Practical enrichments for growing pigs on commercial farms

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What is enrichment?

- Introduction of stimuli or modifications to the environment to better meet the **species-specific behavioural and physiological needs**
  - key to the species' survival
- For pigs this means:

Foraging behaviour: rooting, exploration, chewing

Credit: Alberta Agriculture and Irrigation

Nesting behaviour

Credit: Alberta Pork

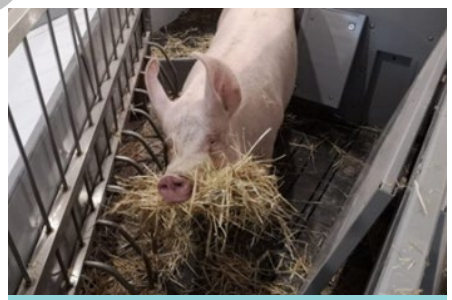
Thermoregulatory behaviour: wallowing

Credit: Alberta Agriculture

Why give enrichment?

- We cannot breed against species-specific motivations, so we must cater to them
- Most commercial barns have limited space and a relatively barren environment which limits these natural behaviours
- Inability to perform these behaviours negatively affects welfare, behaviour, physiology, and productivity
  - Stressed pigs cannot handle diseases as well and may grow slower
  - Can lead to damaging behaviours such as tail biting
- Enrichments can help!

Credit: Miranda Smit



Credit: The PigSite: PigSAFE

Credit: Yolande Seddon

Regulations for enrichments

Canadian Pork Council
Conseil canadien du porc

PigCARE: ≥2 enrichment options must be provided to pigs at all stages of production

Code of Practice for the Care and Handling of Pigs

REQUIREMENTS

Pigs must be provided with multiple forms of enrichment that aim to improve the welfare of the animals through the enhancement of their physical and social environments.

- Vague on characteristics of enrichment to use
- New Pig Code coming – stricter regulations?

What makes enrichments effective?

- Growing pigs are motivated to root & chew
- Effective physical enrichments trigger behavioural feedback loops that satisfy motivations

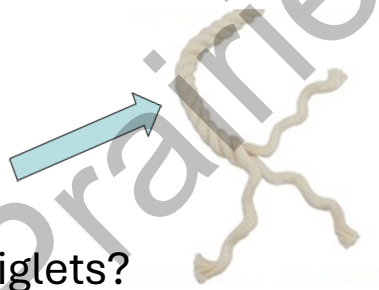
- Characteristics of effective physical enrichment
  - Destructible/ malleable/ deformable
  - Chewable – surface can be broken & ingested
  - Edible
  - Rootable
  - Odorous
  - Novel/ Fresh/ Clean from feces & urine

How can we improve enrichment attractiveness & effectiveness?

- **Size/structure** – can a pig grab/grasp with mouth and teeth fully to manipulate?

- **Quantity** – is there enough to manipulate in a meaningful way?

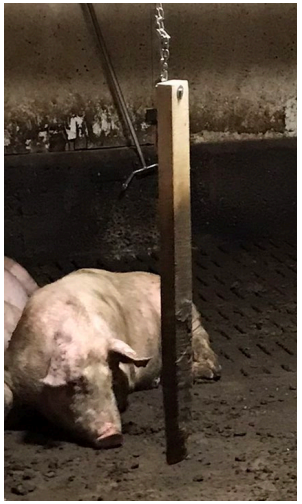
Thin rope: more appropriate for piglets?



How can we improve enrichment attractiveness & effectiveness?

- **Placement/location** – if suspended, is it low enough for pigs to grab with mouth?
  - Does a pig have to lift its neck to interact with object? Consider: pig neck physiology – designed to help root at ground level, not to be looking up and holding head up

How can we improve enrichment attractiveness & effectiveness?



- **Cleanliness** – once dirty, pigs lose interest fast.
  - Interacts with how items are positioned = need to strike a good balance to keep items clean, but accessible to pigs

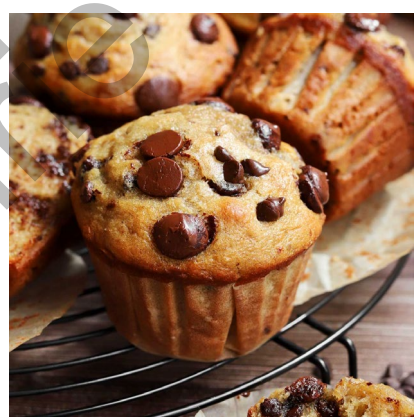
- **Novelty**
  - new objects provided in the pen
  - old objects, provided in rotation
  - new smells

A little exercise…

	Straw (bedding/litter)	Hanging rope	Hanging toy	Hanging chain
				
• Destructible/malleable /deformable	✓	✓	~	X
• Chewable – surface can be broken & ingested	✓	✓	~	X
• Edible	✓	~	X	X
• Rootable	✓	X	X	X
• Odorous	✓	~	~	X
• Novel	✓	✓	X	X
• Fresh/Clean from feces & urine	~	✓	~	✓

But pigs chew on chains…

- Interaction with the enrichment does not in itself indicate improved welfare
  - Remember: need to trigger behavioural feedback loop that satisfies motivations
- Imagine you are hungry and have a craving for something sweet:



How is effectiveness of enrichment measured?

- Measurable, positive welfare outcomes:
  - Physiological:
    - less stress (↓ cortisol)
    - better immunity (↓ inflammation biomarkers ; ↓ need for medical treatments, ↓ mortality)
  - Behavioural/psychological:
    - social dynamics (calm groups)
    - promotion of species-relevant behaviours (i.e. rooting)
    - reduction of abnormal/damaging behaviours (i.e. tail biting)

Research trial – commercial and research farm

Aim:

Find practical (affordable, not labour-intensive) enrichments for growing pigs (wean to slaughter) in commercial farms that provide benefits for welfare and production parameters

Research trial – commercial and research farm

Measures taken:

- **Pig performance:** growth, mortality, medication use
- **Carcass traits:** lean, fat, loin
- **Ease of handling:** time to move pigs or give injections, handleability score
- **Level of aggression**: lesion scores
- **Damaging behaviour**: tail biting
- **Behaviour:** enrichment use, pen mate manipulation
- **Economic analysis –** in progress

Enrichment groups – commercial farm

	Control – chains	Static – toys	Renewable
Nursery (24-28 pigs/pen)			The cardboard and rope were replaced once per week.
Grower (24 or 48 pigs/pen)			
Finisher (24 or 48 pigs/pen)			The wood plank stayed in the pen the entire finisher period.

Enrichment groups – PSC

	Control – chains	Static – toys	Renewable
Nursery (10 pigs/ pen)			The rope was replaced once per week. The wood plank stayed in the pen the entire finisher period.
Grow-Finish (9 pigs/pen)			

Commercial barn results – pig performance

- Body weight at nursery exit – no effect
- Pig removal (found dead, euthanized, or moved to the sick pen):

	Chains	Toys	Renewable	P-value
Nursery				
# pigs removed	22	24	21	
% pigs removed	3.12	3.22	2.96	0.974
Grow-finish				
# pigs removed	55	36	37	
% pigs removed	7.62	4.65	6.12	0.177

Commercial barn results – pig performance

- Medication use:

	Chains	Toys	Renewable	P-value
Nursery				
# of pigs treated per pen	7.76	6.73	8.38	0.118
Pigs treated (% of total pigs per pen)	31.43 ab	26.53 b	34.21 a	<0.05
Medication use (# pigs x # treatments)	20.28 a	17.62 b	22.15 a	<0.01
Grow-finish				
# of pigs treated per pen	4.61	3.56	4.86	0.177
Pigs treated (% of total pigs per pen)	14.19 ab	10.43 b	14.82 a	0.083
Medication use (# pigs x # treatments)	8.12 a	6.23 b	8.77 a	<0.05

- No difference between chains and renewable. Why?

Commercial barn results – carcass traits

	Chains	Toys	Renewable	P-value
Number of carcasses	515	539	526	
# days weaning – slaughter	158.8	158.5	158.3	0.805
Calculated live weight (kg)	146.71 a	145.19 b	143.80 b	<0.001
Carcass weight (kg)	117.37 a	116.15 b	115.04 b	<0.001
Total carcass weight (kg)	60,160	62,322	60,250	
Backfat depth (mm)	18.73	18.43	18.16	0.216
Loin depth (mm)	63.60	63.01	62.67	0.313
Lean yield (%)	60.76	60.86	60.96	0.396

Commercial barn results – ease of handling

- No effect on moving time from nursery to grower, or from grower to finisher
- No effect on Improvest injection time

Commercial barn results – Aggression & tail biting

- Preliminary analysis
- No effects of enrichment

	Chains	Toys	Renewable	P-value
Skin lesion score (% pigs/pen)				
0 (no lesions)	70	71	67	0.550
1 (<10 lesions)	25	24	29	0.421
Tail lesion score (% pigs/pen)				
0 (no lesions)	14	16	16	0.825
1 (chew marks, but no puncturing of skin)	79	74	76	0.669
≥2 (puncture wounds, damaged skin with swelling and fresh blood)	4	5	5	0.745

Commercial barn results – Behaviour

- Preliminary analysis
- No effects of enrichment, but numerically…

	Chains	Toys	Renewable	P-value
Enrichment use (n=interactions/min)	1.94	2.84	3.08	0.151
Pen mate manipulation (tail & ears; n=instances/min)	3.70	3.65	3.13	0.127

PSC results – pig performance

- BW and ADG from weaning to slaughter – no effect
- Pig removal: no statistical effect, but numerically…

	Chains	Toys	Renewable	P-value
Nursery (% of d0)	1.7	0.0	0.8	0.851
Grow-finish (% of d28)	13.9	9.3	5.6	0.143
Total (% of d0)	14.2	8.3	5.8	0.103

PSC results – pig performance

- Medication use:

	Chains	Toys	Renewable	P-value
Number of pigs medically treated (as % of pigs per pen)				
Nursery	9.1	4.1	5.0	0.252
Grow-Finish	2.8	0.9	0.9	0.487
Overall	11.5	4.9	5.7	0.129
Medication use (# pigs treated x # treatments/pig)				
Nursery	1.80 a	0.82 b	1.06 ab	0.099
Grow-Finish	0.71	0.24	0.24	0.131
Overall	2.48 a	1.04 b	1.28 b	<0.05

- Toys and renewable are not different from each other, but numerically toys group is the lowest, similar to the commercial barn

PSC results – carcass traits

	Chains	Toys	Renewable	P-value
# days weaning – slaughter	117.3	116.4	116.7	0.836
Live weight at shipping (kg)	128.80	127.81	128.31	0.769
Carcass weight (kg)	101.37	100.65	100.67	0.766
Backfat depth (mm)	19.62	19.14	19.35	0.660
Loin depth (mm)	71.89	73.20	71.79	0.169
Lean yield (%)	60.80	61.04	60.88	0.542

PSC results – ease of handling

- No effect on moving time from nursery to GF
- Handleability score (lower = better):

score 1 = no issues getting into the scale
score 2 = pig hesitates before entering the scale
score 3 = pig tries to escape or refuses to enter the scale

Average score per pen	Chains	Toys	Renewable	P-value
End of nursery (d28)	1.45	1.46	1.37	0.343
Grower (d62)	1.23 b	1.14 b	1.35 a	<0.01
Finisher (d97)	1.07 b	1.05 b	1.19 a	<0.05
Shipping	1.24	1.33	1.42	0.524

PSC results – Aggression

- Preliminary analysis
- No effect in nursery and grower

	Chains	Toys	Renewable	P-value
Skin lesion score (% pigs/pen) – Finisher				
0 (no lesions)	91.6 a	92.2 a	80.9 b	<0.05
1 or 2 (mild, no severe wounds)	8.4 b	7.8 b	19.1 a	<0.05

Frustration going from rope to wood?

PSC results – Tail & ear biting

	Chains	Toys	Renewable	P-value
Tail lesion score (% pigs/pen) - Nursery				
0 (no lesions)	0.8 b	2.2 ab	7.6 a	0.05
1 (chew marks, but no puncturing of skin)	68.2	74.1	62.1	0.566
≥2 (puncture wounds, damaged skin with swelling and fresh blood)	27.7	16.2	19.1	0.457
Tail lesion score (% pigs/pen) - Grower				
0 (no lesions)	1.9 a	9.5 a	0.4 b	<0.05
1 (chew marks, but no puncturing of skin)	75.1	75.6	94.7	0.126
≥2 (puncture wounds, damaged skin with swelling and fresh blood)	16.0 a	4.2 a	2.9 b	0.086
Ear lesion score (% pigs/pen) – Nursery (no effect in grower and finisher)				
0 (no lesions)	5.1 b	19.2 a	20.4 a	0.05
>0 (superficial bites or bloody ears)	94.9 a	80.8 b	79.6 b	0.05

PSC results – Behaviour

- Preliminary results

	Chains	Toys	Renewable	P-value
Enrichment use count				
Nursery	1.0	2.1	1.3	0.253
Grower	1.6 b	3.8 a	2.5 ab	0.082
Finisher	1.0 b	3.7 a	2.1 ab	<0.05
Pen mate ear and tail manipulation count				
Nursery	2.4 a	1.5 ab	1.2 b	0.097
Grower	0.8	1.8	1.9	0.121
Finisher	0.5	0.5	0.9	0.418

In alignment with nursery tail bite results

Conclusion

- Pigs with chains have highest removal rate and highest medication use in both trials
- Toys (static) seem to work slightly better than the renewable enrichment for performance and welfare parameters
  - **Why?**
    - Rope and cardboard disappeared within a few days but only renewed once a week, so just a chain the rest of the week
    - Potential for frustration in pigs: exposed to effective, attractive enrichment for a short period only

Other things we've learned

- Number of pigs per piece of enrichment
  - Reason for difference in behavioural changes between PSC and commercial barn?
    - 1 in 24 at commercial barn
    - 1 in 9 at research barn

VS

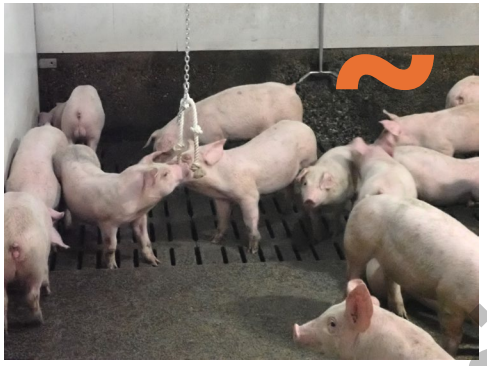
Other things we've learned

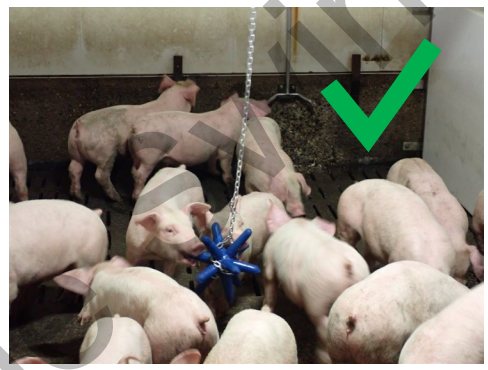
Enrichment lasted:

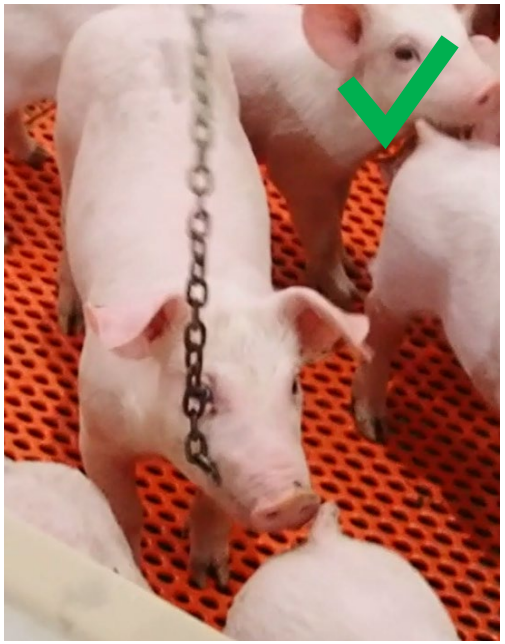
- ~2-3 barn turns for Luna and Astro
- 1 barn turn for PorkyPlay
- 1 barn turn for wood
  - Cannot be cleaned
- 4-7 days for rope
- 2-3 days for cardboard

Other things we've learned

- The height of hanging enrichments matters
  - A bit lower than drinkers
  - Raise up as pigs grow







Other barns as part of this trial

- Contract grow-finish barn (Star City Colony)
  - Control (chains) vs. enriched (4 different enrichments per pen of ~400 pigs; ratio of ~ 1:100 pigs)

More to come... in Centred on Swine

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