Supplementary material S1 for:

Perception of livestock ecosystem services in grazing areas inside and outside Europe

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THE ROLES OF ANIMAL GENETIC RESOURCES IN PROVIDING ECOSYSTEM SERVICES IN GRASSLANDS
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GENERAL INFORMATION

1. Please select the country of your case study.

2. Please select the livestock species.

If other, please specify.

3. Please provide the name(s) of the livestock breed(s) involved.

4. Please select one of the two following cases.

○ Case A: the breed(s) has/have been historically present in the grazing area

○ Case B: the breed(s) has/have been introduced into the area specifically for use in grazing management to provide one or more ecosystem services

Please provide further information.

GRAZING AREA

5. Please indicate the location of the grazing area.
If it has a recognized name (e.g. the name of a national park or a range of mountains) please provide this name. If possible please provide geographic coordinates. Otherwise, please describe where the grazing area is located (e.g. specify that it is located between particular villages or towns or geographical features such as rivers).

6. Please indicate the size of the grazing area.

○ Under 1 km² (<10 ha)

○ 1-10 km² (10-100 ha)

○ 10-50 km² (100-5000 ha)

○ 50-100 km² (5000-10000 ha)

○ Larger than 100 km² (>10000 ha)

If you know the exact size, please, in addition, specify it in km².

7. Please indicate the ecosystem type and the characteristic vegetation of the grazing area.

- ○ Temperate grasslands, savannas and shrublands (e.g. meadow, steppe, heathland)
- ○ Tropical and subtropical grasslands, savannas and shrublands (e.g. cerrado, bushveld)
- ○ Flooded grasslands and savannas (e.g. wet meadow, salt marsh)
- ○ Montane grassland and shrublands (e.g. alpine and subalpine meadows)
- ○ Mediterranean shrublands (e.g. matorral, maquis)
- ○ Deserts and xeric shrublands (e.g. sagebrush steppe)
- ○ Tundra (dominating vegetation consisting of shrubs, sedges, mosses, lichens)
- ○ Other (please specify in the text box)

Please provide further information on the main vegetation types of the grazing area.

[ ]

PROTECTED AREA TYPE

8. Is the grazing area under any kind of protected status?

○ Yes   ○ No

Please add a comment if, for example, there are plans to expand existing protected area(s) in the region so that they will include the grazing area.

[ ]

9. Please indicate the type of protected area.
According to the International Union for Conservation of Nature, there are several international categories of protected areas. Please select the relevant category from the list. If a different classification is used in your country, please select the most appropriate according to the description. Please also name and describe the national type of protected area category in the text box.

○ Category I: Strict Nature Reserve (strictly protected areas set aside to protect biodiversity and also possibly geological/geomorphical features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values)

○ Category Ia: Wilderness area (large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition)

○ Category II: National park (large natural or near natural areas set aside to protect largescale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible, spiritual, scientific, educational, recreational, and visitor opportunities)

○ Category III: Nature monument or feature (specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value)

○ Category IV: Habitat/species management area (protect particular species or habitats and management of the area reflects this priority)

○ Category V: Protected landscape/seascape (in a protected landscape interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic values and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation)

○ Category VI: Protected area with sustainable use of natural resources (areas which conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level nonindustrial use of natural resources, compatible with nature conservation, is seen as one of the main aims of the area)

Name and description of national type of protected area.

[ ]

LAND OWNERSHIP AND MANAGEMENT

10. Please indicate the type of land ownership that operates in the grazing area.

○ Private ownership   ○ Communal ownership   ○ Other

If other, please specify.

[ ]

11. Who manages the grazing area and what roles do they play (livestock and/or landscape management)?

Local community/ethnic group   [ ]

Landscape manager/park manager   [ ]

Commercial farmers/livestock keepers [ ]

Other   [ ]

Please indicate other stakeholders and provide further details.

[ ]

12. How is the spatial distribution of animals managed?

○ Herding

○ Fencing

○ Free roaming

○ Other (please specify in the text box)

Please provide further details.

[ ]

GRAZING MANAGEMENT

13. Please indicate the size and characteristics of the herd(s) (e.g. species mix, breed, sex, age groups).

[ ]

14. Please indicate the average number of animals belonging to the breed(s) you are describing present in the grazing area over the course of the year.

[ ]

15. Please indicate the number of weeks and stocking rates in each season of the year.

Add comments on the livestock management in each season (supplementary feeding, confinement indoors, shoeing, etc.).

Spring:

[ ]

Summer:

[ ]

Autumn:

[ ]

Winter:

[ ]

If these seasons are not applicable in the location where the grazing area is situated, please use this text box to provide the information on the local seasons and the stocking rates and types of livestock management practised in each.

[ ]

SUPPORTING ECOSYSTEM SERVICES

Supporting services (e.g. primary production, habitat provision, nutrient cycling) are essential to the functioning of ecosystems. Supporting services do not directly affect human well-being, but are important for the provision of all other ecosystem services. Please indicate how the livestock population you are describing affects the provision of supporting ecosystem services in the grazing area.

16. Is there evidence that the livestock population you are describing affects the provision of supporting ecosystem services in the grazing area?

Please indicate the impact that the livestock have on the provision of each of the following ecosystem services.

☐ Habitat provision (e.g. abundance of rare plant, insect, bird or animal species influenced by grazing)
    Impact [ ]

☐ Nutrient cycling (e.g. use of manure for grassland or crop production)
    Impact [ ]

☐ Support of primary production (e.g. improving vegetation growth/cover)
    Impact [ ]

☐ Other (please specify in the text box)
    Impact [ ]

Please provide references and comments.

[ ]

REGULATING ECOSYSTEM SERVICES

Regulating services are services obtained from regulation of ecosystem processes. Some regulating services can also be regarded as supporting services (e.g. nutrient regulation, support of nutrient cycling). Indicate how the livestock population you are describing affects the provision of regulating services in the grazing area.

17. Is there evidence that the livestock population you are describing affects regulating ecosystem services in the grazing area?

Please indicate the impact that the livestock have on the provision of each of the following ecosystem services.

- [ ] Control of crop residues/eradication of weeds (e.g. removal of excessive biomass growth)
  Impact [_____]

- [ ] Climate/air quality regulation (e.g. carbon sequestration)
  Impact [_____]

- [ ] Erosion/avalanche control (e.g. regulation of the vegetative cover and stabilizing the soil)
  Impact [_____]

- [ ] Bush encroachment/fire control (e.g. removal of shrubby plants by grazing and browsing)
  Impact [_____]

- [ ] Pest and disease regulation (e.g. destruction of disease vectors or pest habitats)
  Impact [_____]

- [ ] Water quality/cycling regulation (e.g. helping to maintain permanent vegetation cover and thereby maintain water quality)
  Impact [_____]

- [ ] Seed dispersal (e.g. spreading seeds on coats or in guts)
  Impact [_____]

- [ ] Other (please specify in the text box)
  Impact [_____]

Please provide references and comments.
[_____]

CULTURAL ECOSYSTEM SERVICES

Cultural services are non-material benefits that people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences. Please indicate how the livestock population you are describing affects the provision of cultural ecosystem services in the grazing area.

18. Is there evidence that the livestock population you are describing affects cultural ecosystem services in the grazing area?

Please indicate the impact that the livestock have on the provision of each of the following ecosystem services.

- [ ] Cultural, historic and natural heritage (e.g. presence of the breed in the grazing area helps to maintain elements of the local landscape and/or culture that are valued as part of the heritage of the region)
  Impact [_____]

- [ ] Knowledge systems and educational values (e.g. traditional knowledge about the breed and the grazing and sociocultural systems of the area)
  Impact [_____]

- [ ] Landscape values (values associated with the landscape as shaped by the animals themselves or as a part of the landscape, e.g. aesthetic values, sense of place, inspiration)
  Impact [_____]

□ Recreational values (e.g. eco/agrotourism, sports, shows and other touristic activities involving specific animal breeds)

Impact [   ]

□ Spiritual and religious values (e.g. the role of the animals or their products in local customs such as religious ceremonies, funerals or weddings)

Impact [   ]

□ Other (please specify in the text box)

Impact [   ]

Please provide references and comments.

[   ]

RECOGNITION OF ECOSYSTEM SERVICES

It is important that future actions by livestock keepers, breeders and conservationists account for the ecosystem services provided by livestock.

19. Is there any recognition of the ecosystem services provided by the livestock population you are describing?

Recognition of ecosystem services can take various forms: from public awareness and payments for ecosystem services to market support for products supplied by breeds that provide ecosystem services.

○ Yes   ○ Some   ○ No

20. By whom are the ecosystem services recognized?

☐ Policymakers

☐ Land managers

☐ Livestock owners

☐ Civil society, consumers, general public

Other (please specify) or comment on above.

[   ]

21. Please indicate which of the following forms of recognition exist.
Please select all that apply.

☐ Public awareness of the role of the livestock population in the supply of ecosystem services

☐ Payments/economic incentives based on ecosystem services

☐ Policies, strategies and actions that support the role of the livestock population in the supply of ecosystem services (e.g. improving infrastructure for herders in hard-to-reach grazing areas)

☐ Landscape management/nature conservation programmes based on the recognition of the ecosystem services

☐ Educational programmes

Other (please specify) or comment on above.

[   ]

22. What constraints may prevent the livestock population you are describing from providing ecosystem services in the grazing area in the future?
Please select the three most important ones from the list below.

☐ Existing livestock management is not based on the recognition of the ecosystem services provided by the livestock

☐ Insecurity or conflicts that limit access to grazing land

☐ Loss of traditional links between livestock and the local community

☐ Lack of sufficient income generation from the livestock

☐ Absence of supporting policies/regulations

☐ Loss of knowledge on the management of the described livestock population

☐ Lack of research activities on the topic

☐ Social/political issues that affect livestock management

☐ Threats to the traditional production environments of the livestock population caused by climatic or other environmental changes

Please describe any other constraints.

[   ]

23. What opportunities do you see for ensuring that ecosystem services provided by the livestock population are recognized and utilized?
Please select the three most important ones from the list below.

☐ Livestock breeding programmes targeting specific characteristics that are relevant to the provision of ecosystem services

☐ Nature conservation programmes

☐ Financial support/economic incentives

☐ Raising public awareness

☐ Introducing educational programmes for livestock keepers and/or breeders

☐ Ensuring recognition of ecosystem services among policymakers

☐ Introducing/supporting research programmes on ecosystem services provided by animal genetic resources

Please describe any other opportunities.

[   ]

[Submit by e-mail]