

## Supporting Information S3 Appendix

### Need or opportunity? A study of innovative behaviour in equids.

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## Statistical Data, complete GLM models + reduced models (lowest AIC)

Full GLM: dependent variable behavior frequency, sheet behaviours

Call:

```
glm(formula = behaviour.frequency ~ video_quest_num + SID + age. +
  behaviour_category + breed.type.num + purpose.of.domestication +
  restricted...unrestricted..roughage + restricted...unrestricted.contact.with.horses +
  restricted...unrestricted.Pasture + single.group.stabling +
  sex_num, family = poisson(identity), data = Dataset1)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-1.30400	-0.55407	0.09546	0.38707	1.13709

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	7.5776465	1.8634712	4.066	0.0000477 ***
video_quest_num	0.1965641	0.2947378	0.667	0.50483
SID	-0.0017541	0.0008991	-1.951	0.05106 .
age.	0.0075429	0.0152756	0.494	0.62146
behaviour_category	0.0022544	0.0899545	0.025	0.98001
breed.type.num	0.0449593	0.0988250	0.455	0.64915
purpose.of.domestication	-0.2820275	0.1019212	-2.767	0.00566 **
restricted...unrestricted..roughage	-0.1855316	0.2017316	-0.920	0.35773
restricted...unrestricted.contact.with.horses	0.7392814	0.3058808	2.417	0.01565 *
restricted...unrestricted.Pasture	0.1604589	0.2993294	0.536	0.59192
single.group.stabling	-0.3633528	0.2744061	-1.324	0.18546
sex_num	-0.2165500	0.1833697	-1.181	0.23762

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 153.12 on 389 degrees of freedom

Residual deviance: 123.14 on 378 degrees of freedom

(124 observations deleted due to missingness)

AIC: 1359.5

## Reduced GLM - lowest AIC, dependent variable behavior frequency, sheet behaviours

Call:

```
glm(formula = behaviour.frequency ~ sID + age. + purpose.of.domestication +
    restricted...unrestricted..roughage + restricted...unrestricted.contact.with.horses +
    restricted...unrestricted.Pasture + sex_num, family = poisson(identity),
    data = Dataset1)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-1.3138	-0.5256	0.1100	0.4109	1.1713

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )	
(Intercept)	7.5187740	1.6369665	4.593	0.00000437	***
sID	-0.0015288	0.0006619	-2.310	0.02091	*
age.	0.0084962	0.0152692	0.556	0.57792	
purpose.of.domestication	-0.2753410	0.1000149	-2.753	0.00591	**
restricted...unrestricted..roughage	-0.2348661	0.1976762	-1.188	0.23478	
restricted...unrestricted.contact.with.horses	0.5125995	0.2529876	2.026	0.04275	*
restricted...unrestricted.Pasture	0.0660098	0.2859036	0.231	0.81741	
sex_num	-0.2367565	0.1827523	-1.296	0.19515	

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 153.12 on 389 degrees of freedom  
Residual deviance: 125.11 on 382 degrees of freedom  
(124 observations deleted due to missingness)  
AIC: 1353.4

Number of Fisher scoring iterations: 5

**Full GLM: dependent variable Nr. reported behaviours, sheet behaviours**

Call:

```
glm(formula = nr_reported_behaviours ~ video_quest_num + SID +  
  age. + behaviour_category + breed.type.num + purpose.of.domestication +  
  restricted...unrestricted..roughage + restricted...unrestricted.contact.with.horses +  
  restricted...unrestricted.Pasture + single.group.stabling +  
  sex_num, family = poisson(identity), data = Dataset1)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-2.0458	-0.9079	-0.1511	0.5381	3.1380

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	7.324535	1.530249	4.786	0.0000016972 ***
video_quest_num	-0.596111	0.246206	-2.421	0.01547 *
SID	-0.001759	0.000727	-2.420	0.01551 *
age.	-0.004099	0.013550	-0.302	0.76227
behaviour_category	0.228412	0.079831	2.861	0.00422 **
breed.type.num	-0.046275	0.075588	-0.612	0.54040
purpose.of.domestication	0.129731	0.086055	1.508	0.13167
restricted...unrestricted..roughage	0.029581	0.173211	0.171	0.86440
restricted...unrestricted.contact.with.horses	-1.557528	0.276533	-5.632	0.0000000178 ***
restricted...unrestricted.Pasture	0.544131	0.248024	2.194	0.02825 *
single.group.stabling	0.499904	0.226353	2.209	0.02721 *
sex_num	0.189173	0.160745	1.177	0.23925

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 539.80 on 410 degrees of freedom

Residual deviance: 432.87 on 399 degrees of freedom

(103 observations deleted due to missingness)

AIC: 1594.4

Number of Fisher Scoring iterations: 12

reduced GLM – lowest AIC: dependent variable Nr. reported behaviours, sheet behaviours

Call:

```
glm(formula = nr_reported_behaviours ~ video_quest_num + SID +  
  age. + behaviour_category + purpose.of.domestication + restricted...unrestricted.contact.with.horses +  
  restricted...unrestricted..roughage + restricted...unrestricted.Pasture +  
  single.group.stabling + sex_num, family = poisson(identity),  
  data = Dataset1)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-2.0556	-0.9110	-0.1430	0.5388	3.1481

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	7.3413486	1.5309505	4.795	0.0000016244 ***
video_quest_num	-0.6095195	0.2459738	-2.478	0.01321 *
SID	-0.0017736	0.0007251	-2.446	0.01444 *
age.	-0.0048097	0.0135181	-0.356	0.72199
behaviour_category	0.2309408	0.0798652	2.892	0.00383 **
purpose.of.domestication	0.1298351	0.0866419	1.499	0.13400
restricted...unrestricted.contact.with.horses	-1.5514752	0.2765572	-5.610	0.0000000202 ***
restricted...unrestricted..roughage	0.0430476	0.1721454	0.250	0.80254
restricted...unrestricted.Pasture	0.5223906	0.2469190	2.116	0.03438 *
single.group.stabling	0.4794488	0.2249118	2.132	0.03303 *
sex_num	0.1898768	0.1605780	1.182	0.23702

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 539.80 on 410 degrees of freedom  
Residual deviance: 433.26 on 400 degrees of freedom  
(103 observations deleted due to missingness)  
AIC: 1592.8

Number of Fisher Scoring iterations: 12

reduced GLM - lowest AIC: dependent variable Nr. reported behaviours, nested in data source (video ... quest), sheet behaviours

Call:

```
glm(formula = nr_reported_behaviours ~ (sID + age. + behaviour_category +
  purpose.of.domestication + restricted...unrestricted.contact.with.horses +
  restricted...unrestricted..roughage + restricted...unrestricted.Pasture +
  single.group.stabling + sex_num) %in% video...quest, family = poisson(identity),
  data = Dataset1)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-2.3331	-0.7815	-0.1082	0.5112	2.4722

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	10.5903284	1.6575703	6.389	1.67e-10 ***
sID:video...questquest	-0.0020485	0.0007356	-2.785	0.00535 **
sID:video...questquest_door	-0.0044841	0.0007886	-5.686	1.30e-08 ***
age.:video...questquest	-0.0428491	0.0168767	-2.539	0.01112 *
age.:video...questquest_door	0.0171147	0.0201670	0.849	0.39608
behaviour_category:video...questquest	0.1502188	0.1018770	1.475	0.14034
behaviour_category:video...questquest_door	0.1241687	0.1125211	1.104	0.26980
purpose.of.domestication:video...questquest	-0.2918442	0.1090708	-2.676	0.00746 **
purpose.of.domestication:video...questquest_door	0.3972042	0.1387394	2.863	0.00420 **
restricted...unrestricted.contact.with.horses:video...questquest	-2.6753117	0.4142342	-6.458	1.06e-10 ***
restricted...unrestricted.contact.with.horses:video...questquest_door	-1.4849299	0.4773097	-3.111	0.00186 **
restricted...unrestricted..roughage:video...questquest	-0.1915179	0.2469935	-0.775	0.43811
restricted...unrestricted..roughage:video...questquest_door	0.7891742	0.2544358	3.102	0.00192 **
restricted...unrestricted.Pasture:video...questquest	1.7980262	0.4347830	4.135	3.54e-05 ***
restricted...unrestricted.Pasture:video...questquest_door	-0.5130901	0.2892747	-1.774	0.07611 .
single.group.stabling:video...questquest	-0.3139499	0.2543837	-1.234	0.21714
single.group.stabling:video...questquest_door	1.9376424	0.4727323	4.099	4.15e-05 ***
sex_num:video...questquest	0.0273719	0.2029780	0.135	0.89273
sex_num:video...questquest_door	-0.4011968	0.2495297	-1.608	0.10788

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 539.80 on 410 degrees of freedom  
Residual deviance: 349.05 on 392 degrees of freedom  
(103 observations deleted due to missingness)  
AIC: 1524.5

**reduced GLM – lowest AIC: dependent variable Nr. reported behaviours, nested in behaviour category, sheet behaviours**

Call:

```
glm(formula = nr_reported_behaviours ~ (video_quest_num + SID +  
  age. + purpose.of.domestication + restricted...unrestricted.contact.with.horses +  
  restricted...unrestricted..roughage + restricted...unrestricted.Pasture +  
  single.group.stabling + sex_num) %in% behaviour_category,  
  family = poisson(identity), data = Dataset1)
```

Deviance Residuals:

Min	1Q	Median	3Q	Max
-2.0396	-0.7913	-0.1132	0.4974	3.3824

Coefficients:

(Intercept)  
video\_quest\_num:behaviour\_categorycomfort  
video\_quest\_num:behaviour\_categoryescape  
video\_quest\_num:behaviour\_categoryfeeding  
video\_quest\_num:behaviour\_categoryplay  
video\_quest\_num:behaviour\_categoriesocial  
SID:behaviour\_categorycomfort  
SID:behaviour\_categoryescape  
SID:behaviour\_categoryfeeding  
SID:behaviour\_categoryplay  
SID:behaviour\_categoriesocial  
age.:behaviour\_categorycomfort  
age.:behaviour\_categoryescape  
age.:behaviour\_categoryfeeding  
age.:behaviour\_categoryplay  
age.:behaviour\_categoriesocial  
purpose.of.domestication:behaviour\_categorycomfort

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	7.6923812	1.6059822	4.790	1.67e-06 ***
video_quest_num:behaviour_categorycomfort	10.6428149	3.1262236	3.404	0.000663 ***
video_quest_num:behaviour_categoryescape	-1.0266189	0.3169467	-3.239	0.001199 **
video_quest_num:behaviour_categoryfeeding	0.6231075	0.4927509	1.265	0.206033
video_quest_num:behaviour_categoryplay	-1.5122243	0.9252456	-1.634	0.102174
video_quest_num:behaviour_categoriesocial	-0.3902221	0.8071824	-0.483	0.628785
SID:behaviour_categorycomfort	-0.0066749	0.0020989	-3.180	0.001471 **
SID:behaviour_categoryescape	-0.0015139	0.0008123	-1.864	0.062376 .
SID:behaviour_categoryfeeding	-0.0020589	0.0009406	-2.189	0.028610 *
SID:behaviour_categoryplay	-0.0022209	0.0013778	-1.612	0.106973
SID:behaviour_categoriesocial	-0.0019168	0.0014509	-1.321	0.186444
age.:behaviour_categorycomfort	-0.0975195	0.1378480	-0.707	0.479292
age.:behaviour_categoryescape	-0.0115431	0.0177494	-0.650	0.515474
age.:behaviour_categoryfeeding	-0.0307194	0.0245626	-1.251	0.211059
age.:behaviour_categoryplay	0.1278228	0.0711877	1.796	0.072562 .
age.:behaviour_categoriesocial	0.0088841	0.0496427	0.179	0.857968
purpose.of.domestication:behaviour_categorycomfort	0.1366140	0.7162245	0.191	0.848728

purpose.of.domestication:behaviour_categoryescape	0.1963969	0.1163338	1.688	0.091369	.
purpose.of.domestication:behaviour_categoryfeeding	-0.1286774	0.1709093	-0.753	0.451511	.
purpose.of.domestication:behaviour_categoryplay	0.6624964	0.3837817	1.726	0.084306	.
purpose.of.domestication:behaviour_categoriesocial	0.1621007	0.2867746	0.565	0.571901	.
restricted...unrestricted.contact.with.horses:behaviour_categorycomfort	-4.0627965	1.5000274	-2.708	0.006759	**
restricted...unrestricted.contact.with.horses:behaviour_categoryescape	-1.1604146	0.3809264	-3.046	0.002317	**
restricted...unrestricted.contact.with.horses:behaviour_categoryfeeding	-0.8881785	0.6463646	-1.374	0.169406	.
restricted...unrestricted.contact.with.horses:behaviour_categoryplay	-2.0337724	1.0183895	-1.997	0.045820	*
restricted...unrestricted.contact.with.horses:behaviour_categoriesocial	-1.7023928	0.7395914	-2.302	0.021346	*
restricted...unrestricted..roughage:behaviour_categorycomfort	-1.5754269	1.2206027	-1.291	0.196809	.
restricted...unrestricted..roughage:behaviour_categoryescape	0.1807202	0.2263612	0.798	0.424655	.
restricted...unrestricted..roughage:behaviour_categoryfeeding	0.2094799	0.3597500	0.582	0.560369	.
restricted...unrestricted..roughage:behaviour_categoryplay	0.5564003	0.7478706	0.744	0.456889	.
restricted...unrestricted..roughage:behaviour_categoriesocial	-0.2776571	0.5822727	-0.477	0.633469	.
restricted...unrestricted.Pasture:behaviour_categorycomfort	5.0089564	1.8597160	2.693	0.007073	**
restricted...unrestricted.Pasture:behaviour_categoryescape	0.2730010	0.3103033	0.880	0.378974	.
restricted...unrestricted.Pasture:behaviour_categoryfeeding	0.2449627	0.7680798	0.319	0.749781	.
restricted...unrestricted.Pasture:behaviour_categoryplay	0.4761120	0.9950268	0.478	0.632300	.
restricted...unrestricted.Pasture:behaviour_categoriesocial	-0.0023600	0.7713149	-0.003	0.997559	.
single.group.stabling:behaviour_categorycomfort	-2.5296701	1.3047588	-1.939	0.052525	.
single.group.stabling:behaviour_categoryescape	0.3865593	0.3098427	1.248	0.212178	.
single.group.stabling:behaviour_categoryfeeding	-0.1457524	0.5057278	-0.288	0.773191	.
single.group.stabling:behaviour_categoryplay	0.9956029	0.7807344	1.275	0.202234	.
single.group.stabling:behaviour_categoriesocial	1.1061130	0.6393228	1.730	0.083607	.
sex_num:behaviour_categorycomfort	2.2580607	1.3502979	1.672	0.094471	.
sex_num:behaviour_categoryescape	-0.0421517	0.2022829	-0.208	0.834932	.
sex_num:behaviour_categoryfeeding	0.2911486	0.3475627	0.838	0.402207	.
sex_num:behaviour_categoryplay	-0.0954294	0.6863423	-0.139	0.889418	.
sex_num:behaviour_categoriesocial	0.7455583	0.5364538	1.390	0.164593	.

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 539.80 on 410 degrees of freedom  
 Residual deviance: 354.68 on 365 degrees of freedom  
 (103 observations deleted due to missingness)  
 AIC: 1584.2