Dietary organic acids as non-antibiotic additives for aquaculture

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THE IMPORTANCE OF AQUACULTURE

- Aquaculture growth rate of 9% a year since the 1950s (FAO Statistics)
- Almost 45% of the total world fish harvest is coming from aquaculture
- 48.1 Mio t worth 70.3 Billion USD
- Top 20 countries; mainly in Asia (except: 4 in Europe, 3 in America, 1 in Africa)

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THE IMPORTANCE OF AQUACULTURE IN THE PHILIPPINES

- Top 10 world aquaculture producer (557,000 t)
- Milkfish, Tilapia and Shrimp are growing aquaculture sectors
- 2003-2005: Milkfish +17.3% (289,200 t), Tilapia +13.7% (126,600 t), Shrimp +7.7% (37,700 t)
- those 3 species worth 692.7 Mio USD

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HIGH QUALITY FISH FEED

- Fish meal, plant-protein meals as well as grain prices are rising
- Economy and sustainability of "feeding fish" gets crucially important
- Fish growth and FCR are therefore key-factors

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SUSTAINABILITY IN FISH PRODUCTION

- Growing awareness from consumers and producers
- Use of antibiotic growth promoters (AGP) increases the risk of cross-resistances
- EU does not allow the import of aquaculture species which contain residues of AGP → chance for organic aquaculture

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MODE OF ACTION OF ACIDIFIERS

- protects raw materials and finished feed from bacterial degradation (feed hygiene)
- promotes animal (fish) performance (role in intestinal tract and metabolism)

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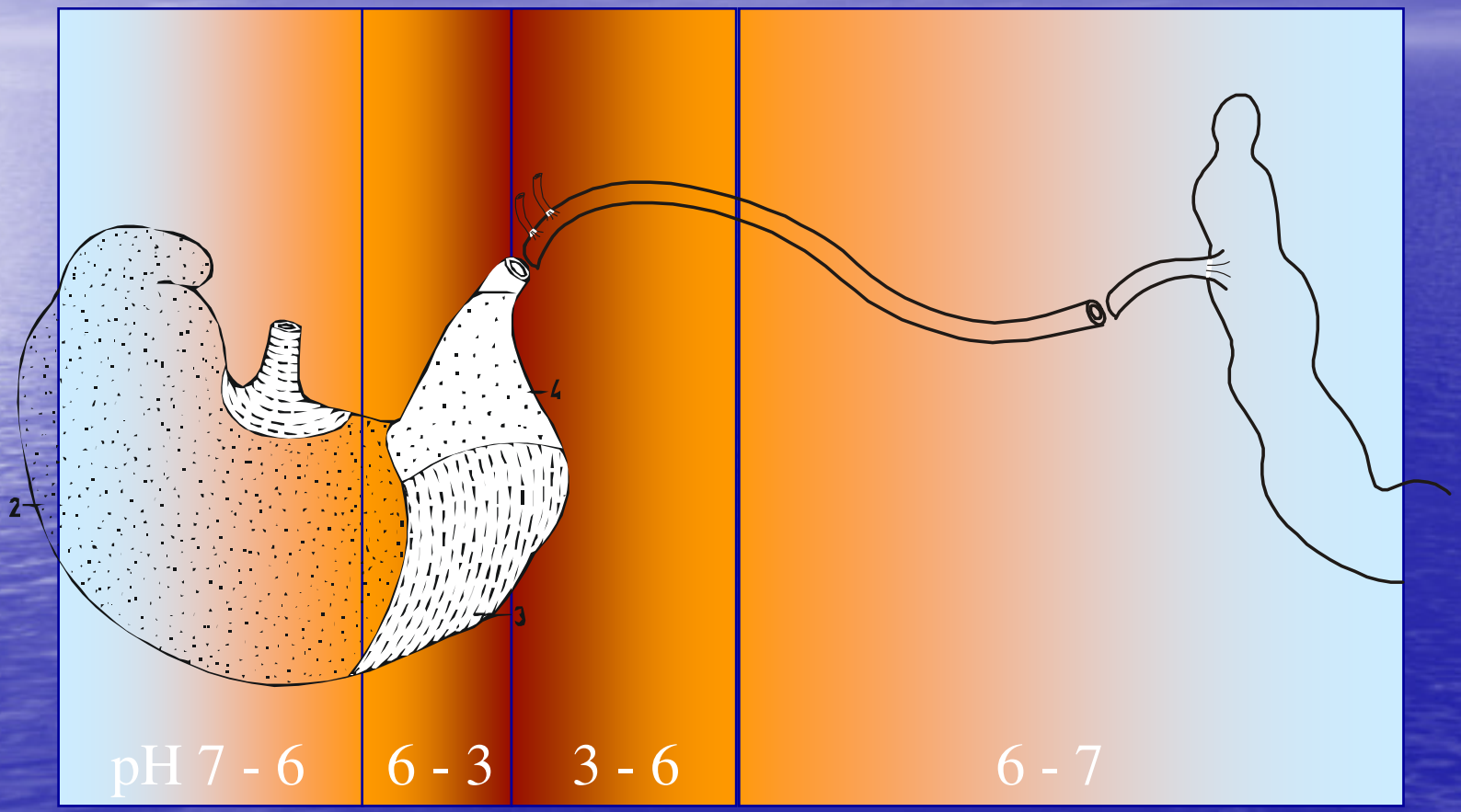
ACIDIFICATION – A NATURAL BARRIER



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ACIDIFICATION

- creates unfavourable conditions for pathogenic bacteria
- reduces acid binding capacity
- helps digestion, mainly protein
- supports health
- increases performance

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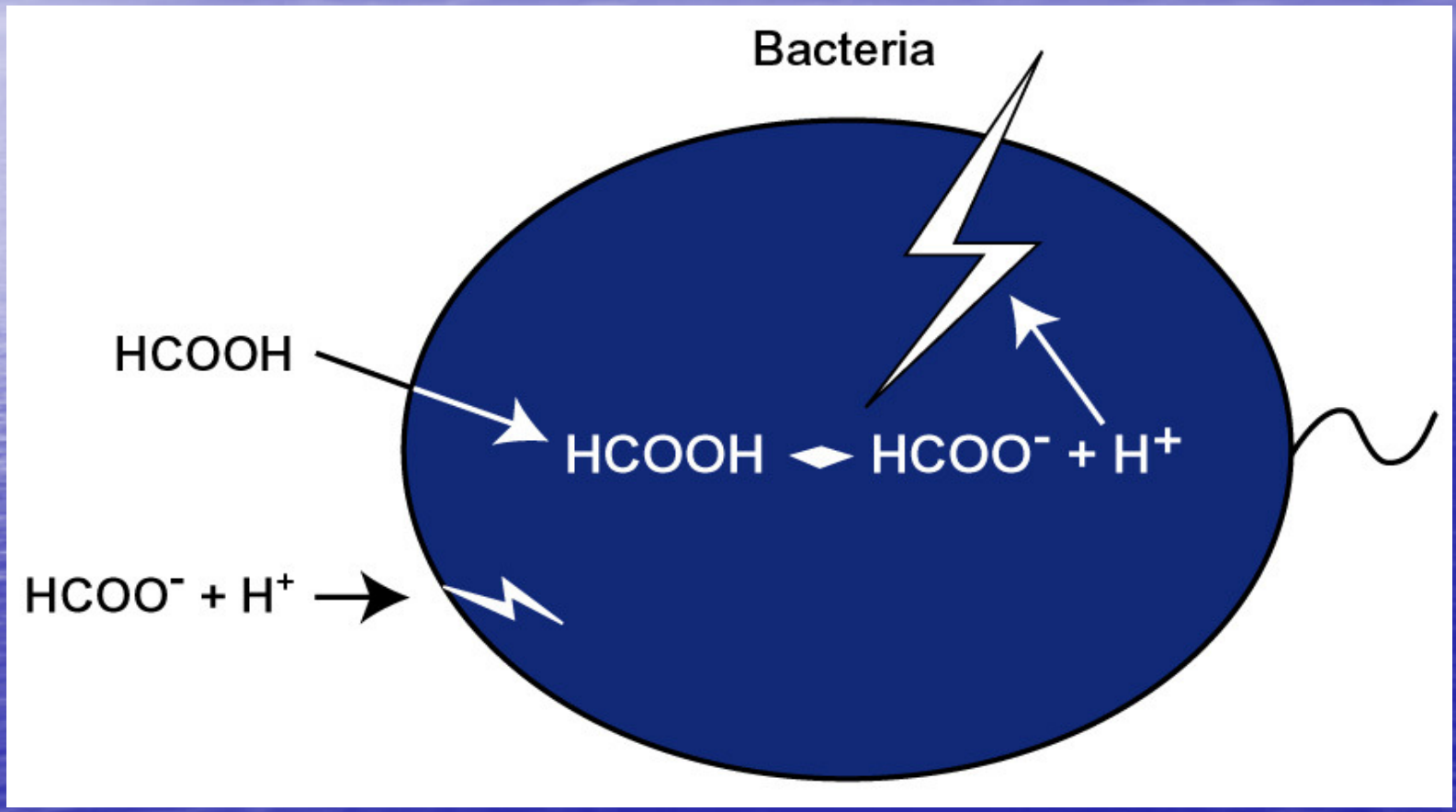
Organic acids inhibit bacteria growth – thereby preventing degradation of feed; healthy intestine



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ACIDS AND ACID SALTS IN AQUACULTURE

- Organic acids:

  formic acid, acetic acid, propionic acid, lactic acid and citric acid

- Organic acid salts:

  calcium formate, sodium formate, potassium diformate (KDF), calcium propionate, calcium lactate

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TRIALS WITH TILAPIA IN SE-ASIA I

- tilapia grow-out for 63 days
- initial fingerling weight: 7 g
- 1.5% acidifier (Ca-formate, Ca-propionate, Ca-lactate, Ca-phosphate and citric acid) vs. 0.5% AGP (Oxytetracycline) and a negative control
- feeding twice a day (31% CP)

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Performance of Tilapia fingerlings with acid mix

Treatment	Final length (in cm)	Final weight (in g)	Feed conversion ratio FCR
Negative Control	**12.5**	**37.9**	**1.43**
Positive Control (AGP)	**12.8**	**40.3**	**1.40**
Acidifier group (1.5%)	**12.9**	**41.3 (+2.5%)***	**1.38 (-1.4%)***

*Relative values against AGP; after Petkam et al. 2008

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TRIALS WITH TILAPIA IN SE-ASIA II

- tilapia grow-out with bacterial challenge for 85 days (*Vibrio anguillarum* at day 10)
- initial fingerling weight: 16.7 g
- 0.2%, 0.3% and 0.5% KDF (Aquaform®) vs. negative control
- feeding 6 times a day (32% CP)

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Performance of KDF (solid) treated Tilapia

	Control	2 kg/t KDF	3 kg/t KDF	5 kg/t KDF
Final weight (g)	218	258	246	252
FCR	1.34	1.23	1.25	1.22
Mortality (%) – post infection	33.0	20.8	18.4	11.0

after Ramli et al. 2005

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OTHER REPORTS/COMMENTS

- 2 kg/t Ca-formate reduces mortality in shrimp
- formates successfully tested in trout and charr, butyrates in catfish
- "Acidifiers" are beneficial for Abalone
- Increased scientific interest; upcoming published articles

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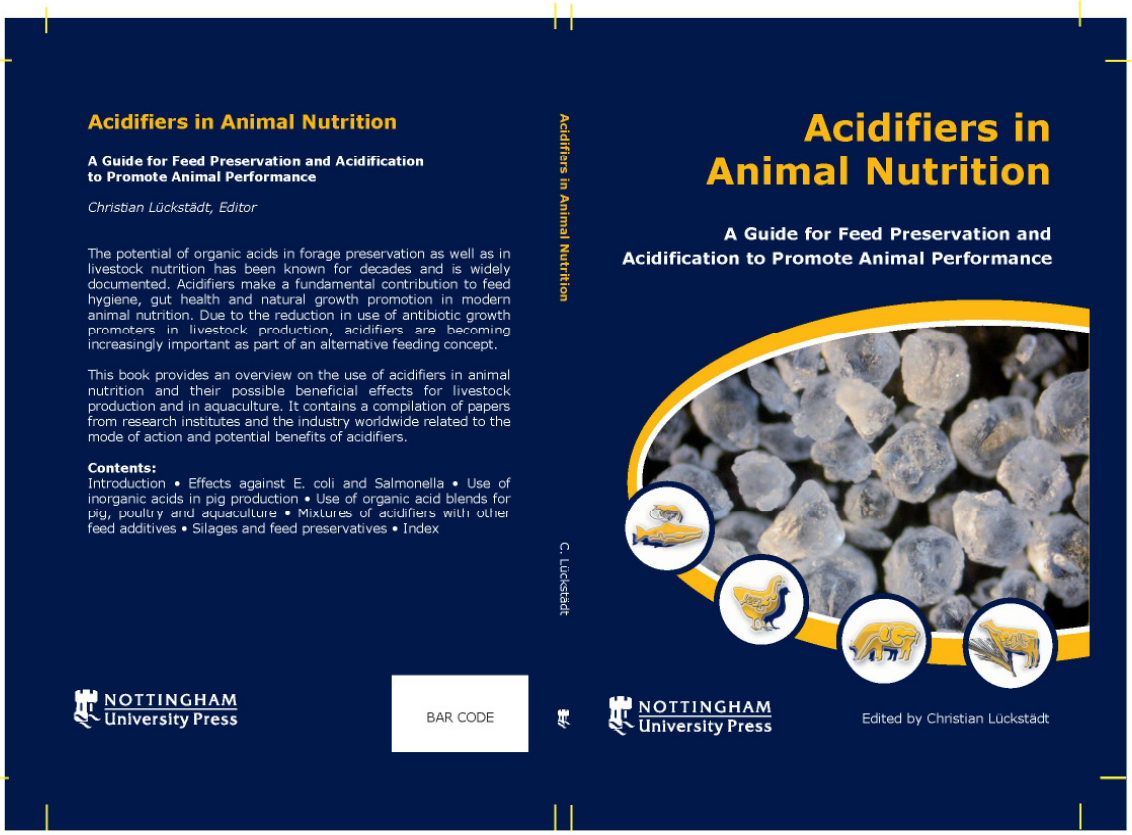
Acidifier...

...a sustainable alternative for organic aquaculture

- increasing growth
- saving feed costs
- strong antimicrobial effects
- high survival rates



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