

Behavioural tests to screen the satiating properties of dietary fibre sources in adult pigs

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Background

Objectives

Methods

Results

Discussion

Conclusion

Questions

■ Dietary fibre (DF)

- Edible parts of plants or analogous carbohydrates
- Neither digested nor absorbed in the small intestine
- Fermented partially or completely in the colon

(AACC, 2001)

■ Satiety

- Period of time following a meal when hunger and desire to eat are inhibited (Le Magnen, 1982)



Beneficial role of DF to induce satiety

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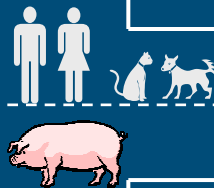
Results

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**Human
Nutrition**



**Animal
Nutrition**



↑ Satiety
↓ Hunger
↓ Food intake
(Body weight loss)

(Howarth *et al*, 2001)

**Obesity &
associated
diseases**

+ food
- food

**Animal
welfare &
behaviour**



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Our project

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“Fermentation in the gut to prolong satiety”

- Estimate the contribution of DF to the regulation of satiety
- Identify the working mechanisms by which DF affect satiety
- Pig as a model for humans/self



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“Fermentation in the gut to prolong satiety”

- ✓ Similar digestive function
- ✓ Similar diet (omnivorous)
- ✓ Better standardization
- ✓ Easier access to body tissues

- Pig as a model for humans/self



Pilot study – Measuring satiety in pigs

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- To develop reliable behavioural tests for assessing satiety in adult pigs



Animals and housing

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- 10 adult female pigs
- Housed in pairs (5 x 2)
- Individually fed in 2 separate boxes
- Enrichment
 - No edible materials → Toys



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Diets (1)

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- Standard commercial pig diet
- Twice daily (7:30 and 16:00)
 - week 1 → Food provided *ad libitum* (2h/day)
 - weeks 2-4 → Food provided at 80% of *ad libitum* food intake (AFI) determined in week 1



Diets (2)

Background

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Methods

Results

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Conclusion

Questions

■ Standard commercial pig diet

■ Twice daily (7:30 and 16:00)

● 2 treatments; cross-over (round I & II)

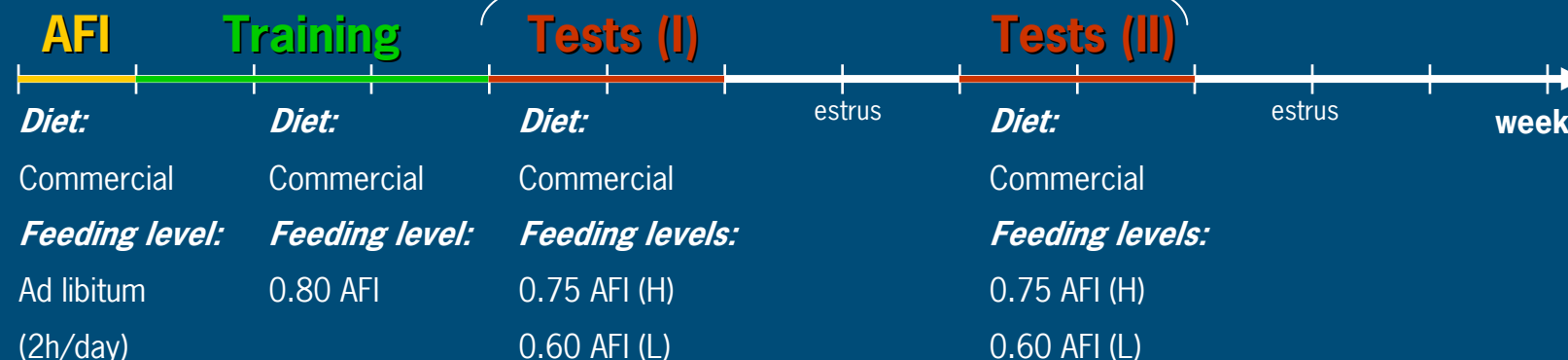
H → High feeding level (75% of AFI);



L → Low feeding level (60% of AFI);



Part 2



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Measurements

Background

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■ Behavioural tests → Feeding motivation (reversal satiety)

- Operant consumer-demand test
- Runway test



Operant consumer-demand test

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- 1h, 3h and 7h after morning meal (on 3 different days)
- Fixed Ratio (FR5) vs. Progressive Ratio (PR1)



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Runway test

Background

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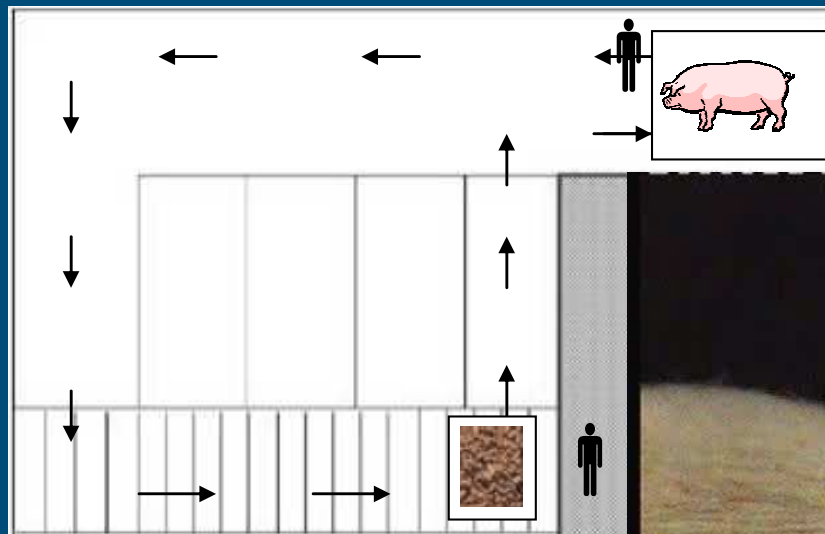
Results

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Questions

- 1h, 3h and 7h after morning meal (on 3 different days)
- Latency to reach end of the route (walktime)



Total distance = 22.5 m



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Results operant test

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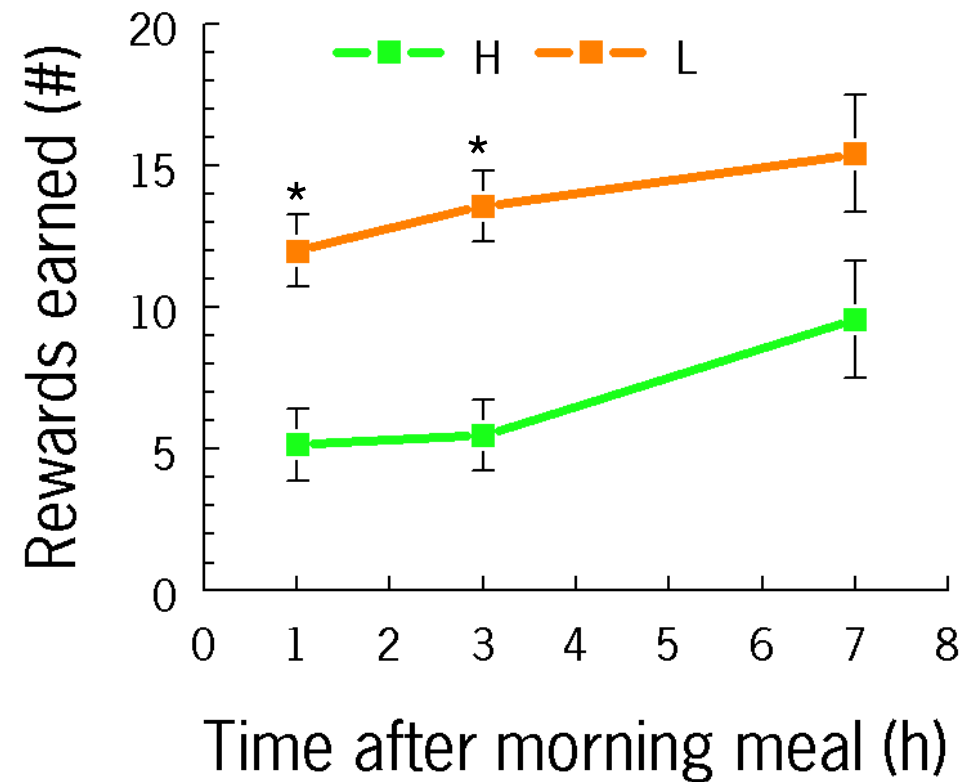
Results

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Rewards earned on PR1



Values are least square means $\pm$ SEM. * $P < 0.05$ vs. High (75%)



Results operant test

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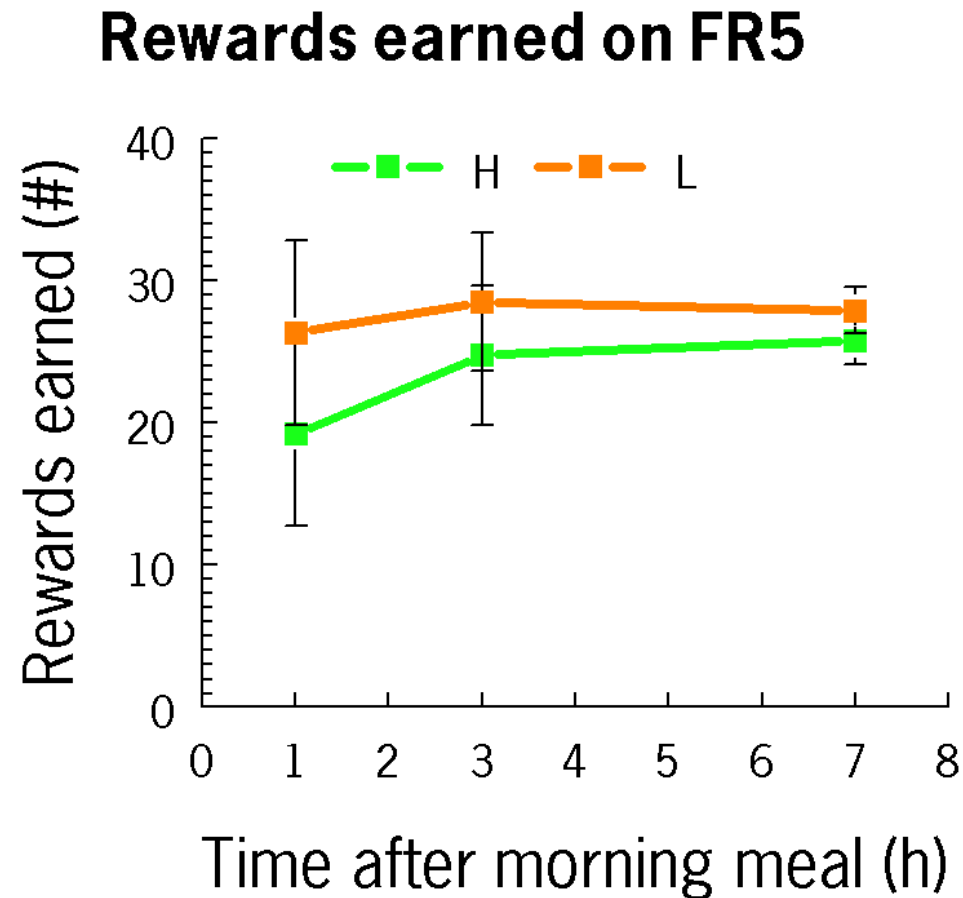
Methods

Results

Discussion

Conclusion

Questions



Values are least square means $\pm$ SEM.



Results runway test

Background

Objectives

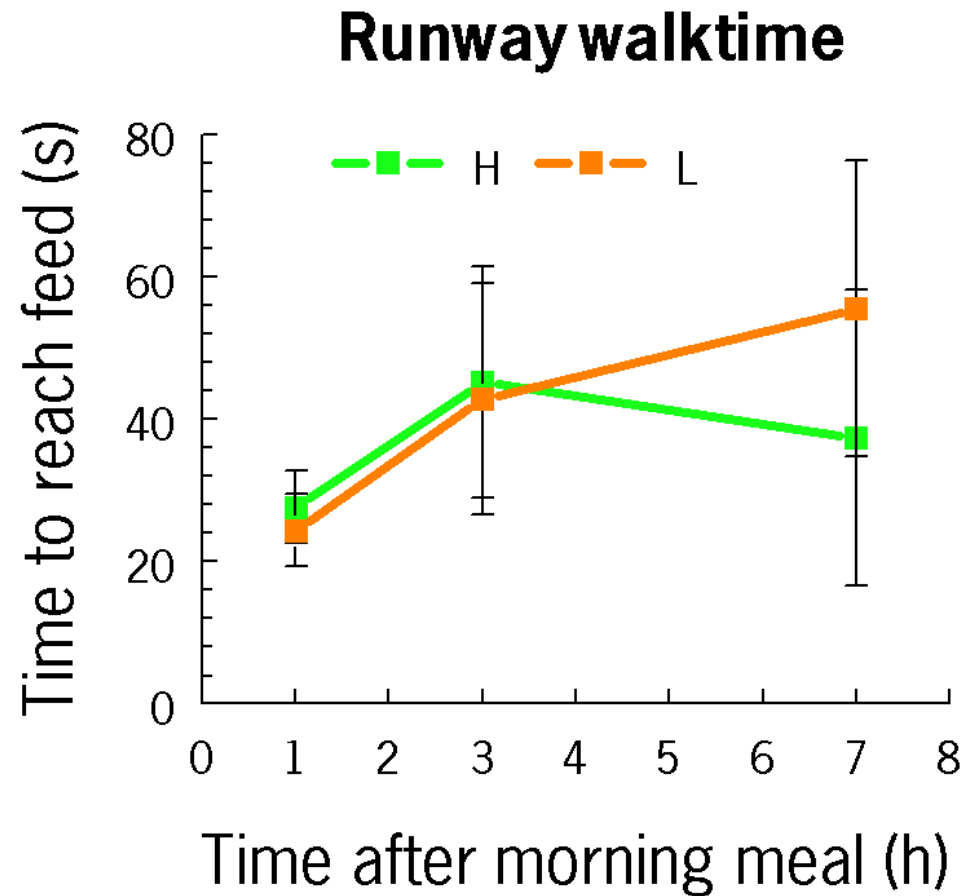
Methods

Results

Discussion

Conclusion

Questions



Values are least square means $\pm$ SEM.



General discussion

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■ PR1: most sensitive

● 1h and 3h:

- H → ↓ feeding motivation ↑ satiety
- L → ↑ feeding motivation ↓ satiety

● 7h: ↑ feeding motivation (all animals)

- time of test (15h) close to time of afternoon meal (16h)

■ FR5: less sensitive

■ Runway

- Reflected differences in feed intake only in round I, but not anymore after round II
 - Small contrast between feeding levels



Conclusion & Future work

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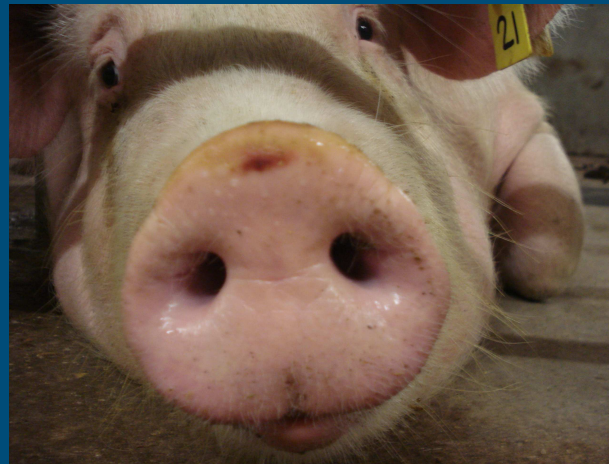
- Rewards earned in Operant consumer-demand test reliably reflected changes in satiety
 - Pigs on a low feeding level showed a higher feeding motivation (cf. lower satiety) than pigs on a high feeding level
- Final results of Runway test did not reflect changes in satiety
- Operant consumer-demand and runway tests are currently being used in a large experiment to screen the satiating properties of fibres
- In general, tests work well and correlate nicely



Thank you for your attention

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Questions?

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