

Tradeoffs Anywhere Imply Tradeoffs Everywhere

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Animal Welfare Economics Workshop
June, 2025



The University of Texas at Austin

Population Wellbeing Initiative

Applied economists have *fuzzy* thoughts about animals

(Approximately-)Real quotes:

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But animals have no WtP...?

Claiming animals matter is getting into something like religious debate.

Yes, I care about animals, but I'd never want to prioritize them when there are poor people.

This Project: Half-Communication; Half-Insight

We enumerate a weak set of axioms that guarantee a social objective function that trade-offs between human and animal interests

- i. Multi-Species Pareto Principle
- ii. Some version of continuous preferences
- iii. The existence of a single human-animal trade-off that society would make

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For a stronger version of continuity, even (iii) is unnecessary

- For a restricted definition of continuity, we need (iii) and a few others

Result: Trade-offs Everywhere

The axioms we propose have the following implication:

For any benefit to any human, there exists a gain to some animal(s) that is equally socially valuable

(Equivalently: Any loss to any human can be socially compensated by a gain to some animals)

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1. Count animals directly in economic policy analysis
2. (Undemocratically) reject very modest interspecies axioms
3. Give up continuity over human utilities (or completeness/transitivity/etc)

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Note: Our result is weak—it doesn't say how much to count animals

We contribute another call to include animals in economic analysis—starting from weaker premises

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Directly Valuing Animal Welfare in (Environmental) Economics

Alexis Carlier, Nicolas Treich

Introduction
○○●

Result 1: Strong (Standard) Continuity
○○○

Result 2: Weaker Continuity
○○○○

Empirical Implications
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Conclusion
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Methodological and Ideological Options

Animal Welfare and Social Decisions: Is It Time to Take Bentham Seriously?



Olof Johansson-Stenman¹

Department of Economics, School of Business, Economics and Law, University of Gothenburg, Box 640, SE, 405 30 Gothenburg, Sweden

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Animal welfare: Methods to improve policy and practice

New methods are emerging to quantify human and animal welfare on a common scale, creating new tools for policy

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Regulators Should Value Nonhuman Animals

Cass R. Sunstein*

Abstract

*Some regulations do not only reduce human deaths, injuries, and illnesses; they also protect nonhuman animals. Regulatory Impact Analyses, required by prevailing executive orders, usually do not disclose or explore benefits or costs with respect to nonhuman animals, even when those benefits or costs are significant. **This is an inexcusable gap.** If a regulation*



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News & views

Inclusive economic valuations

<https://doi.org/10.1038/s43016-023-00759-0>

Animal welfare in economic analyses of food production

Kevin Kuruc & Jonathan McFadden

Check for updates

The time has come to include the wellbeing of animals in cost–benefit evaluations that inform agricultural policy. By doing so, we would account for those with the most to gain – or lose – from our choices.



Economic Environment

Lifetime utility vectors for (fixed) n humans and m animals

$$\mathbf{u}^H = (u_1^H, u_2^H, \dots, u_n^H) \in \mathbb{R}^n$$

$$\mathbf{u}^A = (u_1^A, u_2^A, \dots, u_m^A) \in \mathbb{R}^m$$

$$\mathbf{u} = (\mathbf{u}^H, \mathbf{u}^A) \in \mathbb{R}^{n+m}$$

Goal: Characterize the properties of a social ordering that satisfies simple axioms over utility vectors

Axioms

Standard representation axioms:

1. (Completeness) For any $\mathbf{u}, \mathbf{v} \in \mathbb{R}^{n+m}$, either $\mathbf{u} \succcurlyeq \mathbf{v}$ or $\mathbf{v} \succcurlyeq \mathbf{u}$
2. (Transitivity) If $\mathbf{u} \succcurlyeq \mathbf{v}$ and $\mathbf{v} \succcurlyeq \mathbf{w}$ then $\mathbf{u} \succcurlyeq \mathbf{w}$
3. (Continuity) For any $\mathbf{u} \succ \mathbf{v} \succ \mathbf{w}$, $\exists \alpha \in (0, 1)$ such that $\alpha \mathbf{u} + (1 - \alpha) \mathbf{w} \sim \mathbf{v}$

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Novel Inter-Species Pareto Axiom:

4. (Inter-Species Pareto) If $\mathbf{u} \geq \mathbf{v}$ componentwise and $u_i > v_i$ for at least one $i \in \{1, \dots, n + m\}$, then $\mathbf{u} \succ \mathbf{v}$

A loss to some human can *always* be compensated by some large enough benefit to animals

Let:

- ▶ \mathbf{x} be the status quo utility vector
- ▶ \mathbf{y} be the status quo plus an improvement for some animal
- ▶ \mathbf{y}' be an even larger improvement for the same animal
- ▶ \mathbf{z} be the status quo with one worsening to some human

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$$\alpha \mathbf{y}' + (1 - \alpha) \mathbf{z} \succ \alpha \mathbf{y} + (1 - \alpha) \mathbf{z} \sim \mathbf{x}$$

Monetary valuations without Willingness to Pay

$$\alpha \mathbf{y}' + (1 - \alpha) \mathbf{z} \succ \mathbf{x}$$

$\mathbf{y}' \equiv$ providing anesthetics during a piglet's tail docking

$\mathbf{z} \equiv$ a loss of \$20 to Loren

(And suppose $\alpha = 0.5$)

The planner would **choose to take** (roughly) \$10 from Loren to bestow half of the benefit of anesthetics to the piglet

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The social WTP to improve this piglet's life can be **monetarily valued**, *even if the piglet has no money, nor an estimated WTP*

Perhaps continuity is doing too much work

Completeness + transitivity seem like deep properties of rational preferences

- ▶ Not as intuitive why we should need to respect continuity

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Continuity is not just a technical condition: it is an **inter-species axiom**

Removing the inter-species dimension of continuity

Weaken overall continuity \rightarrow within-species continuity:

- i. Assume continuity **only** over changes in human utilities
(E.g., continuity conditional on animal utilities being fixed)
- ii. Assume continuity **only** over changes in animal utilities

Removing the inter-species dimension of continuity

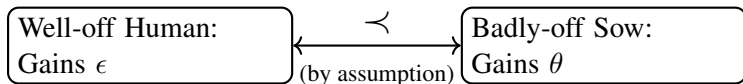
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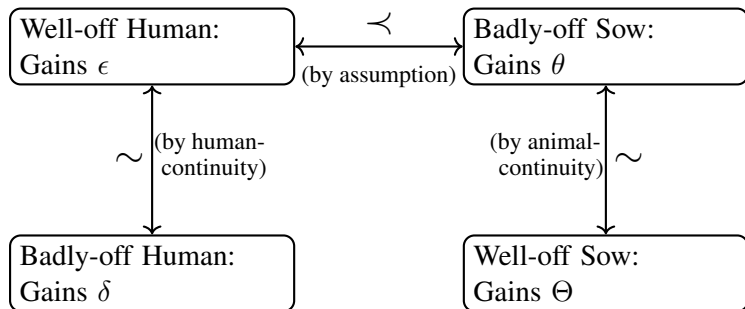
Replace with a more direct interspecies assumption:

Assume there exists some gain to some animal(s) that we would socially prefer to some gain to some human

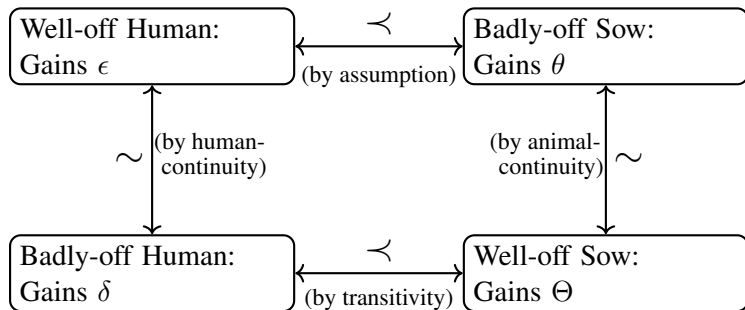
The assumed trade-off serves as a bridging trade-off between species



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Alternative Statement of Main Result

Assume:

1. Completeness
2. Transitivity
3. Within-species continuity
4. Multi-species Pareto
5. The existence of a single “bridging” cross-species trade-off
6. Separability (we think)

Same main result:

There exists a SWF representation, with the property that any human loss can be compensated by a sufficiently large benefit for animals

Is this too obvious to write down?

One reaction: *Duh!*

- ▶ Of course animals deserve *some* weight in social decision making and economic policy

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This is **not how most economists react** to the claim that animals should be directly included in cost-benefit analyses

- ▶ E.g., Most agricultural economists think making hens cage-free is *only* valuable insofar as some humans value it

This result says **this is a mistake**, unless you are willing to take extreme stances on animal welfare

- ▶ Stances which I do not think are justified by a democratic interpretation of axiomatic welfarism, or personal introspection

*The open question is how, not whether,
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*Perhaps current practice can be rescued if
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First pass tells against rounding to zero

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Suppose we value each chicken at $1/10,000$ humans

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Don't worry: We'll do better than this VSL analogy

Q1: How much should we value animal welfare?

Suppose we could alleviate the pain from one human having a broken leg, or C -cows

- ▶ How large does C need to be for you/the planner to be indifferent?

Reasonable starting point: **Weight according to neuron counts**

- ▶ Maybe having N -times the neurons \Rightarrow my experiences are N -times as intense?
- ▶ Animal researchers think this relationship is much flatter

Candidate animal weights

Species	Neurons	Cortical Neurons	Fischer (2024)
Human	100	100	100
Cow	3	2	N/A
Pig	3	3	51.5
Chicken	0.3	0.3	33.2
Mouse	0.1	0.1	N/A
Salmon	0.01 [†]	0.01 [†]	5.6
Shrimp	.001 [†]	0.001 [†]	3.1

(It seems new information about animals causes forecastable updates regarding the richness of their inner lives)

Q2: How disvaluable are certain things that we do to animals?

Jail vs. Caged

Human imprisonment feels like a natural analog for confinement

How much would we value freeing $0.3\% \times$ no. of caged hens, if they were human?

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Anesthetics for mutilation

Dog neutering feels like a natural analog for piglet castration

How much would we value providing anesthetics to the piglets raised in the US, if they were puppies?

Valuation of cage-free eggs

Assume: Difference between caged and free-range comparable to being in jail vs. not (conditional on cognitive capacity)

- ▶ Arguably, larger benefit to hens here (these cages are *crammed*)

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So, for every hen that goes from caged → free-range, we might **value that at \$150**

- ▶ Or, about \$7 per dozen eggs
(Costs \$2 more per dozen eggs to raise them free range)

Valuation of anesthetics during mutilation

Assume: anesthetics during canine neutering about as valuable as anesthetics during piglet castration

People appear willing to pay on the order of \$100 to provide anesthetics during canine-neutering

- ▶ Luckily: no need to mess with neuron-weights!
(Dogs and pigs are very similar)

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Cost to provide anesthetics to piglets is on the order of \$1-\$5

Potentially large social gains to be had from re-optimizing with consideration for animals

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$$\$100 \times 130M \approx \$13B$$

Conclusion

1. Common-sense axiomatic commitments require trading off human and animal welfare
2. The burden of proof seems to be on those who wish to continue rounding these interests to zero