

Evaluating environmental enrichment for pigs

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Needs for good welfare

(1) The Five Freedoms

**Freedom from hunger
& thirst**

**Freedom from thermal &
physical discomfort**



**Freedom from pain,
injury & disease**

**Freedom from fear
& distress**

**Freedom to express
most normal behaviour**



EC Directive (2001/93/EC)

“...pigs must have permanent access to a sufficient quantity of material to **enable proper investigation and manipulation activities**

- How can we decide what meets the requirements of pigs?



Approaches to assessing enrichment

- Resource measures (inputs)
 - The type of enrichment object/substrate
 - The properties of enrichment
- Animal-based measures (outcomes)
 - Measures of adequate enrichment
 - Measures of inadequate enrichment



Defining adequacy by type of enrichment

- EU Directive

“...such as straw, hay, wood, sawdust, mushroom compost, peat or a mixture of such”

- Expert Opinion (Bracke et al., 2007)

9 experts gave 0-10 score to a list of enrichment items

The type of enrichment

Score (0-10 scale)	Materials
<1	Mirror, radio, concrete block
<2	Chain, ball, mineral block, minimal straw
<3	Chain+wood, rope, Bite-rite, operant feeder
<4	Box with shredded paper, sawdust, chopped straw
<5	Branches, earth box, sawdust on floor
<6	Straw basket, daily straw pellets, peat, food-ball
<7	Wood bark layer, loose compost, straw rack
<8	Daily soil, fodder beet, maize silage
>8	Mixed straw+fodder beet, loose straw bale, straw+scattered concentrate

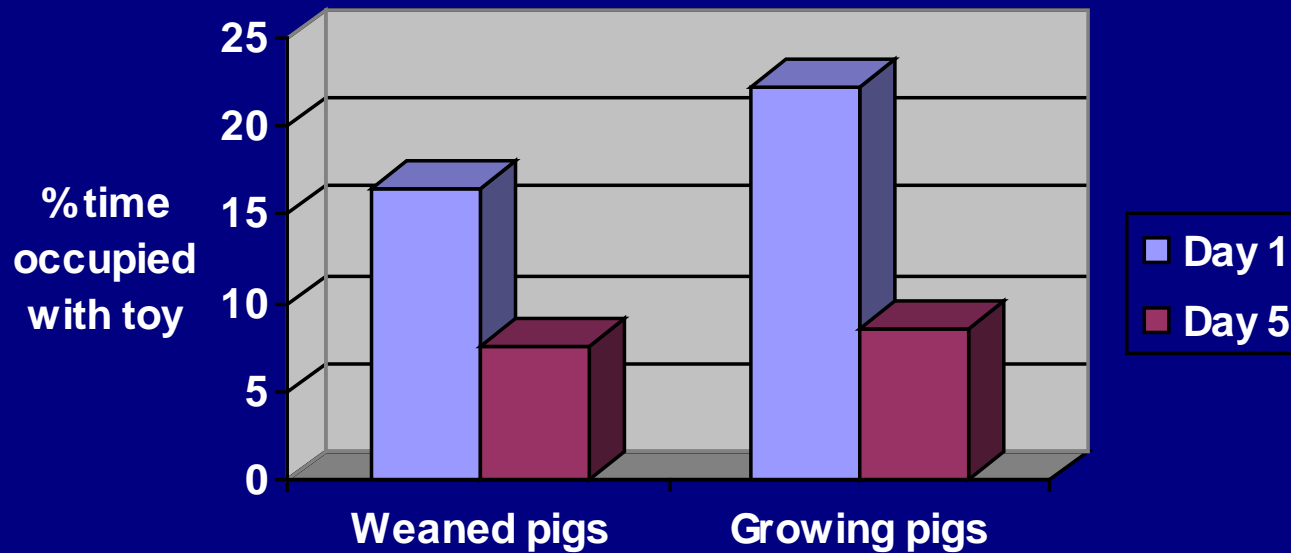
An alternative approach: properties not objects – asking the pig



73 diverse objects
% of 24h in object interaction
day 1 & day 5

(van de Weerd et al, 2003)

Habituation to objects



Winners

1. Lavender straw with peanuts in a trough
2. Carrots hanging on a string
3. Coconut halves hanging on a string
4. Long straw in a trough

9. Sisal hanging rope

Losers = chains, bricks, planks, mirrors

But what characterises winners?

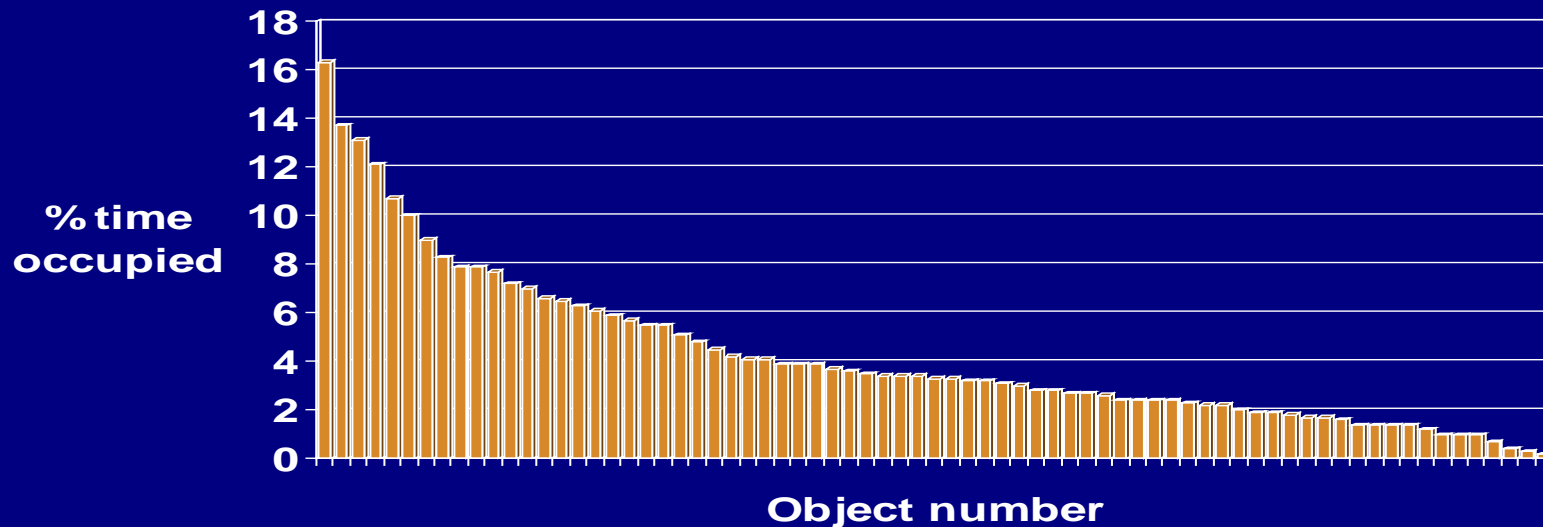
Important Characteristics

DAY 1

- Odorous
- Deformable
- Chewable
- Not Rootable
- Not attached

DAY 5

- Ingestible
- Destructible
- Contained (in box)
- Not Rootable (hanging)

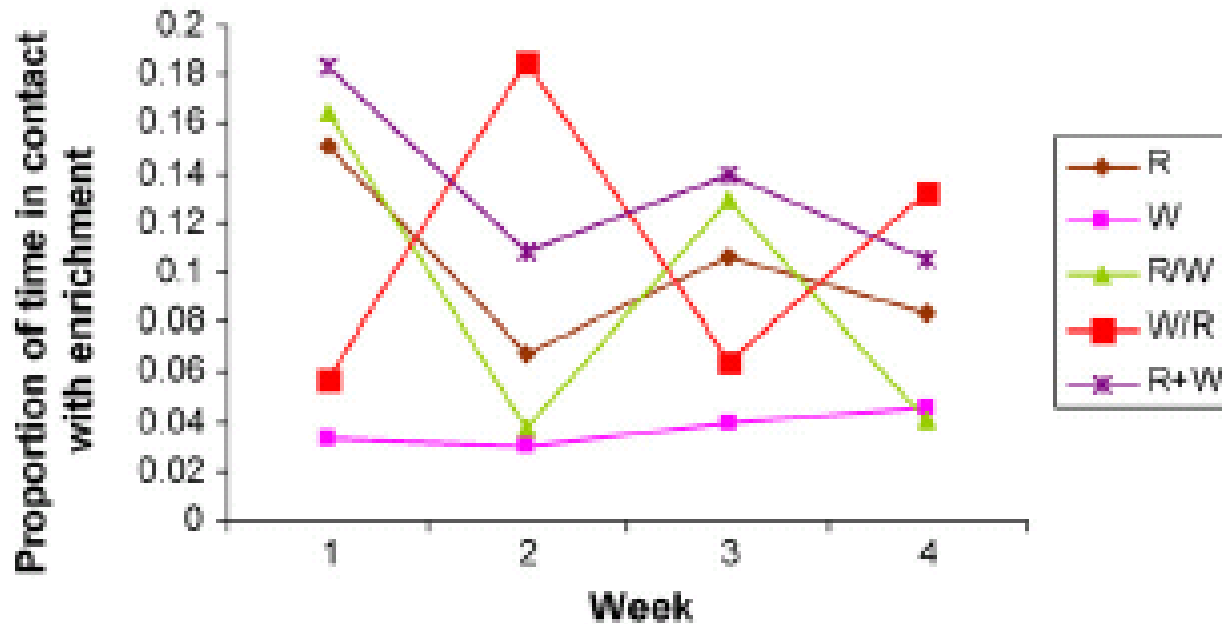


(van de Weerd et al, 2003)

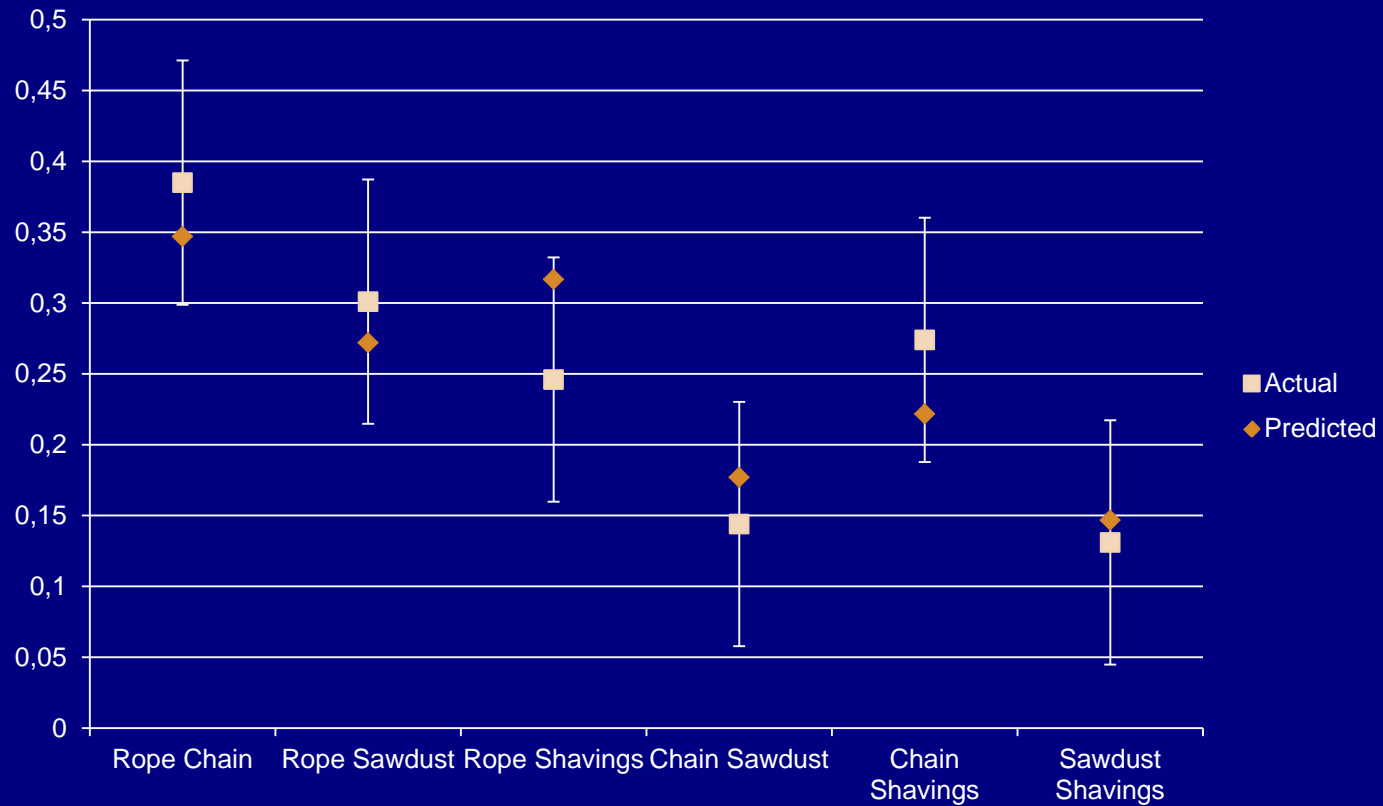
Importance of novelty (and additivity)

Hanging rope or wood block on floor

- separately or together
- changed weekly or continuous (rope renewed after 2 weeks)



Independence of objects (additivity)



Guy et al., (2013)

The important properties of enrichment

(36 experts: Bracke et al, 2006)

% citing	Properties
39	Provides occupation
39	Rootable / digable
31	Manipulable with mouth
28	Chewable
22	Variable and unpredictable

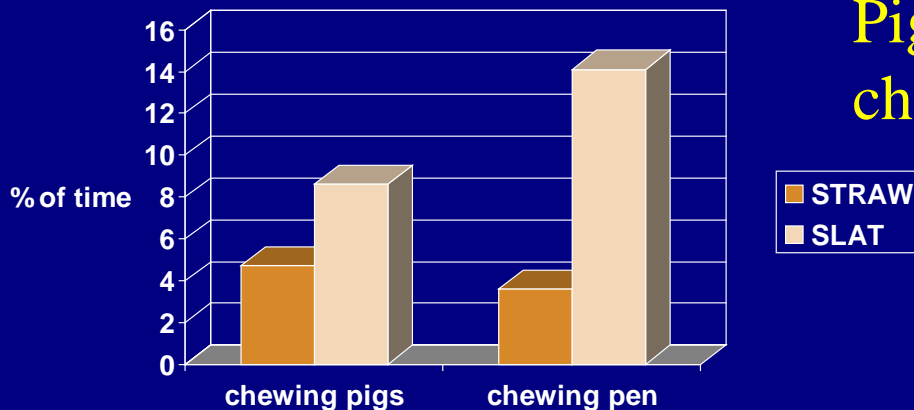
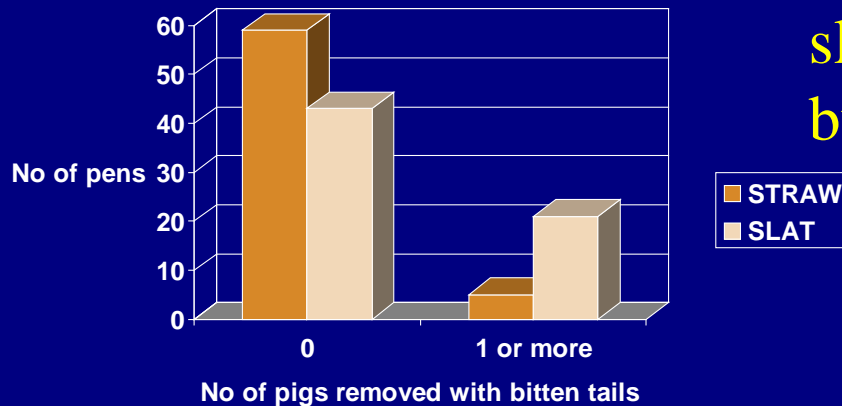


OUTCOME EVALUATION

- **Which outcome measures are relevant ?**
- + Animal-enrichment interaction
- + Activity – play
- Harmful social behaviour – tail, ear biting
- Aggression
- Pig directed behaviour – chewing, massaging
- Pen directed behaviour
- Fearfulness – novelty, humans
- + Production – feed intake growth, efficiency
- + Hygiene and health

Outcomes of environmental enrichment

More pens show tail biting in a slatted building than matched building with straw bedding (33% v 8%, $P < 0.001$)



Pigs in slatted pens spend more time chewing other pigs and pen fittings ($P < 0.001$)

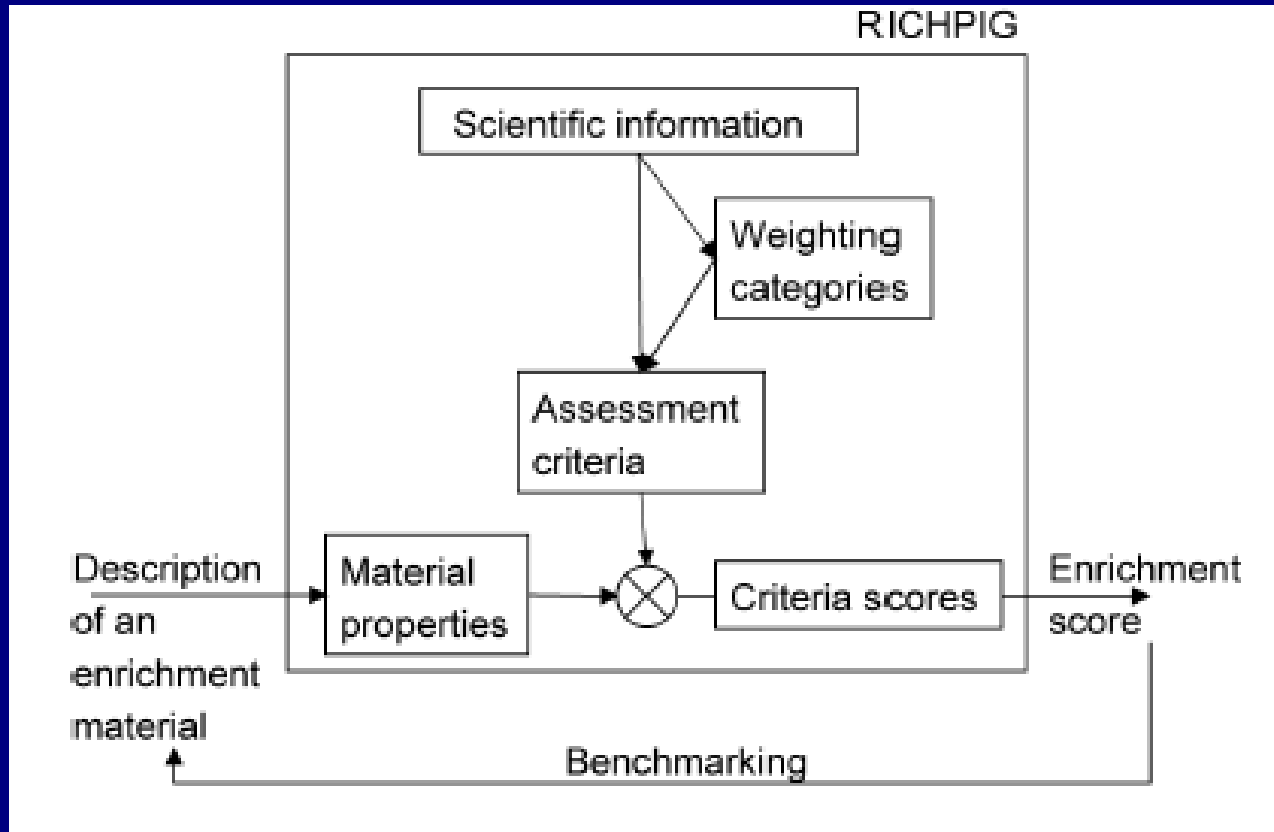
How do outcomes map to materials

(Bracke et al, 2006)

Material	+	-	0	+/-	Weighted Index
Metal (chains)	6	4	8	1.5	0.3
Mineral blocks	3	1	3	3.0	0.5
Rubber / plastic (hoses, belts)	19	4	9	4.7	0.7
Rope / cloth	6	1	5	6.0	0.8
Wood (beams, blocks, branches)	7	1	3	7.0	0.9
Straw (loose, rack, basket)	28	3	8	9.3	1.1
Roughage (beet, hay, silage)	10	1	5	10.0	0.8
Mixtures (compound enrichment)	28	2	4	14.0	1.3
Substrates (compost, earth, sawdust)	17	1	7	17.0	1.0

54 experiments, 200 statistically significant welfare outcomes

Modelling enrichment value



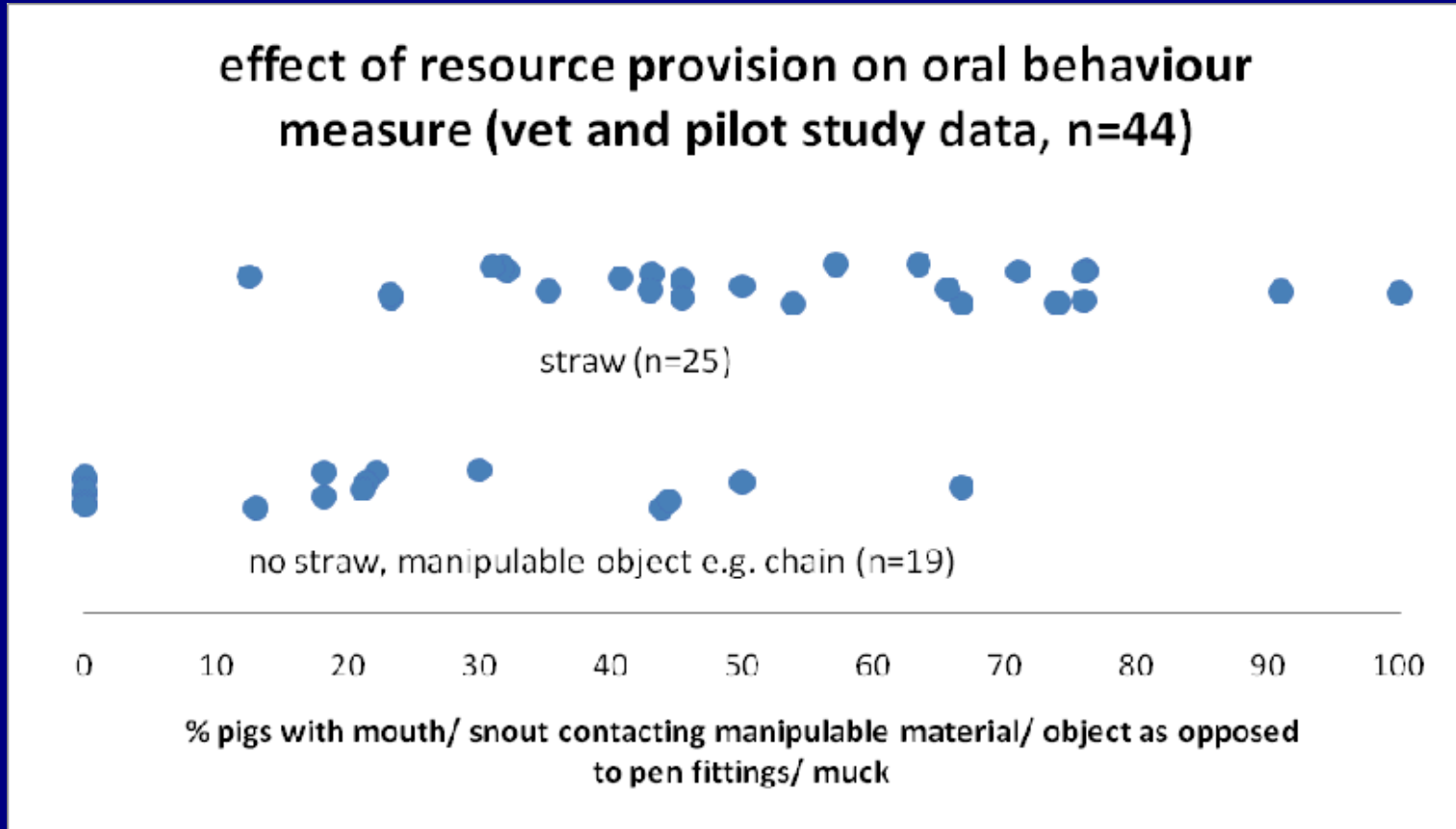
(Bracke, 2008)

ICEBERG Indicators



Simple and quick measures to summarise enrichment adequacy **in daily practice** ?

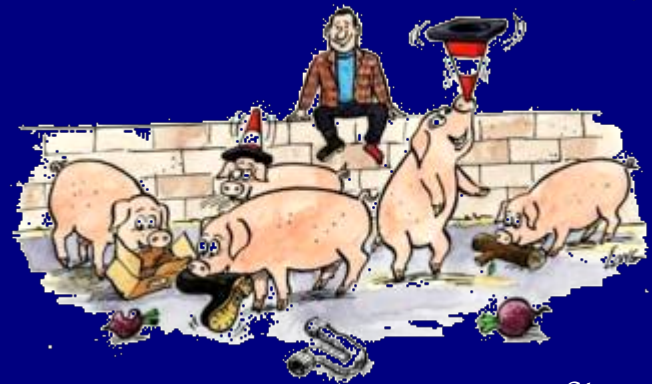
Pig oral behaviour index



Simple scan measure unaffected by time of day or level of activity (Mullan et al., 2009)

BPEX Enrichment use score

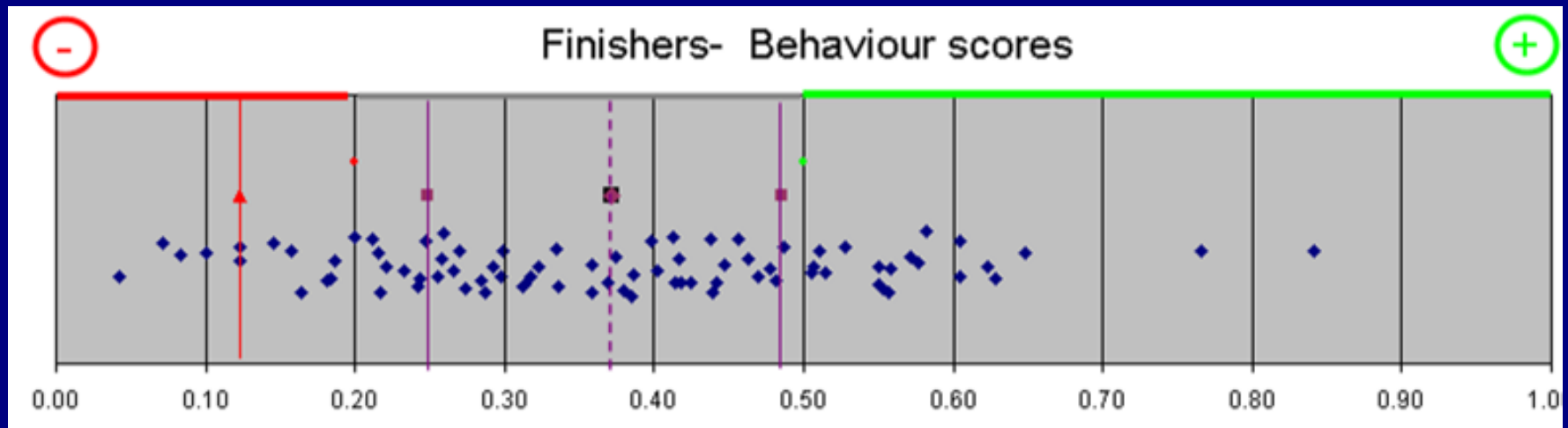
- Looking at sitting or standing pigs only
- Ignore pigs eating or drinking
- Proportion of active pigs occupied (orally) with objects provided for enrichment
/ All active pigs



BPEX Real Welfare Project



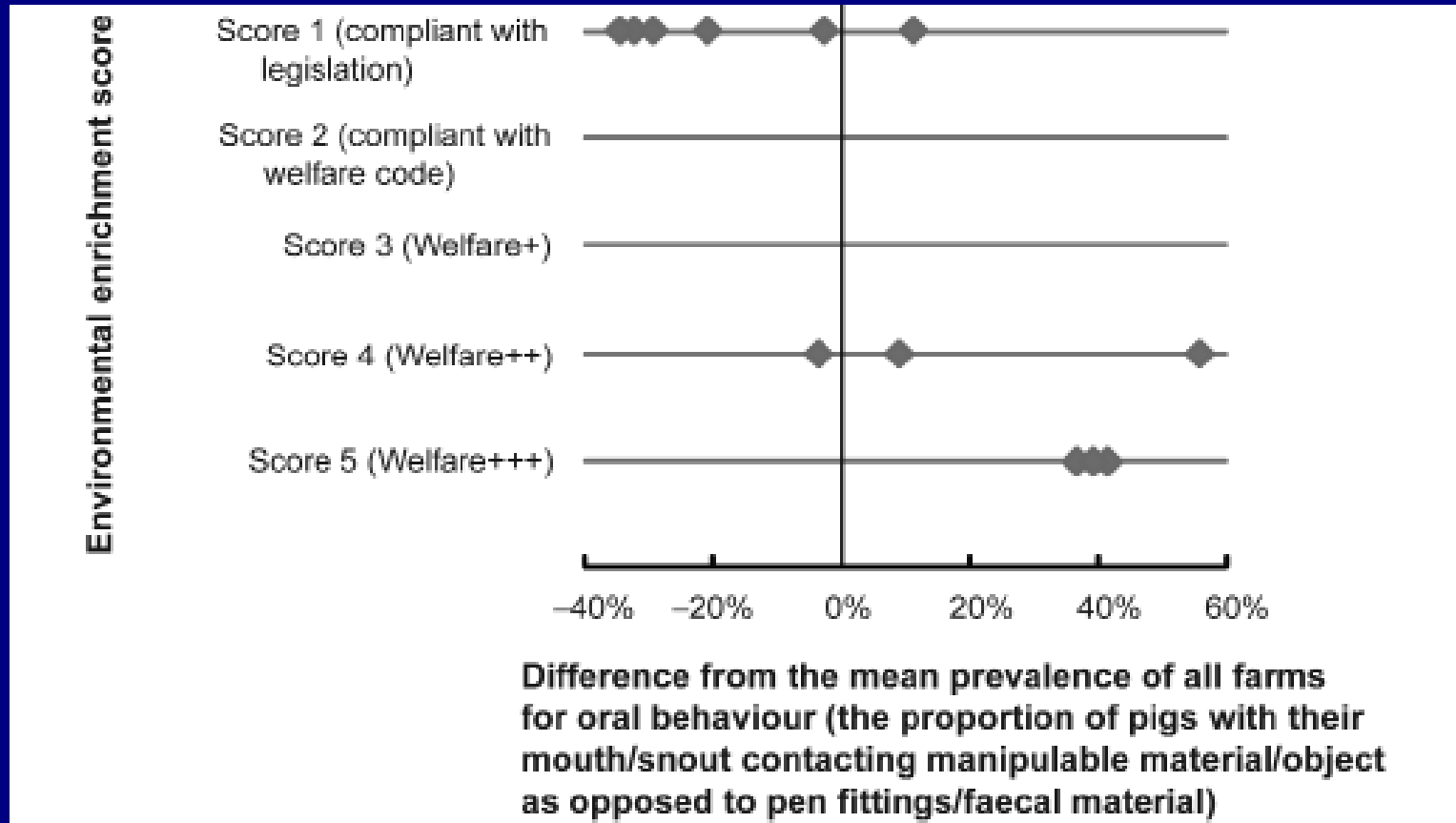
82 finishing units assessed by farm vet at 3 quarterly visits



Mean score	0.37
Lower quartile	0.25
Median	0.37
Upper quartile	0.49
95 th percentile	0.62

Measure now rolled out in most UK farms as part of Red Tractor farm assurance

Is this score a useful enrichment measure?



15 UK farms, 5 pens, 100 pigs/farm

(Mullan et al., 2011)

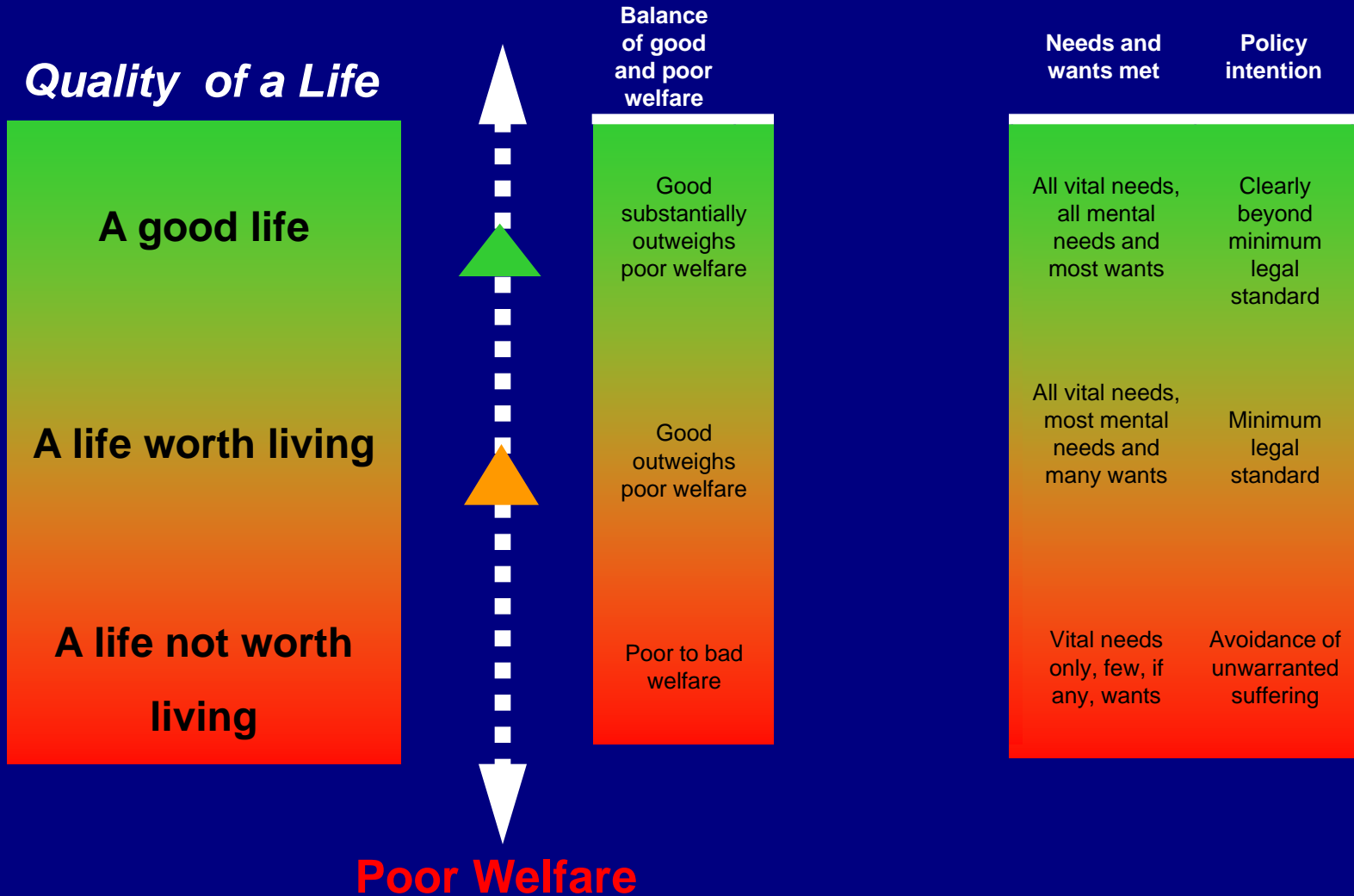
Is this score a useful enrichment measure?

- 63 farms, 170 visits, 981 pen evaluations
- In straw pens, the score was a significant predictor of tail lesions. A higher proportion of active pigs manipulating other pigs significantly predicted a higher probability of tail lesions.
- For non-straw pens, the proportion of pigs occupied with the pen floor or fittings was a significant factor in risk of tail lesions, as was a higher proportion of active pigs manipulating other pigs.

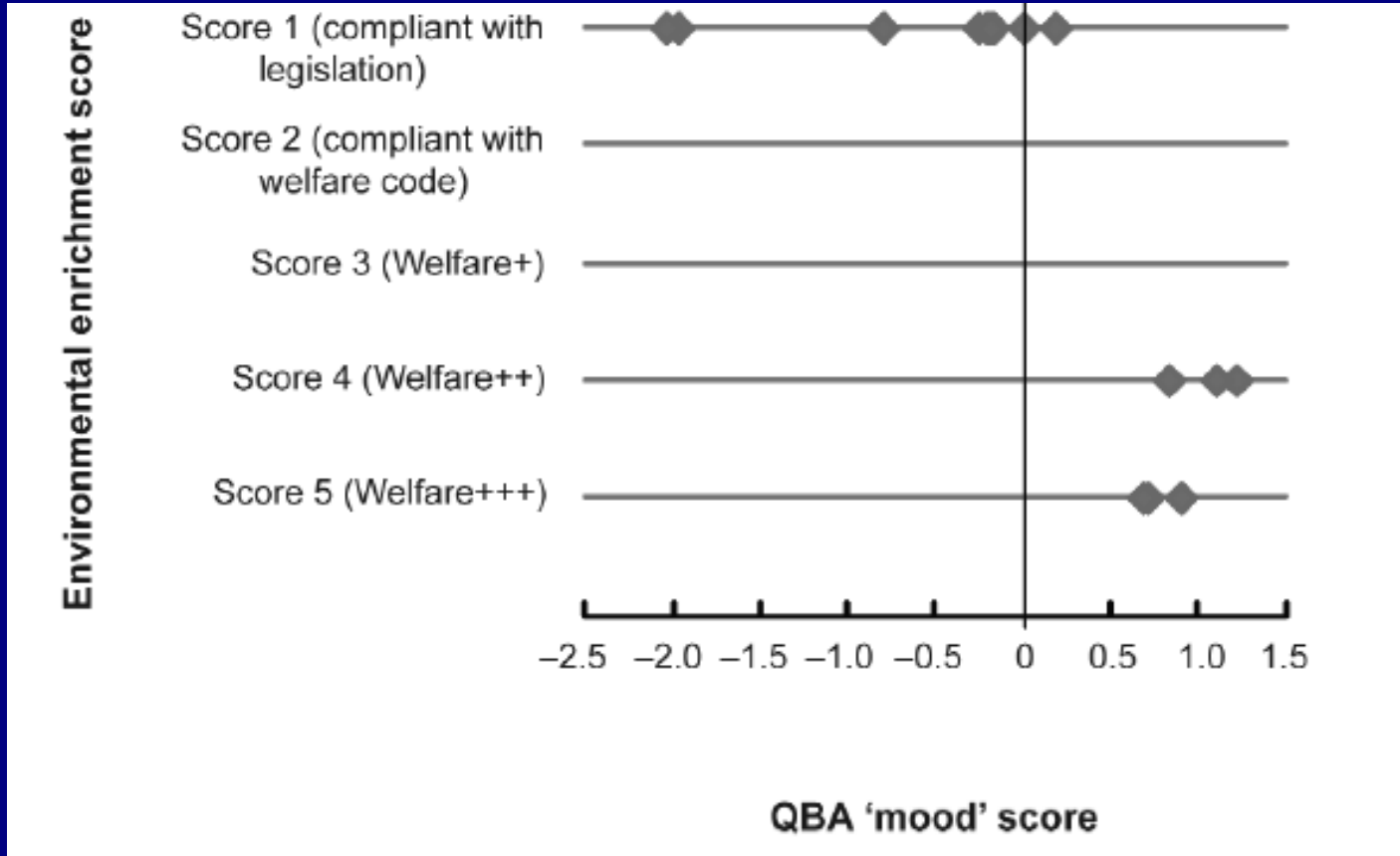
(Taylor et al., unpublished)

POSITIVE WELFARE?

Good Welfare



Does good enrichment generate “positive welfare”?



15 UK farms, 5 pens, 100 pigs/farm

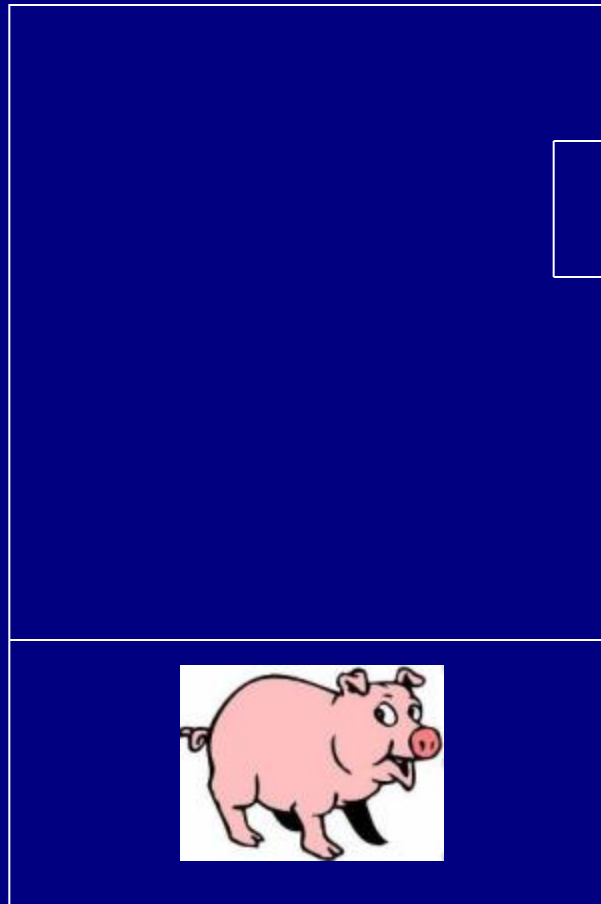
(Mullan et al., 2011)

Cognitive bias test



3 stimuli:

- Positive
(glockenspiel then apple)
= approach
- Negative
(clicker then shaken plastic)
= do not approach
- Ambiguous
(squeaky toy then nothing)
? response



The Hatch (pigs either do or do not approach this depending on the stimulus)

Pigs placed behind the line between stimuli

(30 second wait)

Housing

Prolonged environment

(4 weeks training)

New environment

(7 days)

Return to original environment

(7 days)

Group 1

Enriched



Group 2

Barren



Testing Days:

Day -1

Day 1

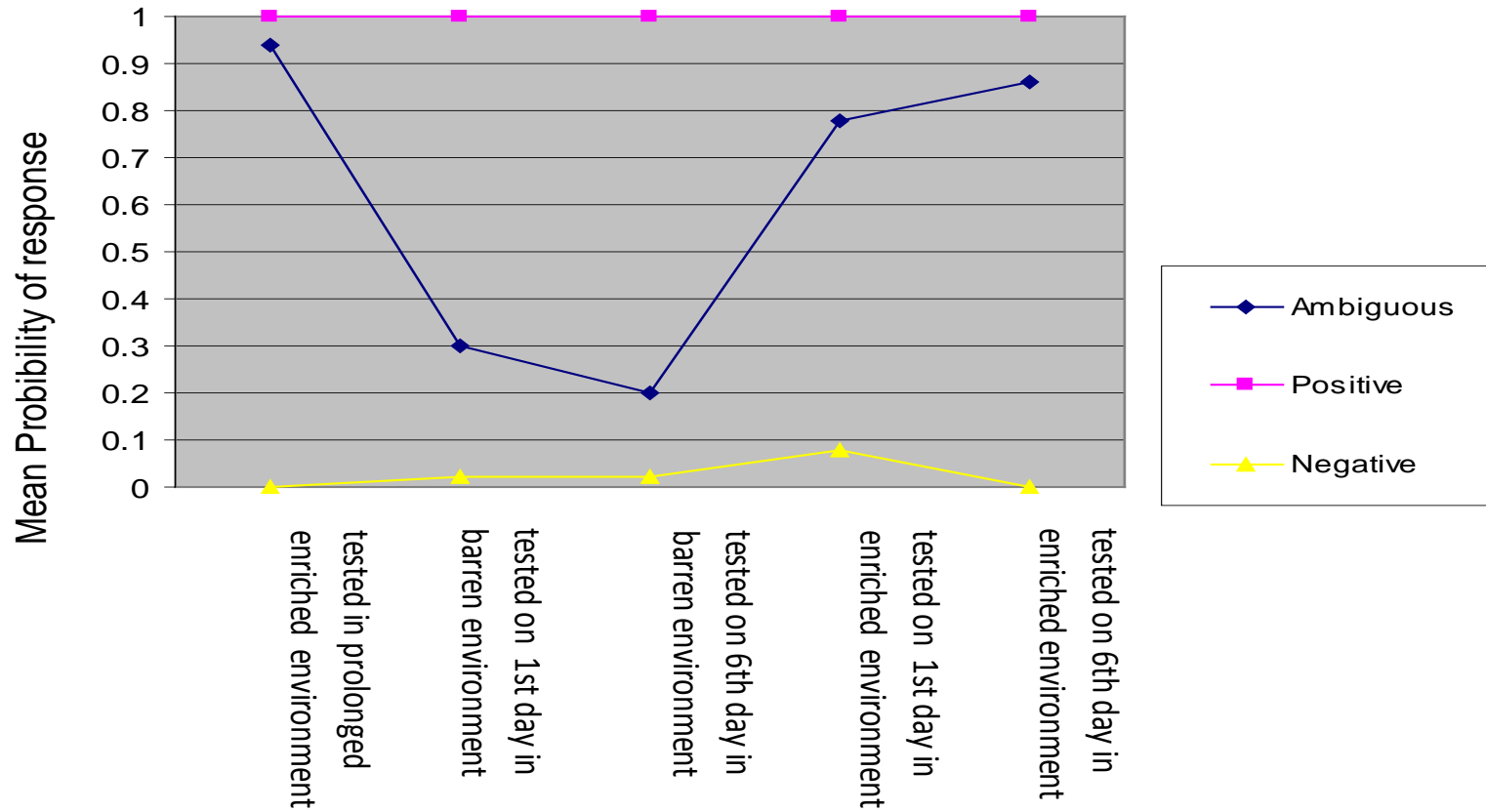
Day 6

Day 1

Day 6

Results

Group 1 (enriched first) – Probability of response



(Douglas et al., 2012)

Conclusions

- Enrichment is a complex concept
- Legislation on “type” (object/material) ignores other important aspects
- Outcome measures should be applied
 - but evaluation should be more than just absence of injurious behaviour
- Measures to define “positive welfare” value of enrichment need further development