

# Ecological Adjustments and Behavioural Patterns of the European Badger in North-Western Italy

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## Supplementary Material



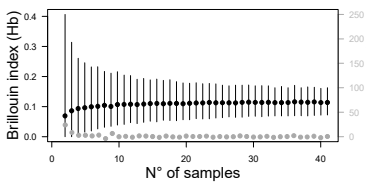
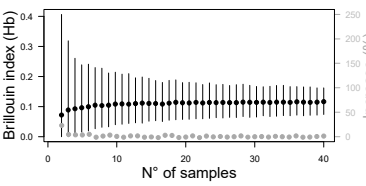
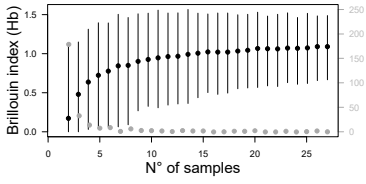
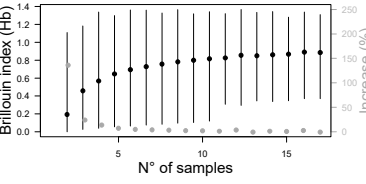
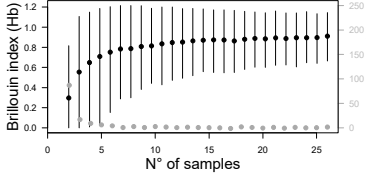
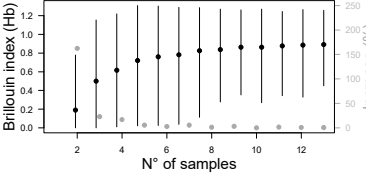
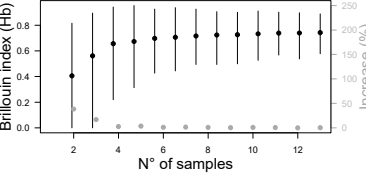
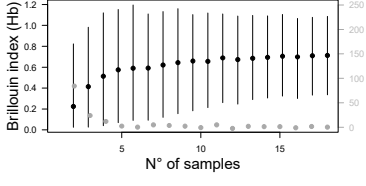
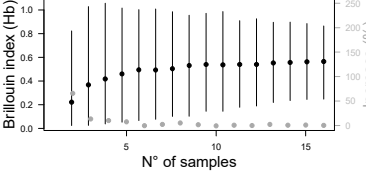
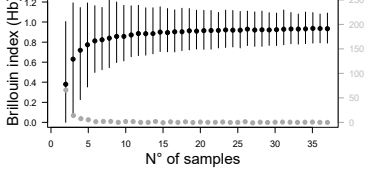
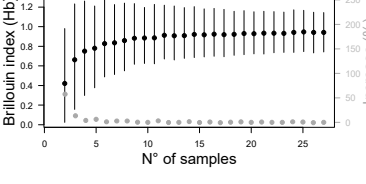
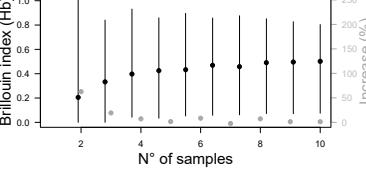
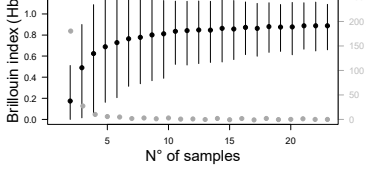
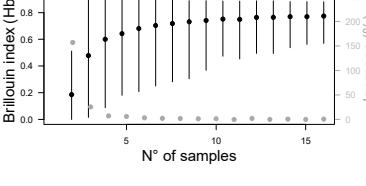
**Figure S1.** Examples of undigested food remains found in analysed faeces.

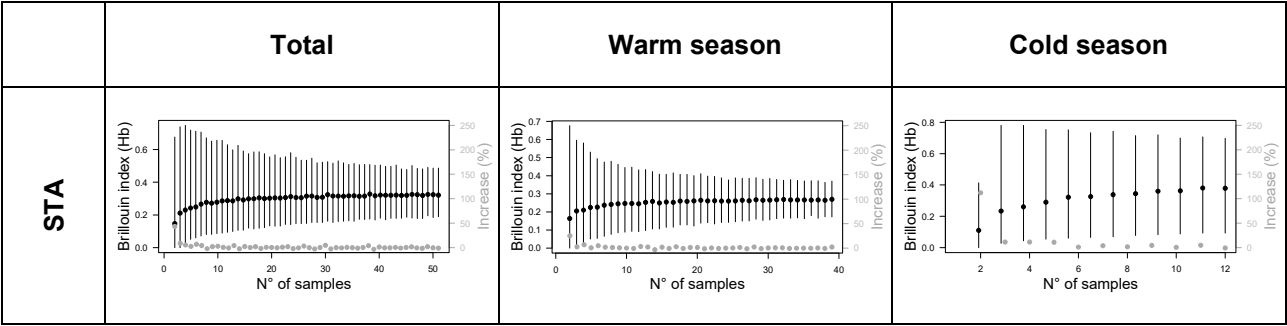
Top: guard hairs (20X) of *Sus scrofa* (left), *Lepus europaeus* (middle) and *Glis glis* (right). Middle: seeds of *Prunus spinosa* (left), *Morus* spp. (middle) and *Vitis vinifera* (right). Bottom: earthworms chetae compared to the point of a pin.

**Table S1.** Adequacy of the sample size analysed to investigate the diet of the European badger in north-western Italy.

Results of Brillouin index ( $H_b$ ) for each study area: LAR = Triangolo Lariano; BNM = Boschi Negri e Moriano; MON = Basso Monferrato; ORB = Torrente Orba; COP = Colline Oltrepò Pavese; TID = Val Tidone; STA = Valle Staffora.

The diversity curve reached an asymptote, and the incremental change curve dropped below 1% with fewer samples than those analysed i) for each sample during the total study period, ii) for LAR, MON, ORB, COP, TID, and STA in the warm season, and iii) for BNM, MON, COP, and STA in the cold season.

	Total	Warm season	Cold season
LAR			N = 1 Sample size not adequate
BNM		N = 10 Sample size not adequate	
MON			
ORB			N = 2 Sample size not adequate
COP			
TID			N = 7 Sample size not adequate



**Table S2.** Diet composition expressed as Mean Percent Volume (VM%  $\pm$  SE) in each study area in north-western Italy.

**Triangolo Lariano (LAR)**

Food items		Total (N = 41)		Warm season (N = 40)	
		VM%	ES	VM%	ES
<b>Earthworms</b>		<b>96.2</b>	<b>0.7</b>	<b>96.1</b>	<b>0.7</b>
<b>Invertebrates</b> (other than earthworms)	Insecta				
	Coleoptera	0.3	0.1	0.3	0.1
	Larvae Coleoptera	0.01	0.01	0.01	0.01
	Larvae Lepidoptera	0.01	0.01	0.01	0.01
	ND	0.01	0.01	0.01	0.01
<b>Total</b>		<b>0.3</b>	<b>0.1</b>	<b>0.3</b>	<b>0.1</b>
<b>Dry fruits *</b>		<b>1.1</b>	<b>0.5</b>	<b>1.2</b>	<b>0.5</b>
<b>Fleshy fruits</b>	<i>Malus sylvestris</i>	0.5	0.1	0.5	0.1
	<b>Total</b>	<b>0.5</b>	<b>0.1</b>	<b>0.5</b>	<b>0.1</b>
<b>Grass</b>		<b>0.01</b>	<b>0.01</b>	<b>0.0</b>	<b>0.0</b>

\* Dry fruits: *Castanea sativa*

**Boschi Negri e Moriano (BNM)**

Food items		Total (N = 27)		Cold season (N = 17)	
		VM%	ES	VM%	ES
<b>Earthworms</b>		<b>11.5</b>	<b>5.5</b>	<b>12.4</b>	<b>6.8</b>
<b>Invertebrates</b> (other than earthworms)	Gastropoda	0.02	0.02	0.03	0.03
	Insecta				
	Orthoptera	0.02	0.02	0.0	0.0
	Coleoptera	4.1	3.6	0.6	0.2
	Lepidoptera	0.1	0.1	0.1	0.1
	Hymenoptera	1.4	1.4	0.0	0.0
	Larvae Hymenoptera	0.1	0.1	0.2	0.1
	ND	0.1	0.1	0.0	0.0
	<b>Total</b>	<b>5.9</b>	<b>3.8</b>	<b>0.9</b>	<b>0.4</b>
<b>Cereals *</b>		<b>3.7</b>	<b>3.6</b>	<b>5.9</b>	<b>5.8</b>
<b>Fleshy fruits</b>	<i>Cornus</i> sp.	0.2	0.1	0.1	0.1
	<i>Fragaria</i> sp.	0.1	0.1	0.2	0.1
	<i>Morus</i> sp.	3.5	2.0	2.4	2.2
	<i>Prunus</i> sp.	47.1	9.1	61.7	11.3
	<i>Vitis vinifera</i>	11.1	6.0	6.0	5.8
	ND	3.2	3.2	0.0	0.0
	<b>Total</b>	<b>65.2</b>	<b>8.2</b>	<b>70.5</b>	<b>10.2</b>
<b>Grass</b>		<b>0.4</b>	<b>0.2</b>	<b>0.6</b>	<b>0.2</b>
<b>Wild ungulates *</b>		<b>3.6</b>	<b>3.6</b>	<b>0.0</b>	<b>0.0</b>

Food items		Total (N = 27)		Cold season (N = 17)	
		VM%	ES	VM%	ES
Small mammals	Microtidae	1.4	1.4	2.2	2.2
	<b>Total</b>	<b>1.4</b>	<b>1.4</b>	<b>2.2</b>	<b>2.2</b>
Med.-sized mammals *		<b>3.6</b>	<b>3.6</b>	<b>5.8</b>	<b>5.8</b>
Birds		<b>1.4</b>	<b>1.4</b>	<b>0.0</b>	<b>0.0</b>

\* Cereals: *Zea mays*; Wild ungulates: *Sus scrofa*; Med.-sized mammals: *Sylvilagus floridanus*.

#### Basso Monferrato (MON)

Food items		Total (N = 26)		Warm season (N = 13)		Cold season (N = 13)	
		VM%	ES	VM%	ES	VM%	ES
Earthworms		<b>63.6</b>	<b>7.5</b>	<b>65.4</b>	<b>12.2</b>	<b>61.8</b>	<b>9.1</b>
Invertebrates (other than earthworms)	Insecta						
	Odonata	0.02	0.02	0.04	0.04	0.0	0.0
	Coleoptera	0.3	0.1	0.5	0.2	0.1	0.1
	Lepidoptera	0.0	0.0	0.04	0.04	0.0	0.0
	Larvae Lepidoptera	0.04	0.03	0.0	0.0	0.04	0.04
	<b>Total</b>	<b>0.3</b>	<b>0.1</b>	<b>0.5</b>	<b>0.2</b>	<b>0.2</b>	<b>0.1</b>
Dry fruits *		<b>3.4</b>	<b>3.3</b>	<b>6.8</b>	<b>6.6</b>	<b>0.0</b>	<b>0.0</b>
Fleshy fruits	<i>Ficus italica</i>	0.6	0.6	1.2	1.2	0.0	0.0
	<i>Malus sylvestris</i>	0.1	0.1	0.2	0.2	0.0	0.0
	<i>Prunus</i> sp.	8.8	4.9	17.5	9.3	0.0	0.0
	ND	17.8	5.8	0.0	0.0	35.7	9.2
	<b>Total</b>	<b>27.3</b>	<b>6.9</b>	<b>18.9</b>	<b>10.0</b>	<b>35.7</b>	<b>9.2</b>
Grass		<b>0.1</b>	<b>0.03</b>	<b>0.1</b>	<b>0.1</b>	<b>0.0</b>	<b>0.0</b>
Fungi		<b>0.6</b>	<b>0.6</b>	<b>0.0</b>	<b>0.0</b>	<b>1.2</b>	<b>1.2</b>
Garbage		<b>0.02</b>	<b>0.02</b>	<b>0.04</b>	<b>0.04</b>	<b>0.0</b>	<b>0.0</b>
Small mammals	Gliridae	0.6	0.6	0.0	0.0	1.2	1.2
	<b>Total</b>	<b>0.6</b>	<b>0.6</b>	<b>0.0</b>	<b>0.0</b>	<b>1.2</b>	<b>1.2</b>
Med.-sized mammals *		<b>2.9</b>	<b>2.0</b>	<b>5.8</b>	<b>4.0</b>	<b>0.0</b>	<b>0.0</b>
Birds		<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>	<b>0.0</b>	<b>0.0</b>

\* Dry fruits: *Castanea sativa*; Med.-sized mammals: *Sylvilagus floridanus*.

#### Torrente Orba (ORB)

Food items		Total (N = 18)		Warm season (N = 16)	
		VM%	ES	VM%	ES
Earthworms		<b>75.3</b>	<b>8.2</b>	<b>79.4</b>	<b>7.8</b>
Invertebrates (other than earthworms)	Gastropoda	0.03	0.03	0.03	0.03
	Diplopoda/Chilopoda	0.1	0.1	0.2	0.2
	Insecta				
	Coleoptera	0.3	0.1	0.3	0.2

Food items		Total (N = 18)		Warm season (N = 16)	
		VM%	ES	VM%	ES
	Hymenoptera	0.03	0.03	0.03	0.03
	ND	4.4	2.9	4.9	3.2
	<b>Total</b>	<b>4.9</b>	<b>2.9</b>	<b>5.5</b>	<b>3.2</b>
<b>Cereals *</b>		<b>5.0</b>	<b>3.5</b>	<b>4.7</b>	<b>3.9</b>
<b>Fleshy fruits</b>	<i>Morus</i> sp.	0.03	0.03	0.03	0.03
	<i>Prunus</i> sp.	2.1	2.1	2.4	2.4
	<i>Sambucus nigra</i>	0.06	0.04	0.06	0.04
	<b>Total</b>	<b>2.2</b>	<b>2.1</b>	<b>2.5</b>	<b>2.4</b>
<b>Grass</b>		<b>0.7</b>	<b>0.2</b>	<b>0.8</b>	<b>0.2</b>
<b>Med.-sized mammals *</b>		<b>5.6</b>	<b>5.4</b>	<b>0.2</b>	<b>0.2</b>
<b>Birds</b>		<b>0.1</b>	<b>0.1</b>	<b>0.2</b>	<b>0.2</b>

\* Cereals: *Zea mays*; Med.-sized mammals: *Sylvilagus floridanus*.

#### Colline Oltrepò Pavese (COP)

Food items		Total (N = 37)		Warm season (N = 27)		Cold season (N = 10)	
		VM%	ES	VM%	ES	VM%	ES
<b>Earthworms</b>		<b>42.9</b>	<b>6.5</b>	<b>54.1</b>	<b>7.2</b>	<b>12.7</b>	<b>8.9</b>
<b>Invertebrates (other than earthworms)</b>	Diplopoda/Chilopoda	0.03	0.02	0.04	0.03	0.0	0.0
	Insecta						
	Odonata	0.01	0.01	0.0	0.0	0.05	0.05
	Coleoptera	3.8	2.5	3.4	3.2	4.9	3.7
	Larvae Coleoptera	0.8	0.6	1.1	0.8	0.0	0.0
	Larvae Lepidoptera	0.3	0.1	0.4	0.2	0.0	0.0
	Larvae Hymenoptera	0.1	0.1	0.1	0.1	0.0	0.0
	<b>Total</b>	<b>5.1</b>	<b>2.5</b>	<b>5.2</b>	<b>3.2</b>	<b>5.0</b>	<b>3.7</b>
<b>Fleshy fruits</b>	<i>Actinidia deliciosa</i>	0.4	0.4	0.6	0.6	0.0	0.0
	<i>Ficus italica</i>	5.8	2.8	0.0	0.0	21.5	9.0
	<i>Hedera</i> sp.	0.1	0.1	0.2	0.1	0.0	0.0
	<i>Mespilus germanica</i>	3.8	2.8	5.2	3.8	0.0	0.0
	<i>Prunus</i> sp.	5.4	3.7	3.7	3.7	10.1	9.8
	<i>Vitis vinifera</i>	31.6	5.9	22.6	5.5	55.9	13.6
	ND	2.7	2.6	3.6	3.6	0.05	0.05
	<b>Total</b>	<b>49.9</b>	<b>6.5</b>	<b>36.0</b>	<b>6.8</b>	<b>87.5</b>	<b>7.9</b>
<b>Grass</b>		<b>0.5</b>	<b>0.4</b>	<b>0.7</b>	<b>0.6</b>	<b>0.0</b>	<b>0.0</b>
<b>Wild ungulates *</b>		<b>1.2</b>	<b>1.0</b>	<b>1.6</b>	<b>1.4</b>	<b>0.0</b>	<b>0.0</b>
<b>Birds</b>		<b>0.4</b>	<b>0.4</b>	<b>0.6</b>	<b>0.6</b>	<b>0.0</b>	<b>0.0</b>

\* Wild ungulates: *Sus scrofa*.

## Val Tidone (TID)

Food items		Total (N = 23)		Warm season (N = 16)	
		VM%	ES	VM%	ES
Earthworms		57.1	9.1	63.1	10.9
Invertebrates (other than earthworms)	Insecta				
	Coleoptera	3.7	1.3	5.3	1.8
	Larvae Coleoptera	0.3	0.2	0.5	0.3
	<b>Total</b>	<b>4.0</b>	<b>1.3</b>	<b>5.7</b>	<b>1.7</b>
Fleshy fruits	<i>Cornus</i> sp.	0.02	0.02	0.0	0.0
	<i>Ficus italica</i>	0.7	0.7	0.0	0.0
	<i>Malus sylvestris</i>	0.2	0.2	0.2	0.2
	<i>Morus</i> sp.	1.7	1.7	2.4	2.4
	<i>Prunus</i> sp.	20.5	7.6	20.3	9.6
	ND	8.7	5.5	6.1	6.1
	<b>Total</b>	<b>29.1</b>	<b>8.9</b>	<b>29.0</b>	<b>11.0</b>
Grass		0.02	0.02	0.0	0.0
Fungi		4.3	4.3	0.0	0.0

## Valle Staffora (STA)

Food items		Total (N = 51)		Warm season (N = 39)		Cold season (N = 12)	
		VM%	ES	VM%	ES	VM%	ES
Earthworms		91.4	2.2	92.8	1.6	86.9	7.8
Invertebrates (other than earthworms)	Gastropoda	0.01	0.01	0.0	0.0	0.04	0.04
	Diplopoda/Chilopoda	0.07	0.05	0.01	0.01	0.3	0.2
	Insecta						
	Coleoptera	0.3	0.1	0.3	0.09	0.1	0.1
	Larvae Coleoptera	0.7	0.4	0.9	0.6	0.0	0.0
	Larvae Lepidoptera	0.1	0.05	0.1	0.1	0.04	0.04
	Larvae Hymenoptera	0.1	0.05	0.1	0.1	0.0	0.0
	ND	0.01	0.01	0.01	0.01	0.0	0.0
	<b>Total</b>	<b>1.2</b>	<b>0.4</b>	<b>1.4</b>	<b>0.6</b>	<b>0.5</b>	<b>0.2</b>
Dry fruits *		2.1	1.9	0.2	0.1	8.2	8.2
Cereals *		0.6	0.4	0.8	0.6	0.0	0.0
Fleshy fruits	<i>Cornus</i> sp.	0.7	0.7	1.0	1.0	0.0	0.0
	<i>Malus sylvestris</i>	1.9	0.5	2.1	0.7	1.3	0.3
	ND	0.3	0.3	0.0	0.0	1.3	1.3
	<b>Total</b>	<b>3.0</b>	<b>0.9</b>	<b>3.1</b>	<b>1.1</b>	<b>2.5</b>	<b>1.3</b>
Grass		0.03	0.02	0.04	0.02	0.0	0.0

\* Dry fruits: *Castanea sativa*; Cereals: *Zea mays*.