disciplinary-stakeholder effort involving a wide network. This shift gradually expanded the scope of collaboration beyond the original plan, incorporating diverse perspectives and forms of engagement. Many people contributed in meaningful ways to the project's success, and we express our sincere gratitude to everyone who participated at different stages of the project. We also thank the many individuals who enriched the work by sharing their knowledge, materials, experiences, and perspectives, often spontaneously. While it is not possible to acknowledge every contributor individually, we gratefully recognize their collective contribution.

We are especially grateful to the citizens who participated in and supported the research. We thank veterinarian Ossi Kemppainen, a pioneer in the rescue of northern Finncattle, who shared previously undocumented aspects of his unofficial conservation work and granted access to his personal archives. We are also grateful to citizen assistant Ingrid Svarto for providing bone material for analysis, which offered valuable insights for the project. Our sincere thanks go to Ilmari Majuri, who generously shared his knowledge, experience, and archival materials on the revival of northern Finncattle and participated in project events with his cattle, Valkko and Oukan Noadi. We also thank Suvi Tiainen for providing outstanding photographs used in the project, as well as the nearly 200 participants who contributed images to the photo competition.

We further acknowledge the important contribution of individuals in various institutions who facilitated access to historical archives. We thank Norrbotten's Museum, the Swedish National Archives in Östersund, the Archive of Popular Movements in Västerbotten, and Uppsala University Library for their support in providing access to Swedish archival sources. We are particularly grateful to Jaana Juvani, whose work on Finnish herd books, conducted as part of her thesis, provided an essential foundation for this project. We also thank Tampere University Library for their valuable interlibrary services.

We are grateful to our colleagues and collaborators whose expertise and support contributed in countless ways to the project. In particular, we thank Maria Sjöström for her highly professional coordination of project reporting.

Finally, we would like to thank the Interreg Nord Secretariat, the Regional Council of Lapland, and the Norrbotten Region for their financial and administrative support, and for their trust in the project from its early stages. Their encouragement and commitment were crucial to the project's success.

Appendix: Media coverage, events and communication outputs (2019–2022)

This appendix provides a **complete and comprehensive list** of all identified media coverage, public events, communication outputs and digital tools produced in connection with the 3MC project during the project period.

1. National and regional news media (Finland and Sweden)

Maaseudun Tulevaisuus

- 20 October 2019 – *Uhanalaisen lapinlehmärotuun tutkimukseen liki miljoonan euron rahoitus* (news article)
- 29 May 2020 – *Alkuperäisroduistamme tarvitaan lisää tutkimusta* (opinion article)
- 30 October 2020 – *Alkuperäisrodut ovat pitäneet suomalaiset hengissä vaikeina aikoina* (news article)
- 30 October 2020 – *Tunturilehmät ovat pandaa harvinaisempia* (feature/interview article)
- 25 March 2022 – *Potilaat ovat poissa, mutta lehmärotu säilyi – lapinlehmä pelastettiin Torniossa* (news article)
- 3 April 2022 – *Snöhvit, Punakorva, Fjellblom – tunturikarjan kuuluisuudet esillä Tornionlaakson museossa* (news article)
- 6 July 2022 – Video: *Lapinlehmät uitetaan laitumelle Tornionjoen saareen*

YLE

- Week 26, 2020 – YLE Lappi interview related to memory collection and mountain cattle
- 28 March 2022 – YLE News: *Maatiaiskarjojen geeneissä voi piillä sopeutumismahdollisuuksia ilmastonmuutokseen*
- 7 April 2022 – YLE Lappi live interview (exhibition opening)
- 8 April 2022 – YLE News: *Torniossa avattava näyttely kertoo harvinaiseksi käyneen tunturikarjan tarinaa*

- 1 July 2022 – YLE: *Tornion ja Haaparannan tapahtumiin odotetaan tuhansia kävijöitä*
- 28 August 2022 – YLE: *Onko Uuralla tulevaisuutta?*

Sveriges Radio

- 26 September 2021 – *Nytt forskningsprojekt ska sätta fjällkons genetik på kartan i Norden*
- 26 December 2021 – follow-up broadcast on Nordic Mountain Cattle genetics
- 8 April 2022 – *Lapinlehmää nostetaan näkyville ja tutkitaan*
- 8 April 2022 – *Ruotsi pelasti lapinlehmän sukupuutolta*

Other Finnish media

- Lapin Kansa (multiple news articles, including exhibition coverage on 9 April 2022)
- Kaleva (14 April 2022 – *Lapinlehmät pääsivät näyttelyyn*)
- *Nauta* magazine 02/2022 – *Voiko lehmää parempaa terapeuttia olla?*
- Local and regional newspapers (memory calls and exhibition coverage): Tornionlaakso, Inarilainen, Sompio, Koillissanomat, Luoteis-Lappi

Jordbruksaktuellt

- 3 October 2019 – *Nordiska gener för framtida matproduktion*
- 30 June 2021 – *Samarbete för fler betande lantrasdjur*

ATL

- 24 May 2020 – *Mer forskning behövs om hotade nordiska lantrasdjur* (opinion article)

Aftonbladet

- 27 December 2021 – *Fjällkons genetik i fokus för forskningsprojekt*

NSD

- 4 April 2022 – *Här får Tornedalens fjällkor huvudrollen*

Landsbygdens Folk

- 14 April 2022 – *Ny utställning visar tvärvetenskapligt projekt om hotad nordisk fjällboskap*

2. Opinion and debate articles

- ATL (Sweden), 24 May 2020 – *Mer forskning behövs om hotade nordiska lantrasdjur*
- Maaseudun Tulevaisuus (Finland), 29 May 2020 – *Alkuperäisroduistamme tarvitaan lisää tutkimusta*
- Bondebladet (Finland), 12 June 2020 – Debate article on the need for research on endangered Nordic native breeds

3. Institutional and project communication

NordGen

- 4 October 2019 – *New big project will increase the knowledge of Nordic cattle breeds*
- 29 August 2020 – *Winners Selected: Photo Competition to Spread Knowledge About Nordic Transboundary Cattle*
- 7 October 2020 – *Nytt benfynd kan lära oss mer om fjällkornas historia*
- 7 November 2020 – *Material från 100-årigt avelscentrum ger viktig kunskap om fjällkornas genetik*
- 12 February 2021 – *Hilja Solala is Investigating the Common Origins of the Nordic Mountain Cattle*
- 11 March 2021 – *Mervi Honkatukia Builds New Future for Northern Indigenous Cattle*
- 28 July 2021 – *NordGen in Cooperation on Pastures – Native Breeds a Great Asset*
- 3 August 2021 – *Maria Kjetså Helps Breeders Make Better Choices to Safeguard Genetic Diversity*
- 21 October 2021 – *New Research: Co-operation and Participation Are Crucial to Safeguard Our Nordic Native Breeds*
- 12 November 2021 – *Juha Kantanen Knows the Genes of Northern Survivors*
- 7 April 2022 – *Cross-disciplinary Project Showcases Findings at Museum Exhibition*
- 3 June 2022 – *Auli Bläuer and the Worlds of Old Bones*

- 16 May 2022 – *Where the Nordic Mountain Cattle Are Given a Voice*
- 28 June 2022 – *Broadening Awareness About Nordic Mountain Cattle*
- 2 September 2022 – *Where Facts and Fiction Meet: Happy Cows Are the Key to Success in New Innovative Farm Survival Game*
- 6 September 2021 Traditional Grazing: Native Breeds Are Vital for the Nordic Biodiversity
- 23 September 2022 – *Professor Charlotte Kroløkke Investigates Human–animal Bonds*
- 28 September 2022 – *New DNA Research Reveals the Origins of Northern Native Breeds*
- Exhibition booklet (Finnish/Swedish/English) published in 2022

Podcast interview with veterinarian Ossi Kemppainen on the conservation of northern Finncattle, [podcast name/platform], [year/date], discussing personal experiences and archival insights related to informal conservation efforts

LUKE

- 2 June 2020 – Information and dissemination of the photo competition and memory bank call through news and social media channels

4. Museum-based and place-based communication

The Museum of Torne Valley

- Main exhibition host: *Snöhvit, Punakorva, Fjellblom* (opened April 2022, Tornio/Torneå)
- Coordination of travelling exhibition activities in Sweden
- Memory collection initiatives and storytelling activities
- Exhibition booklet (Finnish/Swedish/English) published in 2022

5. Public seminars and fairs

- Public seminar: **"White Cattle" (Northern Finncattle)**, 7 May 2022
- **Peräpohjola Markkinat**, Tornio, 1 July 2022 – *How Northern Finncattle was rescued* (presentation by Ossi Kemppainen)
- **Maaseudulta käsin** fair, Loue (Rovaniemi), August 2022 – launch of the *Nordic Cows* game
- Participation in the opening of the **Northern Finncattle Living Gene Bank**, Loue Farm, Rovaniemi, 29 August 2022

6. Digital and interactive communication tools

- **Nordic Cows** game application – educational mobile game based on 3MC project results
- **Online exhibition**: *Snöhvit, Punakorva, Fjellblom*
  Narratives on the history, present state and future of northern mountain cattle. https://www.tornio.fi/kulttuuri-ja-vapaa-aika/tornionlaakson-museo/nayttelyt/verkkonayttelyt/snohvit-punakorva-fjellblom/
- **EU #EUinmyregion project video**, released 9 October 2020

7. Scientific and peer-reviewed outputs

Ovaska, Ulla, Auli Bläuer, Charlotte Kroløkke, Maria Kjetså, Juha Kantanen, and Mervi Honkatukia. "The conservation of native domestic animal breeds in Nordic countries: From genetic resources to cultural heritage and good governance." *Animals* 11, no. 9 (2021): 2730.

Solala, Hilja. 2023. *From Variable Animal Populations to the Nordic Mountain Cattle Breeds – A Model of the Birth of Native Animal Breeds and Local Cattle Types in Northern Sweden, Finland and Norway at the End of the Nineteenth Century and the Beginning of the Twentieth Century*. Faravid 54.

Kroløkke, Charlotte, and Mervi Honkatukia. "Parallel Lives: Human–Cow Entanglements at a Finnish Prison Farm." *Humanimalia* 14, no. 1 (2023): 281-313.

Kroløkke, Charlotte, Anne Nørkjær-Bang, Ulla Ovaska, and Mervi Honkatukia. "A flock of one's own: Nordic human-mountain cattle kinship-making practices." *society & animals* 33, no. 7-8 (2024): 736-759.

Kjetså, Maria; Weldenegodguad, Melak; Bläuer, Auli; Ginja, Catarina; Hufthammer, Anne Karin; Johansson, Anna Maria; Solala, Hilja; Kantanen, Juha; and Honkatukia, Mervi (2926). *Genomic and mitochondrial analyses show close genetic affinities between ancient cattle and modern native breeds originating from northern Fennoscandia.* Manuscript in preparation.

About this publication

Three mountain cattle breeds: Their cultural heritage and genetic resources (3MC)

NordGen Publication Series: 2026:02
ISBN: 978-91-986030-8-8
DOI: 10.53780/THDK1791

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Cover photo: Suvi Tiainen
All other photos: Suvi Tiainen, unless otherwise stated
Layout: Elina Sjölinder

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Acknowledgements
The project coordinator gratefully acknowledges the valuable contributions of the 3MC project consortium to the preparation of this report, particularly their thorough review and proofreading of the manuscript.

NordGen

The Nordic Genetic Resource Centre (NordGen) is the Nordic countries' genebank and knowledge centre for genetic resources. NordGen is an organisation under the Nordic Council of Minister and works with the mission of conserving and facilitating the sustainable use of genetic resources linked to food, agriculture and forestry.

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