Supplementary material: Conservation of FAnGR in Romania

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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		

2. How big is your farm?

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

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

Yes ☐ No ☐

4. If answered YES to question 3, which rare or traditional breeds do you keep?

_____

5. 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	☐

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

Better yields	☐	Better quality products	☐
Perceived reputation	☐	Social status	☐

7. 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 ☐

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

Sheep ☐ Buffalo ☐ Cows ☐ Goat ☐

Horses ☐ Pigs ☐

9. 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	_____

10. 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

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

Yes ☐ No ☐

12. If you answered yes, which payments do you receive?

(e.g. HNV)_____

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

Yes ☐ No ☐

14. 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
	☐	☐	☐

15. 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

16. **Gender**

Male ☐ Female ☐

17. Please tell us which age group you are in

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

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

Secondary ☐ University degree ☐

Foundation degree/HND ☐ Professional qualification ☐

19. 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: _____

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

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

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

Breed	Risk Status	Estimated Population	Support level
	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	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	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
Huţul	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
Mangaliţa	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:

$$\boldsymbol{Pr(j|X_{it})} = \int \left(\prod_{n=1}^{N} \left[\frac{\boldsymbol{exp(\beta_i X_{ij} + \varepsilon_i)}}{\sum_k^J \boldsymbol{exp\ (\beta_i X_{ik} + \varepsilon_i)}} \right] \right) \boldsymbol{f\ (\beta|\theta) d\beta} \quad (1)$$

Where *f (θ|ϑ)* is the density function for *θ* 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 β are drawn from $f\ (\beta_i|\theta)$ 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 $\frac{\beta_{attribute}}{\beta_{cost}}$. Given the contract attributes were effects coded WTA estimates were calculated from the ratio $\frac{2*\beta_k}{\beta_c}$ where *k* is the attribute coefficient and *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:

$$Pr(j|x_i, z_i) = \frac{\exp(z_{ij}\gamma + x_i\beta_j)}{\sum_k^j \exp(z_{ik}\gamma + x_i\beta_k)} \quad (2)$$

whereby alternative specific variables (i.e. contract options) for individual *i* and alternative *j* are given by z_{ij} whilst coefficients are denoted by γ. Case specific variables for individual *i* are given by x_i 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	
R^2	0.193		0.217	

Note: ***; ** indicates significance at 1% and 5% respectively. SE=standard error

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