



Adaptation of the rumen in transition dairy cattle: does function follow form?

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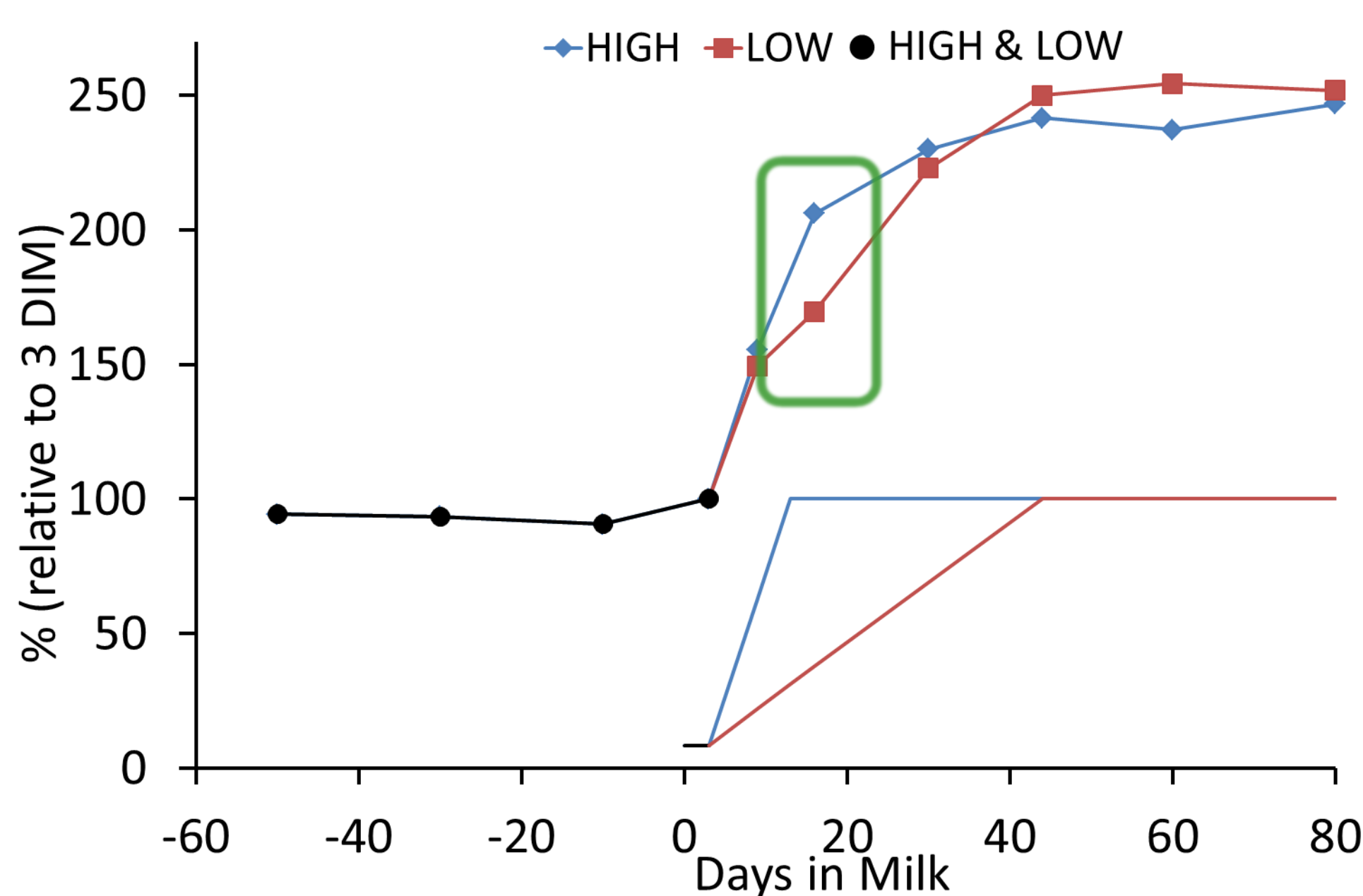
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Yes! Form (papilla surface area) & function (VFA absorption) increase after calving
No! Rate of increase concentrate allowance affects form, but has no effect on function

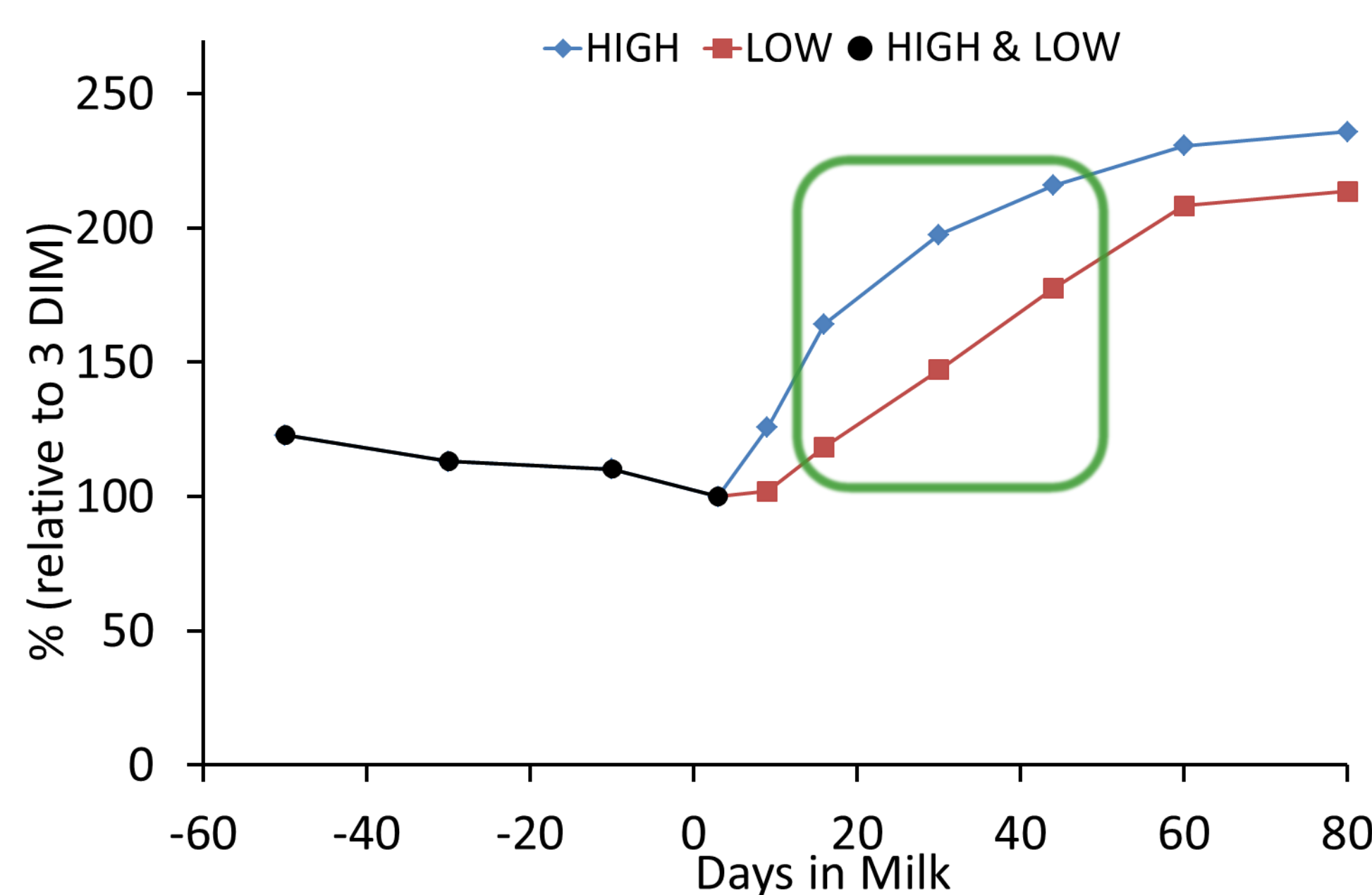
Results challenge traditional 'function follows form' view of rumen adaptation

Objectives

Create contrast in daily Fermentable Organic Matter (FOM) intake using rate of increase of concentrate allowance ❖ Repeated measurements of rumen form and function during dry-period and lactation ❖ High validity: used animal model = target species

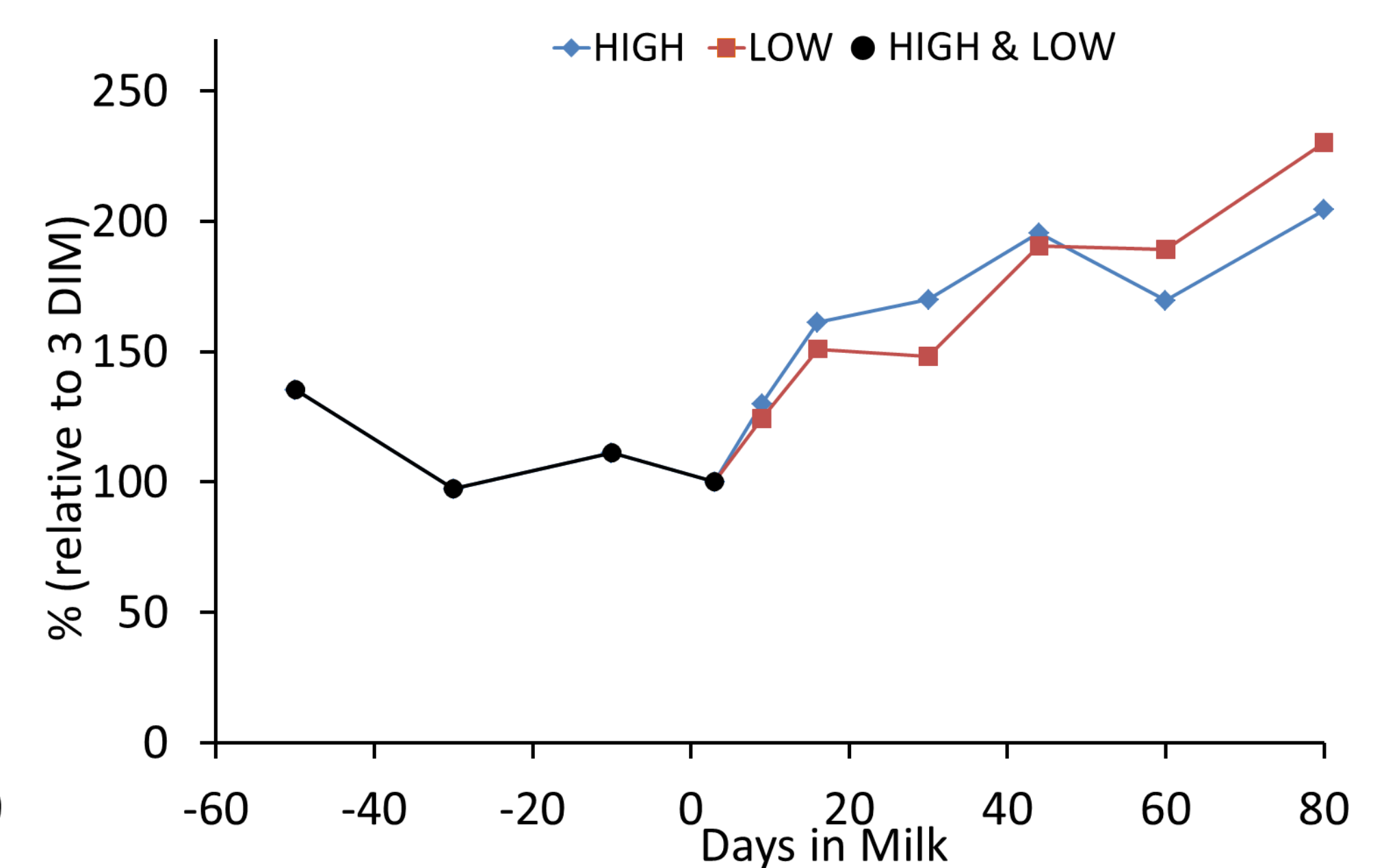


Daily FOM intake (◆—■) and daily concentrate intake (% of max., HIGH—LOW—) Green box: HIGH and LOW differ (P < 0.05)



Rumen papilla surface area

Green box: HIGH and LOW differ (P < 0.05)

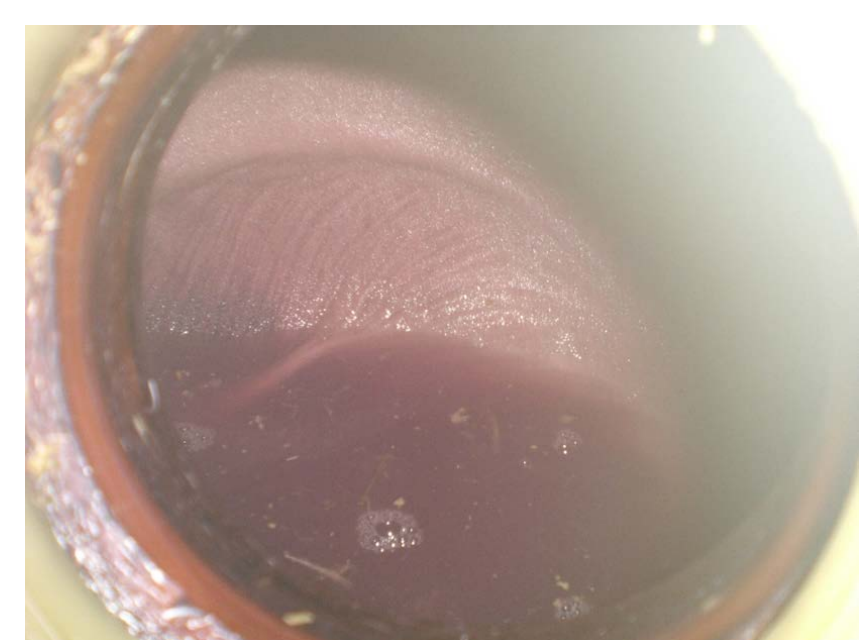


Rumen VFA absorption capacity

Methods

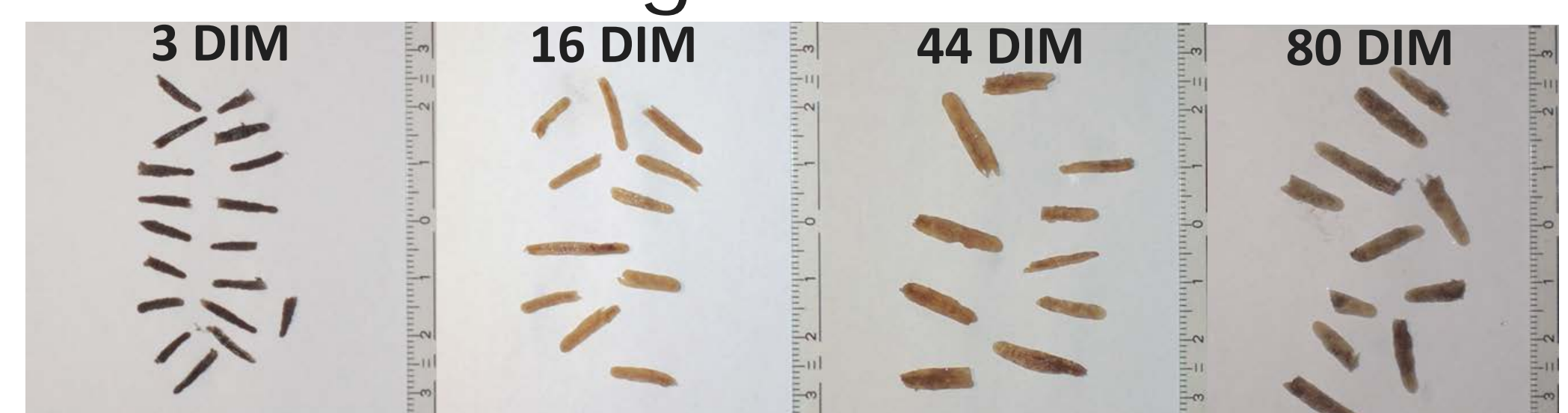
- ❖ Increase rate concentrate allowance:
 - HIGH** 1.0 kg DM/d; n=6
 - LOW** 0.25 kg DM/d; n=6
 - Start at 4 DIM, max. 10.9 kg DM/d
- ❖ Rumen-wall form:
 - Papilla biopsies, 3 sites
- ❖ Rumen-wall function:
 - infusion and 60 min. incubation of 46 L buffer at pH 6.0 with 120 mM VFA and 0.07 g/L Co-EDTA

- Acetic acid 60%
- Propionic acid 25%
- Butyric acid 15%

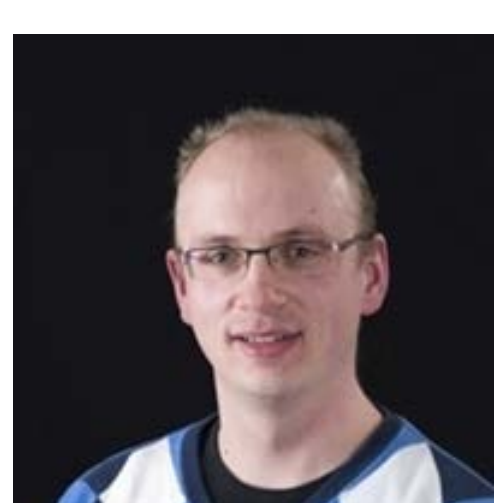


Results

- ❖ Daily FOM intake:
 - Similar from -50 to 3 DIM
 - HIGH 22% higher than LOW at 16 DIM
- ❖ Papilla surface area:
 - 19% decrease from -50 to 3 DIM
 - HIGH 39% larger than LOW at 16 DIM



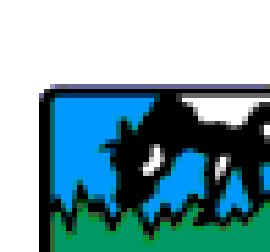
- ❖ VFA absorption capacity:
 - 26% decrease from -50 to 3 DIM
 - HIGH similar to LOW at 16 DIM



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