**Supplementary material: Conservation of FAnGR in Romania**

Warwick Wainwright; Klaus Glenk; Faical Akaichi; Dominic Moran

**Appendix 1:** The respondent questionnaire

**Farm Questionnaire**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Location & GPS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section A: About you & your farm**

1. **Which livestock species do you currently farm with?**

|  |  |  |
| --- | --- | --- |
| **Species** | **Breed?** | **Total animals?** |
| Sheep |  |  |
| Goat |  |  |
| Pigs |  |  |
| Buffalo |  |  |
| Cows |  |  |
| Poultry |  |  |
| Other |  |  |

1. **How big is your farm?**

1-2 hectares  3-6 hectares  7-20 hectares  >20 hectares

1. **Do you currently farm with rare or traditional native breeds (not cross breeds)?**

Yes  No

1. **If answered YES to question 3, which rare or traditional breeds do you keep?**
2. **If you keep rare breeds, why do you maintain them?**

Cultural significance  Quality of products

Level of endangerment  Ease of management

Level of hardiness  Adaptability

Tradition  Tourism

1. **If you now keep cross breeds instead of rare / traditional breeds then why is this?**

Better yields  Better quality products

Perceived reputation  Social status

1. **If you do not currently farm with rare / traditional breeds, would you consider doing so in the future if conservation subsides were in place?**

Yes  No

1. **If you answered YES, which species would you consider keeping?**

Sheep  Buffalo  Cows  Goat  Horses  Pigs

1. **Which traits do you consider most important when deciding which breed to farm? Please rank these statements (1=most important, 8= least important) according to how important they are to you.**

*Rank*

Cultural tradition associated with the breed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Level of yield (e.g. milk) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fertility and ease of breeding \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Adaptability to terrain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Resistance to disease and parasites \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Low veterinary bills \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ease of management & handling \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Quality of products produced \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **If you farm or would consider farming with rare breeds, we want to know which factors you think are most important for ensuring their continued preservation. Please rank the following statements (1=most important, 6= least important) according to how important they are to you.**

*Rank*

Maintaining traditional farming practices \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Cultural and historic factors associated with the breed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Ensuing continued supply of genetic material \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Potential contribution of breed to tourism \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Maintain adaptive traits for future breeding programmes \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Continued production of traditional, local products \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section B: Rare breeds and conservation support measures**

1. **Do you currently receive Romanian agri-environment support payments on your farm?**

Yes  No

1. **If you answered yes, which payments do you receive?**

(e.g. HNV)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Did you know there is currently support available for farming with rare breeds under Romania’s Rural Development Programme (RDP)?**

Yes  No

1. **Would you consider applying for this support in the future if you decide to / are farming with rare breeds?**

Yes  No

If no, why not?

1)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section C: Future Options for conservation schemes**

**Choice set: \_\_\_\_**

***Choice Task 1:***

I prefer: Option A Option B Nothing

***Choice Task 2:***

I prefer: Option A Option B Nothing

***Choice Task 3:***

I prefer: Option A Option B Nothing

***Choice Task 4:***

I prefer: Option A Option B Nothing

1. **Which statement best describes how you made your choice of Option?**

I chose randomly

I chose the ‘Nothing’ plan because I wouldn’t benefit from conserving rare breeds

I never chose the ‘Nothing’ plan because I don’t want to see breed diversity decline

I chose the most expensive option

I chose the plan which provided the greatest overall benefits relative to my opportunity cost

I chose the plan which provided greatest overall benefits irrespective of my opportunity cost

Other (Please specify)……………………………………………………………………

**Section D: About you**

1. **Gender**

|  |  |  |  |
| --- | --- | --- | --- |
| Male |  | Female |  |

1. **Please tell us which age group you are in**

|  |  |  |  |
| --- | --- | --- | --- |
| Under 20 |  | 50 - 59 |  |
| 20 - 29 |  | 60 - 69 |  |
| 30 - 39 |  | Over 70 |  |
| 40 - 49 |  |  |  |
|  |  |  |  |

1. **What is the highest level of education you have attained?**

|  |  |  |  |
| --- | --- | --- | --- |
| Secondary |  | University degree |  |
| Foundation degree/HND |  | Professional qualification |  |
|  |  |  |  |

1. **Please indicate your main sources of household income. Please rank your income sources from a scale of most to least (1=most)**

|  |  |  |  |
| --- | --- | --- | --- |
| EU support payments |  | Off farm income |  |
| Sale of milk |  | Sale of meat products |  |
| Sale of local food products |  | Government subsides |  |
| Other, please state: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |  |

1. **Please indicate your monthly household income (Lei / month)**

|  |  |  |  |
| --- | --- | --- | --- |
| Less than 200 |  | 201-400 |  |
| 401 - $800 |  | 801-1,600 |  |
| 1,601-3,000 |  | More than 3,000 |  |

**Appendix 2:** Background information concerning rare breeds supported in the Romanian RDP.

|  |  |  |  |
| --- | --- | --- | --- |
| **Breed** | **Risk Status** | **Estimated Population** | **Support level**  **(per annum)** |
| *Bovine* | | | |
| Steppe Grey | In danger of extinction | 312 heads | € 200 / head |
| Romanian Buffalo | In danger of extinction | 289 heads | € 200 / head |
| *Ovine* | | | |
| Merinos of Suseni | In danger of extinction | 300 heads | € 13 / head |
| Transylvanian Merinos | In danger of extinction | 268 heads | € 13 / head |
| Merino of Cluj | In danger of extinction | 203 heads | € 13 / head |
| Ţigaie –ferruginous variety | Vulnerable | 1120 heads | € 13 / head |
| Raţca | Vulnerable | 3888 heads | € 13 / head |
| Karakul of Botoşani | Vulnerable | 2694 heads | € 13 / head |
| Merinos of Palas | Vulnerable | 4364 heads | € 13 / head |
| Ţigaie with black Teleorman head | Vulnerable | 2988 heads | € 13 / head |
| *Caprine* | | | |
| Banat White | In danger of extinction | 972 heads | € 6 / head |
| Carpatina | Vulnerable | 1492 heads | € 6 / head |
| *Equidae* | | | |
| Lipizzan | In danger of extinction | 350 heads | € 200 / head |
| Arabian Shagya | In danger of extinction | 111 heads | € 200 / head |
| Furioso North Star | In critical condition | 47 heads | € 200 / head |
| Huțul | In critical condition | 88 heads | € 200 / head |
| Gidran | In critical condition | 36 heads | € 200 / head |
| Nonius | In critical condition | 45 heads | € 200 / head |
| Romanian semi-heavy | In critical condition | 91 heads | € 200 / head |
| *Pigs* | | | |
| Bazna | In critical condition | 22 cap | € 88 / head |
| Mangalița | In critical condition | 50 cap | € 88 / head |

Data sourced from Draganescu (2003)

**Appendix 3**: Econometric specification of the RPL model

The unconditional choice probability is the expected value of the logit probability over all possible values of β weighted by the density of β. The marginal probability of choice can be derived from integrating the distribution functions for the random parameters β. The probability of choosing alternative *j* over *N* observed choices is:

|  |  |  |
| --- | --- | --- |
|  |  | ( 1) |
|  |  |  |

Where *f (β|θ)* is the density function for *β* with a mean *b* and covariance *W*. This equation does not have a closed form and so we rely on simulation methods (for details see Train (2009)). Draws of values of are drawn from for r=1,…, R. The probabilities are approximated by drawing the values from the density function and averaged to estimate the simulated probability. Random parameters were estimated using 1000 Halton draws which take into account the heterogeneity of parameter values sampled from the distribution of respondent’s choice (Mariel et al., 2013; Greiner, 2015). A normal distribution is assigned to the all random parameters (accept subsidy) to allow respondents to have either positive or negative marginal utility for the contract attributes (Christie et al., 2015). A triangular distribution was assigned to the subsidy attribute to ensure the parameter does not change sign over its range.

In a CE, the standard approach to calculate respondent WTA is to is to compute . Given the contract attributes were effects coded WTA estimates were calculated from the ratio where *k* is the attribute coefficientand *c* is the cost coefficient as outlined by Bech and Gyrd‐Hansen (2005). Confidence intervals were estimated using the Delta method. Individual specific parameters (Table 2) for individual *i* were dummy coded and interacted with random parameters to determine policy relevant factors influencing contract preferences. Contract probabilities of enrolment were calculated under alternative payment scenarios to determine how probability of uptake varied according to contract attributes and payment rates, following a similar method to Adams et al, (2014). Based on the CE, the probability of an individual *i* choosing a contract alternative *j* is given by:

|  |  |  |
| --- | --- | --- |
|  |  | ( 2) |

whereby alternative specific variables (i.e. contract options) for individual *i* and alternative *j* are given by whilst coefficients are denoted by γ. Case specific variables for individual *i* are given by *xi* whilst coefficients are denoted by β. We estimated the probability of participation for case specific contracts under two scenarios– ‘optimal’ and ‘non-optimal’ contracts. ‘Optimal’ refers to contract attributes (excluding subsidy) that meet the preferences of agents while ‘non-optimal’ contracts do not. This was relative to a non-enrolment option.

**Appendix 4**: Results summary from the multinomial logit models for bovine and ovine farmers

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Attribute** | **Bovines** | | | **Ovines** | | | |
| Coefficient | SE | | Coefficient | | SE | |
| [CL] Contract Length | -0.279\*\*\* | 0.067 | | -0.453\*\*\* | | 0.090 | |
| [SS] Scheme Support | 0.060 | 0.079 | | -0.224\*\* | | 0.111 | |
| [SOS] Structure of Scheme | -0.426\*\*\* | 0.079 | | -0.311\*\*\* | | 0.106 | |
| [COS] Subsidy | 0.013\*\*\* | 0.001 | | 0.245\*\*\* | | 0.030 | |
| [N0] Nothing option | 1.090\*\*\* | 0.177 | | 0.092\*\*\* | | 0.222 | |
| *Model summary* |  |  | |  | |  | |
| No of observations | 464 |  | | 324 | |  | |
| Log likelihood | -405.252 |  |  | | -271.767 | |  | |
| R2 | 0.193 |  |  | | 0.217 | |  | |
| Note: \*\*\*; \*\* indicates significance at 1% and 5% respectively. SE=standard error | | | | | | |  | |

**References**

Adams, V.M., Pressey, R.L., Stoeckl, N., 2014. Estimating landholders’ probability of participating in a stewardship program, and the implications for spatial conservation priorities. PLoS One 9, e97941.

Bech, M., Gyrd‐Hansen, D., 2005. Effects coding in discrete choice experiments. Health Econ. 14, 1079–1083.

Christie, M., Remoundou, K., Siwicka, E., Wainwright, W., 2015. Valuing marine and coastal ecosystem service benefits: Case study of St Vincent and the Grenadines’ proposed marine protected areas. Ecosyst. Serv. 11, 115–127.

Draganescu, C., 2003. Romanian strategy for a sustainable management of farm animal genetic resources.

Greiner, R., 2015. Factors influencing farmers’ participation in contractual biodiversity conservation: a choice experiment with northern Australian pastoralists. Aust. J. Agric. Resour. Econ.

Mariel, P., De Ayala, A., Hoyos, D., Abdullah, S., 2013. Selecting random parameters in discrete choice experiment for environmental valuation: A simulation experiment. J. choice Model. 7, 44–57.

Train, K.E., 2009. Discrete choice methods with simulation. Cambridge university press.