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Breaking Barriers: Exploring Dietary Factors Influencing Gut Function for Cattle

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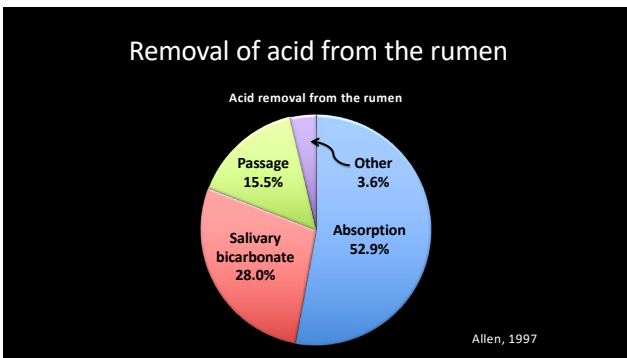
Critical roles of a healthy gastrointestinal tract

- **Absorptive and secretory**
 - Feed digestion
 - Digesta passage
 - **Regulates luminal pH**
 - **Nutrient absorption**
 - Urea recycling
- **Barrier**
 - First arm of the immune response
 - Prevents pathogen and antigen translocation
 - Intrinsic, extrinsic, immunological (Jorfi et al., 2011)
- **Communicative**
 - Facilitates cross-talk between host and microbiota
 - Nutrient sensing and signaling
 - Gut peptides (ghrelin, GIP, GLP1, GLP2, PYY, etc.)

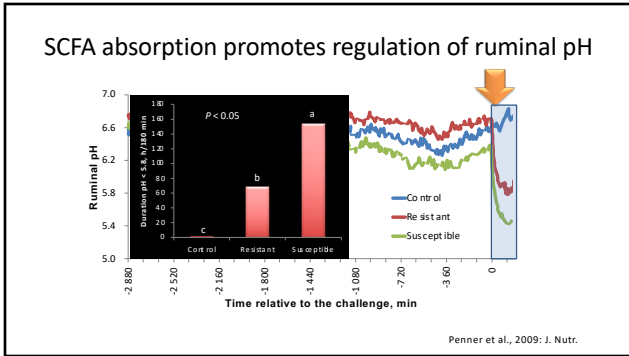


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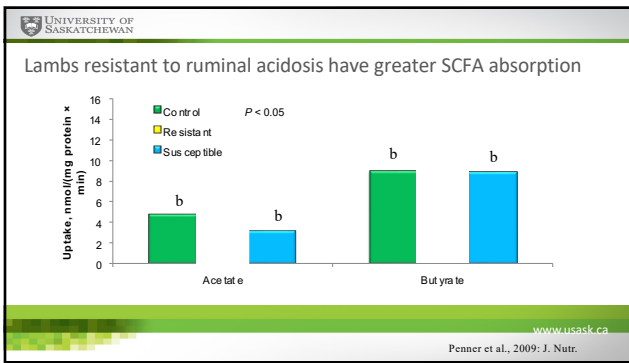
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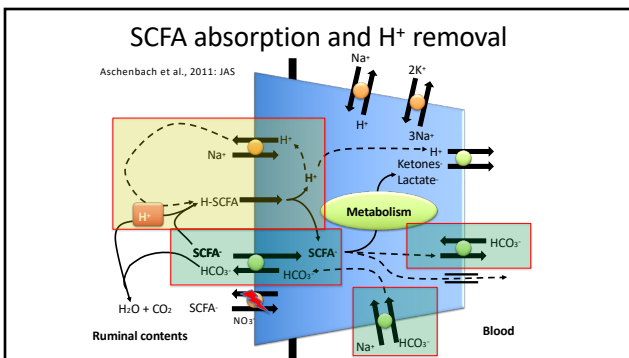
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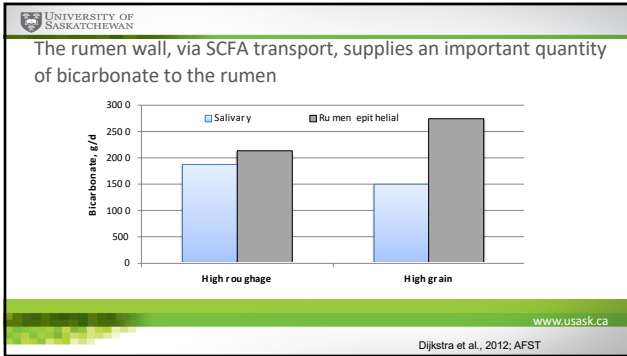
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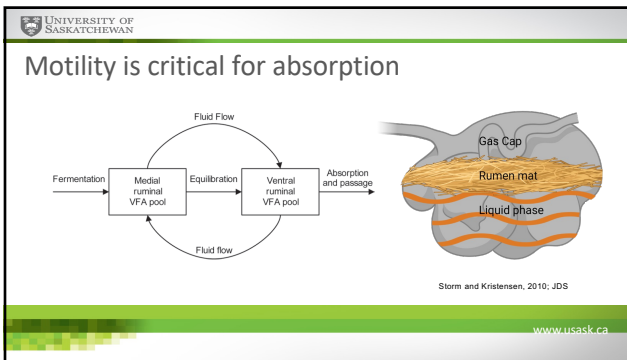
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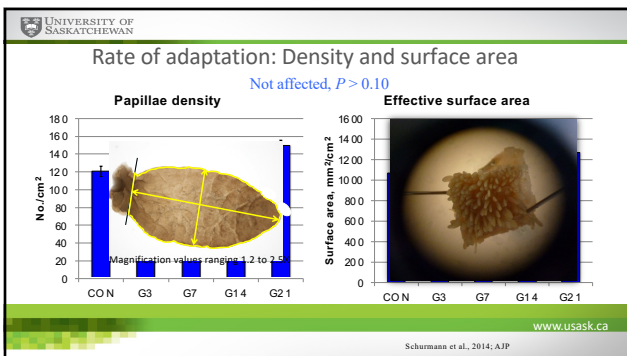
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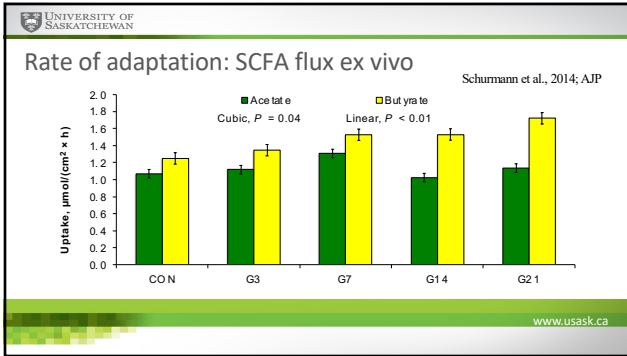
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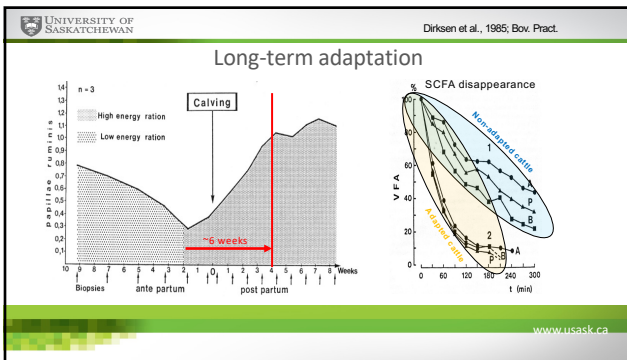
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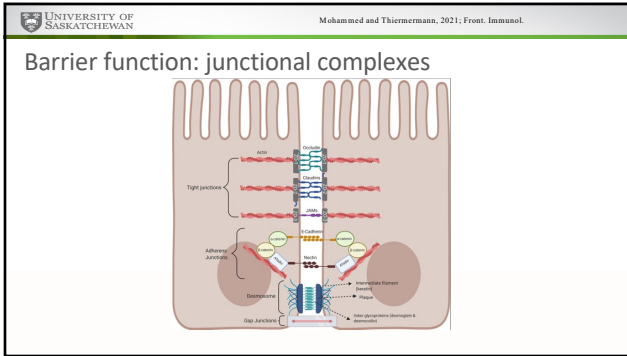
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Critical roles of a healthy gastrointestinal tract

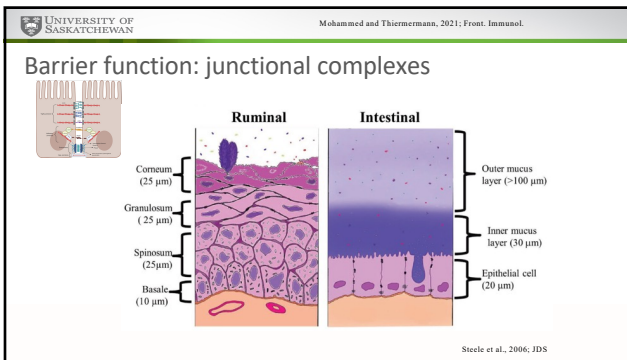
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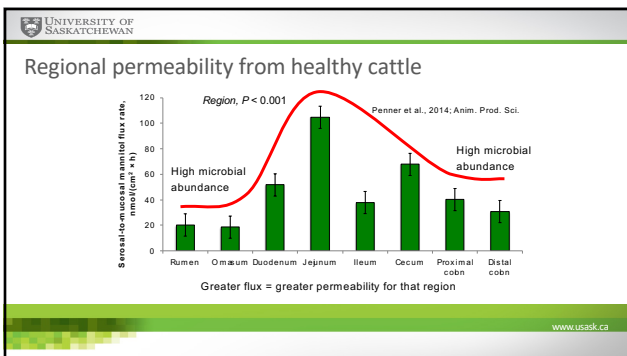
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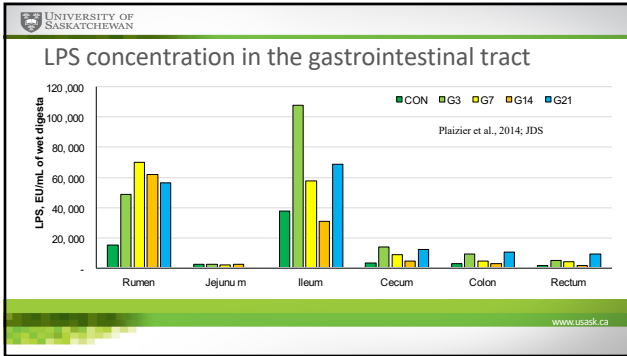
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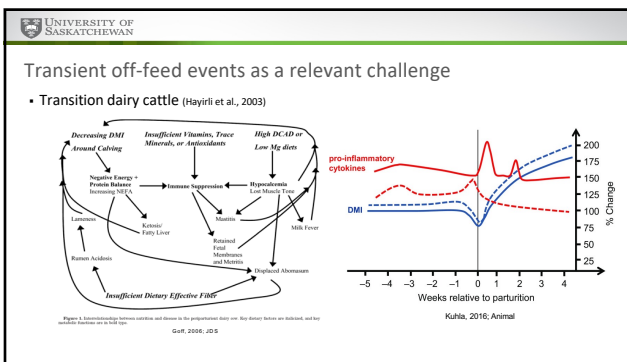
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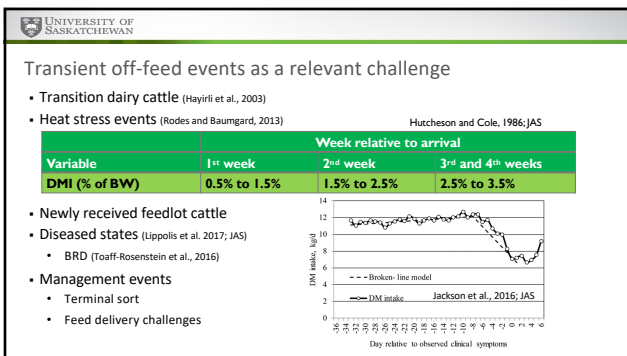
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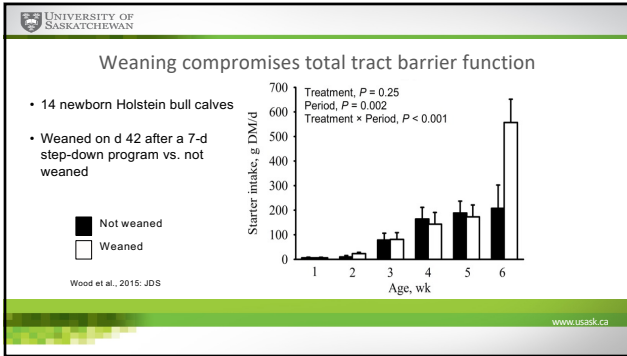
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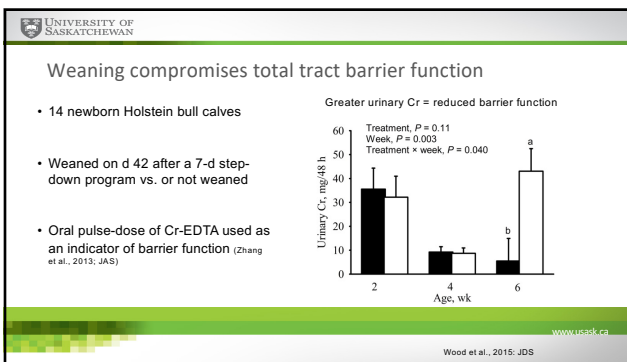
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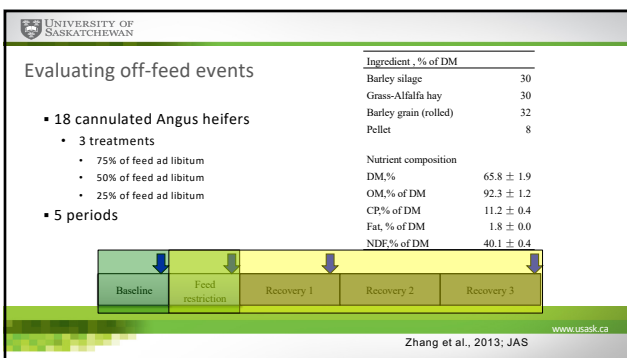
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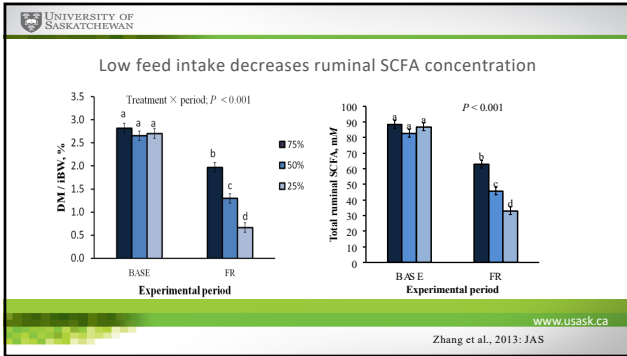
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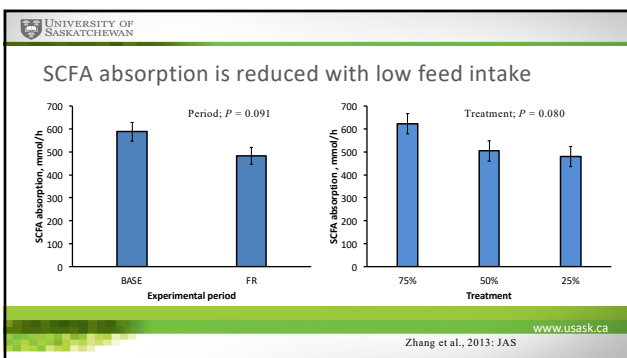
Low feed intake increased luminal pH in the rumen and prox. colon

Region ¹	Treatment			SEM	P Value	
	CON	RA	LFI		CON vs. RA	CON vs. LFI
Reticulo-rumen	6.14	5.33	6.61	0.14	0.001	0.032
Duodenum	5.28	4.99	5.18	0.35	0.71	0.82
Jejunum	7.03	6.98	7.31	0.16	0.82	0.22
Cecum	6.96	6.33	7.05	0.15	0.012	0.68
Proximal colon	6.94	6.52	7.30	0.10	0.010	0.023
Distal colon	6.90	6.52	7.13	0.14	0.06	0.26

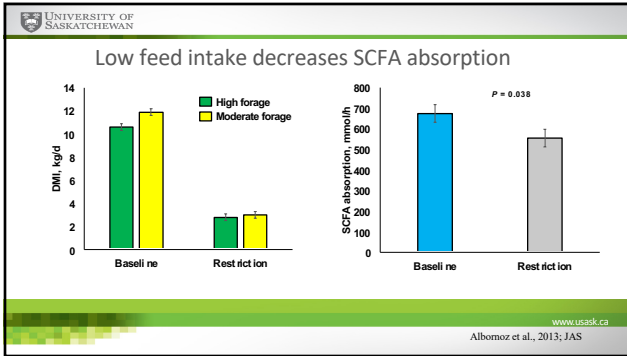
¹pH was measured using a ratio of 1:1 g/g of digesta and double distilled water

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Pederzoli et al., 2018: JAS

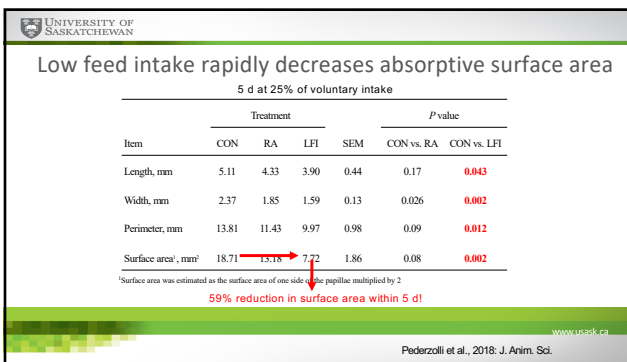
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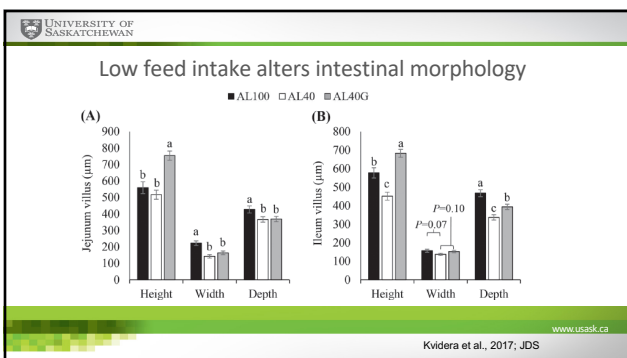
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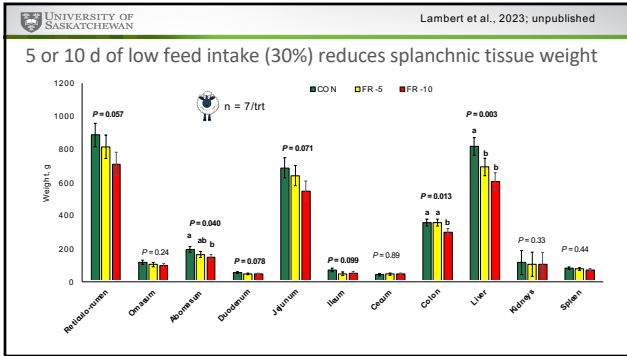
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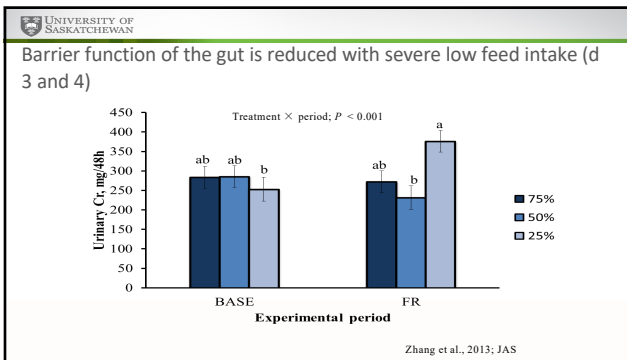
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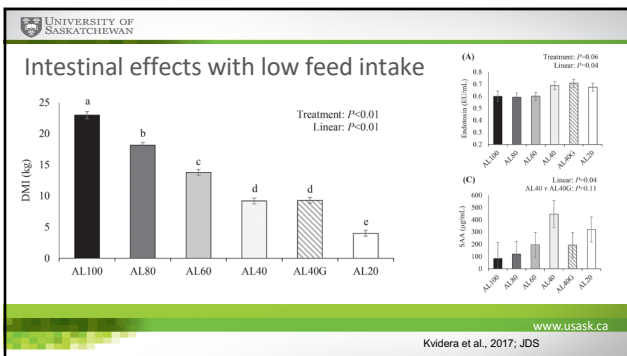
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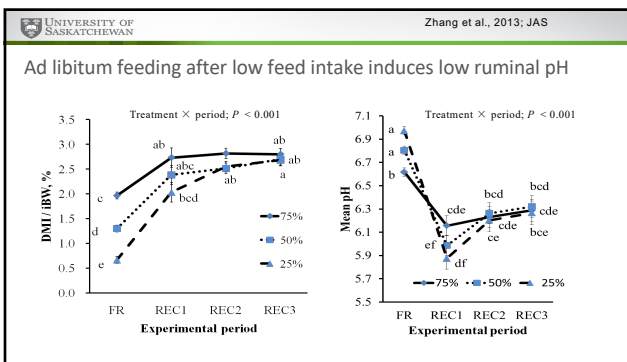
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Is there a cost to this inflammation?

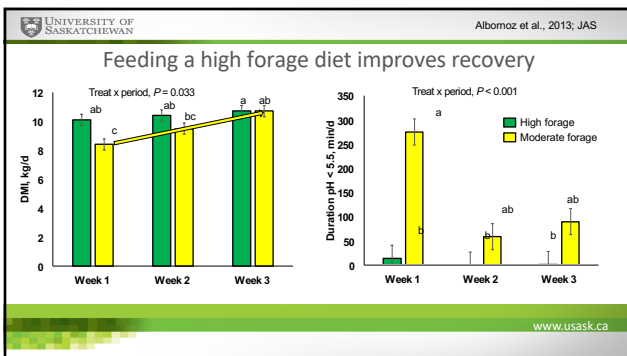
- Intravenous LPS induces glucose utilization of ~1 kg/12 h (Kvidera et al., 2017)
- Intravenous LPS dramatically increases liver amino acid uptake (McNeil et al., 2016)
 - Acute phase proteins
 - Plasma proteins
 - Lymphocyte protein synthesis
- Intentionally-induced leaky gut (Briggs et al., 2021)
 - Decreased HCW, ribeye area, yield grade

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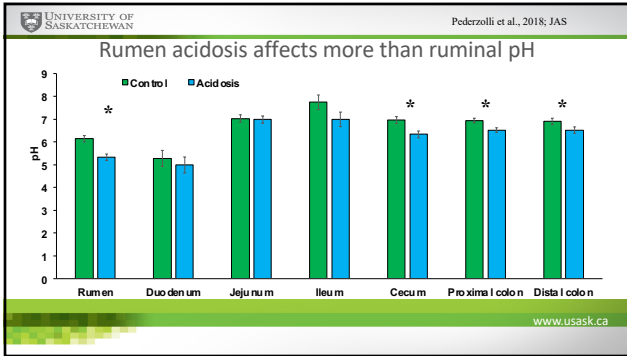
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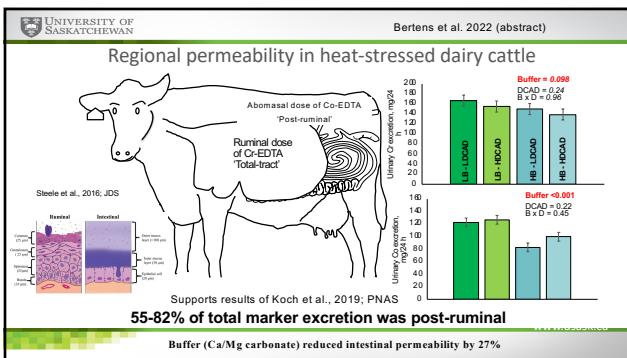
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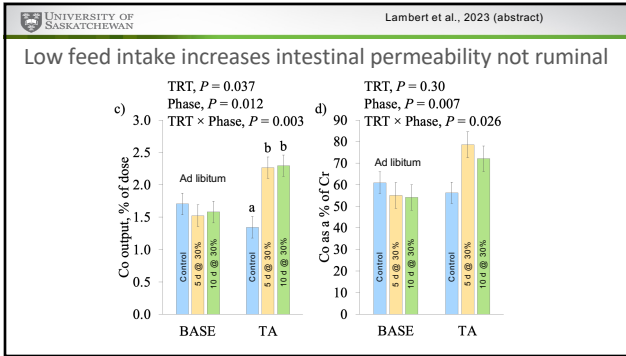
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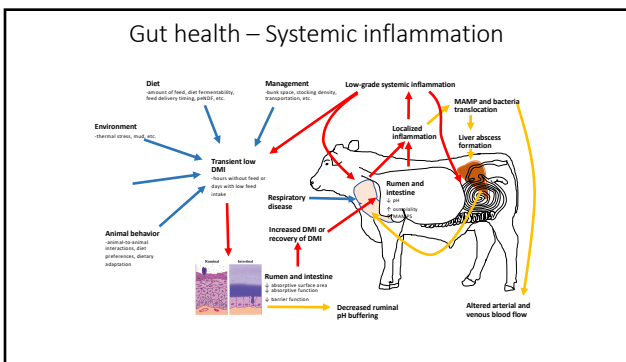
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Conclusions

- A healthy gut requires a consistent supply of nutrients
- GIT responds to low feed intake
 - Reduced nutrient supply and gut surface area
 - Reduced nutrient absorption
 - Increases risk for ruminal acidosis as they rebuild DMI
 - Reduced barrier function
 - Increased risk for inflammation
- Little is known regarding factors that promote recovery

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