Delineating spatio-temporal processes in the gut mucosa of pigs

B. Hulsegge, J.M.J. Rebel, D. Schokker, and M.A. Smits

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Relevance to livestock production

➢ Gut is important for animal performance
  ✓ Feed efficiency / growth

➢ Gut is the gatekeeper of health
  ✓ 70% of the immune cells located in mucosal tissue

Healthy | Disturbed

Animal Breeding & Genomics Centre
Focus on gut development

- Functional differentiation
- Immune system programming
- Microbiota colonization
- Nutritional factors
- Management factors

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Wageningen UR
For quality of life

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Objective

➢ Investigate intestinal development by combining multiple transcriptomic studies

✓ Spatio-temporal processes

✓ Biological function
Data – meta-analyses

9 Experiments

2 Platforms
- Agilent Technologies
- affymetrix

98 Microarrays

17 Time-points

8,069 Genes

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Results – microarrays & time-points

Histogram of the microarrays shows acceptable distribution
Proper representation of all biological functions

Mapped to human - more information
Results – Self Organizing Maps

- 9 clusters
- Different patterns
Results

Gene expression

Extracellular matrix
Metabolism

Platelets
Kainate receptor
Immune system
Cell proliferation

Cluster number

GeneRatio p.adjust
• 0.05
• 0.10
• 0.15
• 0.20
• 0.25

Factors involved in megakaryocyte development and platelet production
Ionotropic activity of Kainate Receptors
Kainate receptor expression
Immune System
Cytokine Signaling in Immune system
Interleukin Signaling
Signal Transduction
Cell Cycle Checkpoints
Synthesis of DNA
Eukaryotic Translation Elongation
Peptide chain elongation
Translation
Viral mRNA Translation
L13a-mediated translational silencing of Ceruloplasmin expression
Conclusions

- Obtained insight into time-dependent fluctuations of biological processes

- Maybe exploited to modulate particular processes changes

Changes in
- Management
- Nutrition
- Genetic background
Thank you for your attention

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