Seaweed formulations (Oceanfeed ™) as feed ingredients in swine: A New Dimension In Nutrient Technology

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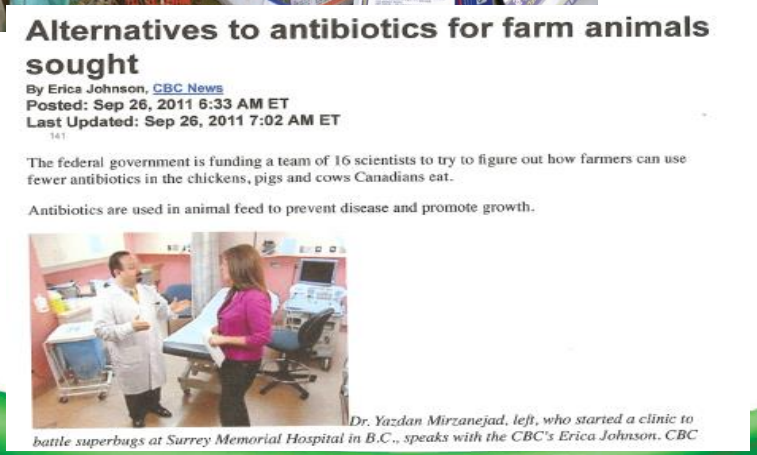
OCEANFEED™ SWINE
IN TUNE WITH NATURE

OCEAN HARVEST TECHNOLOGY

Why pigs?

2. Disease: high density & low bio-security

FMD, PRRS and pig epidemic diarrhea



Alternatives to antibiotics for farm animals sought

By Erica Johnson, CBC News
Posted: Sep 26, 2011 6:33 AM ET
Last Updated: Sep 26, 2011 7:02 AM ET

The federal government is funding a team of 16 scientists to try to figure out how farmers can use fewer antibiotics in the chickens, pigs and cows Canadians eat.

Antibiotics are used in animal feed to prevent disease and promote growth.

Dr. Yazdan Mirzanejad, left, who started a clinic to battle superbugs at Surrey Memorial Hospital in B.C., speaks with the CBC's Erica Johnson. CBC

- Intensive pig farming susceptible to many diseases including: trichinosis, Taenia solium, cysticercosis, and brucellosis.
- Pigs are also known to have a lot of parasitic ascarid worms, causing, Diarrhoea and other intestinal problems
- Antibiotics major issue in EU and US, Legislation will demand reduction or total ban in EU and strong emphasis on natural products (Turner et al., 2001)

Antibio

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- Macroalgae
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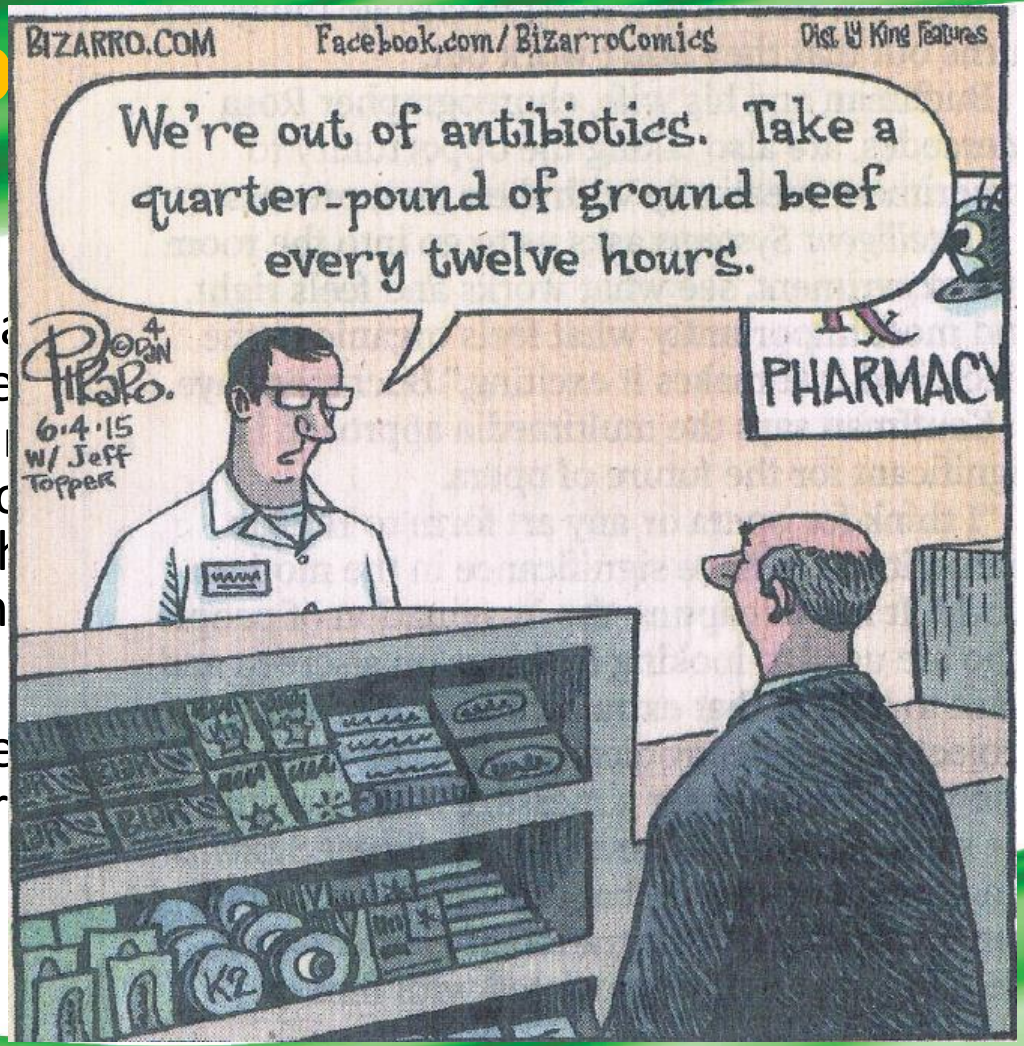
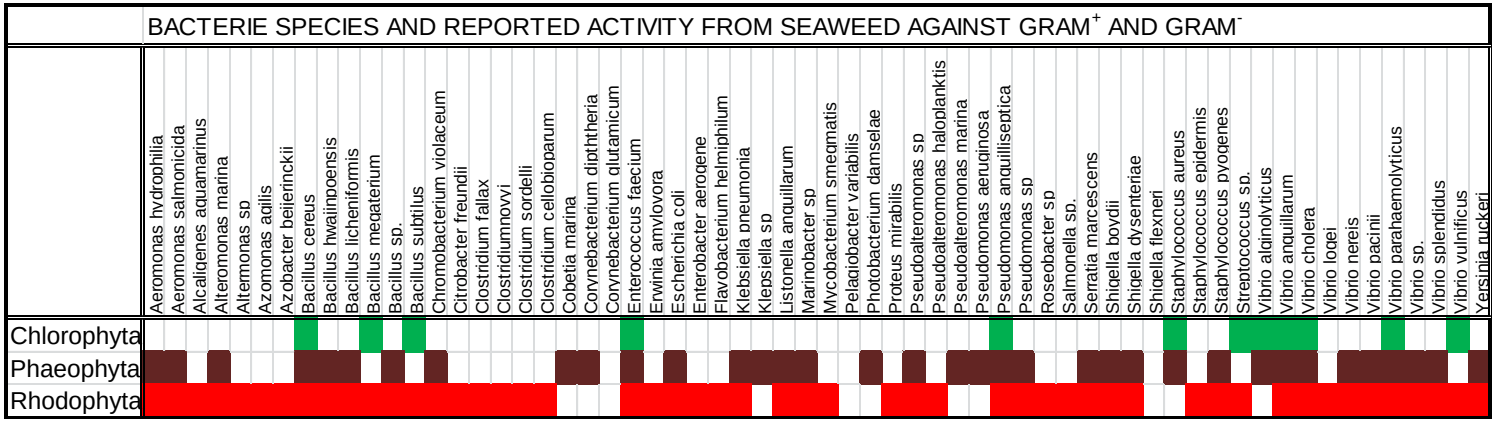


Antibiotics

- In North America and Asia still widely used, resistance in bacteria created
- Reduction and replacement proposed but very slow. In north America still used as growth promoter (ractopamine, B-antagonist, Paylean)
- Macroalgae extracts known to have strong anti-bacterial properties



Feed Industry – A Drive For Change

Controversy

- Industry is plagued with bad publicity
- Widespread use of chemicals, antibiotics & synthetic ingredients
- Spread of diseases and resistance to antibiotics
- Inferior taste, texture and quality
- Harmful effects on consumers and the environment

Recent Changes

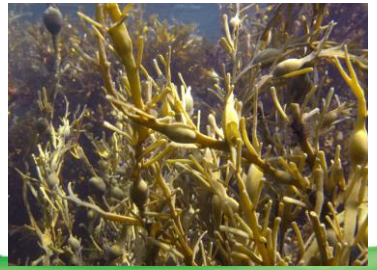
- Increasing pressure on industry to reduce environmental harm (white-house paper)
- Huge trend towards alternative feeds and natural & **sustainable** ingredients
- EU, N-America increased legislation on the use of synthetic additives and antibiotics in feed ingredients
- Since March 2012 FDA ordered to remove all antibiotics from Animal feed
- Public demanding disclosure and clarity on ingredients used in feed relating to health and environmental responsibility

Seaweed as a Micro-ingredients opportunity

- Micro-ingredients obtained from a sustainable and natural resource that doesn't impact existing food chains? Yes! Look at Seaweeds

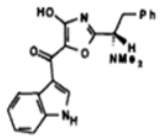
OceanFeed Swine :First to Market Patented formulation of macroalgae

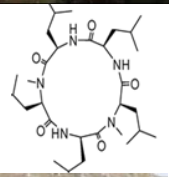
100% natural and sustainable feed ingredient
Provides a rich sources of organic bound vitamins, minerals and trace elements
Provides a cost effective alternative to chemical pre-mixes, synthetic additives and antibiotics


GMP+ FEMAS, USDA/NOP
Organically certified

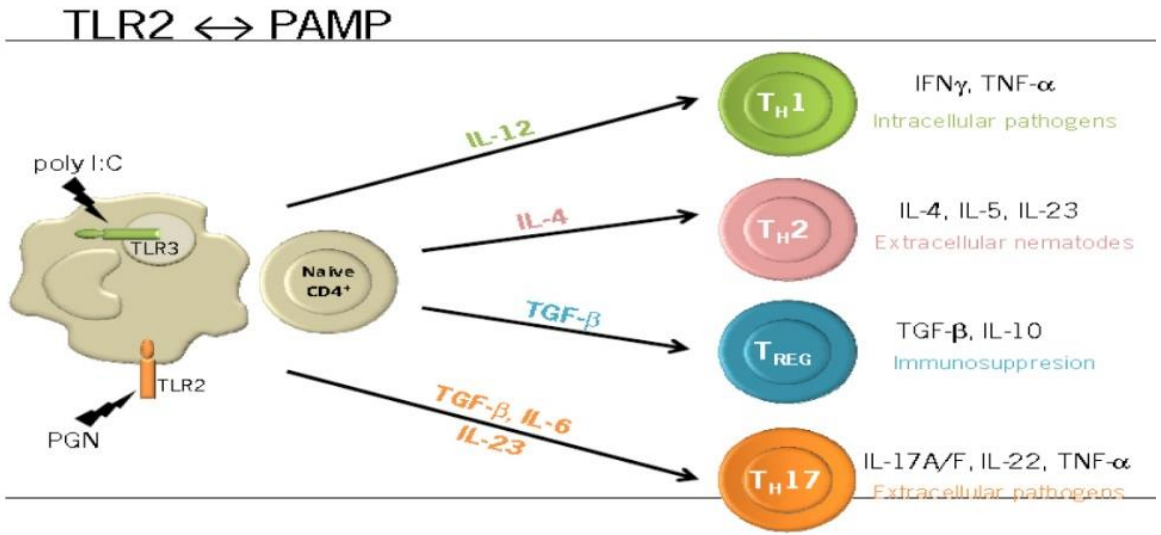
Many interesting bioactives unique to seaweed





- Polysaccharides only present in seaweed
- Alginates, fucoidan, laminarin, ulvan, agar, carrageenan
- Profound effect on gut health (suppress bad gram+ bacteria and stimulate gram- bacteria like lacto and entero bacteria)
- Anti-adhesion effect
- Tightening cell junctions
- Innate immune response
- Anti oxidant working
- Anti biotic and antiviral
- Mineral rich, good Vit E and C
- Mycotoxin binding abilities

Seaweed polysaccharides stimulate PAMP



OHT and Raw material and R&D

- **Tank cultivation**
- **Seaweed farms**
- **Sustainable wild harvest**














OHT Production Process

Macroalgae air or sun dried without the use of fossil or low electrical heat or dehumidifiers to avoid heat damage and maintain the activity of the

OceanFeed added up to 1.5% in weaner diet to 0.66% in sows and 0.5% in fattening

Pellets extruded low heat to avoid any heat damage

First Irish research trial Sharragh pig farm (Makeway group)

- Incl levels 0.5%; 2% and 5%
- 120 pigs per treatment, 3 replicates (40 per group) same house start weight ca. 10 kg
- More alert and aware, healthier skin no ulcerations Growth, Weight Gain, FCR, Gutflora, Carcass analysis, taste (omega 3) and gut flora
- Improved at 0.5%, no SD at 2% and negative at 5%

Irish Sow trial Perma pigs

- Sow/piglet trial
- OceanFeed Swine to the lactating sow ration at an inclusion rate of 0.66%
- Average farrowings per week: 39.
- Ration fed to all sows in the farrowing house for 9 weeks in total.
- This gave a period of 4 weeks where the prodigy/piglets would have got the OceanFeed Swine the full time they were on the sow the farrowing house.
- Assess performance of these progeny at 30 days post weaning.

- FCR 12.68% more efficient FCR
  - OceanFeed Swine group FCR: 1.24
  - Control FCR group: 1.42
- Mortality
  - The trial also gave an indication of better immunity showing a shift of 22% reduction in the Deaths Vs Births percentage.
  - OceanFeed Swine group: 9.3%
  - Control group: 12%

NDSU trial, USA

- 120 Cross bred weaners per group (control, Oceanfeed, Ractopamine)
- 1.5% incl weaner; 0.5% fattening
- Oceanfeed KPI not SD from Ractopamine
- Quality and flavour SD better
- Higher levels of immune markers
- Same results in Berkshire

SW-34 RalCo Nursery Phase 3

ingredient	cost/lb ($)	lb/used	cost ($)
corn, grd	0.0614	1409.65	$86.59
sbm (46.0%)	0.1775	528.00	$93.72
EnMax Sow	2.0400	5.00	$10.20
EnMax GF	1.5400	3.75	$5.78
mono-cal, 21%	0.4817	14.40	$6.94
limestone	0.1109	21.20	$2.35
salt	0.2600	9.00	$2.34
L-lys	0.7455	5.20	$3.88
L-thr	1.7460	1.60	$2.79
Dl-meth	3.3460	2.20	$7.36
OHT (1.5%)		30	
	total	2030.00	$221.95

Limestone and salt can be replaced partially, some lysine and methionine, 1% SBM . It does not have to be fed over the top but ingredients can be replaced

SW-37 RalCo Finisher(180 - 250 lb pigs)

ingredient	cost/lb ($)	lb/used	cost ($)
corn, grd	0.0614	1692.20	$103.95
sbm (46.0%)	0.1775	271.00	$48.10
mono-cal, 21%	0.4777	1.90	$0.91
limestone	0.1109	17.20	$1.91
salt	0.2600	8.00	$2.08
EnMax GF	1.4900	7.50	$11.18
L-lys	0.7455	2.20	$1.64
L-thr	1.7460	0.00	$0.00
Dl-meth	3.3460	0.00	$0.00
Regano EX	10.4700	1.00	$10.47
OHT (0.5%)		10	
	total	**2000.00**	**$180.23**

Swine trials China:

- 6 pens with 12 pigs each separated in 3 control 3 Oceanfeed
- Start weight ca. 40 kg fed for 124 days
- Corn, soybean, wheat, premix diet (+ or – oceanfeed)
- Reduced ammonia output, less respiratory issues, reduced antibiotic use (> 50%) in oceanfeed fed pigs
- Average of 7kg difference control vs Oceanfeed
- Better quality (colour, flavour)

University trials Vietnam

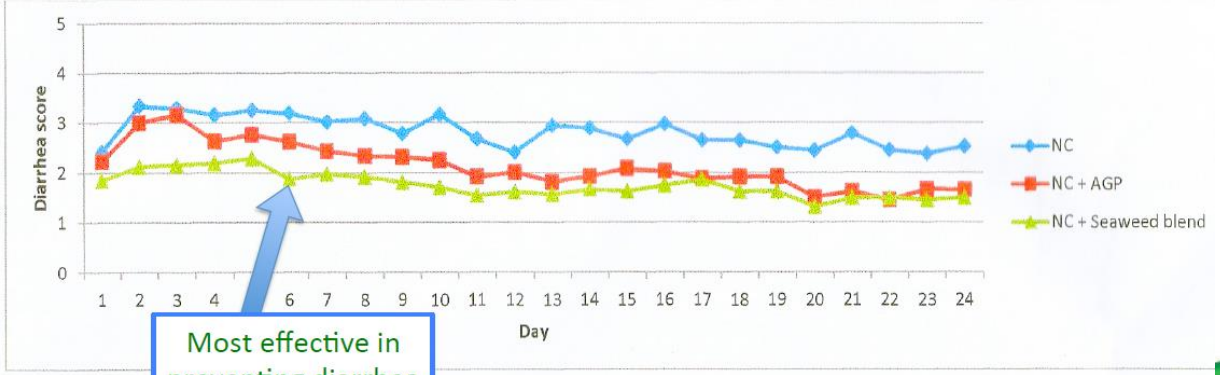
- Vietnam (300 crossbred pigs (Yorkshire-Landrace) x Duroc; 65 days old; 22.4 ± 3.1 kg randomly allotted to 2 treatments in a randomized complete block design.
- 37.5% reduction in mortality in Oceanfeed group
- 33% less need for antibiotic treatments in Oceanfeed group

University nursery trial Philippines

- 3 treatments (negative control; NC +AGP; NG +Oceanfeed at 2% inclusion
- 8 replicates per treatment, 4 pigs per replicate start weight 10 kg

- First 24 days Oceanfeed outperforms AGP, then similar but 2.2 kg more than control
- Replaces 100% of Antibiotic Growth Promoter (AGPs like Tiamulin and CTC)

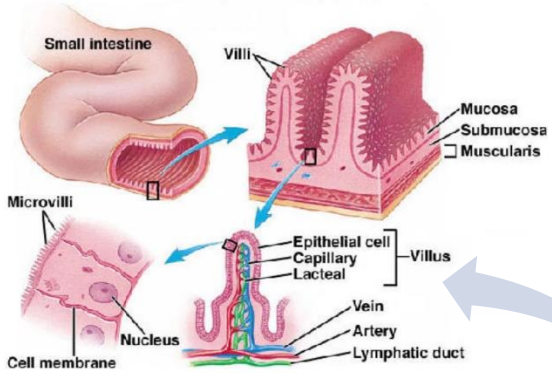
- Prevents diarrhea all throughout the post-weaning period



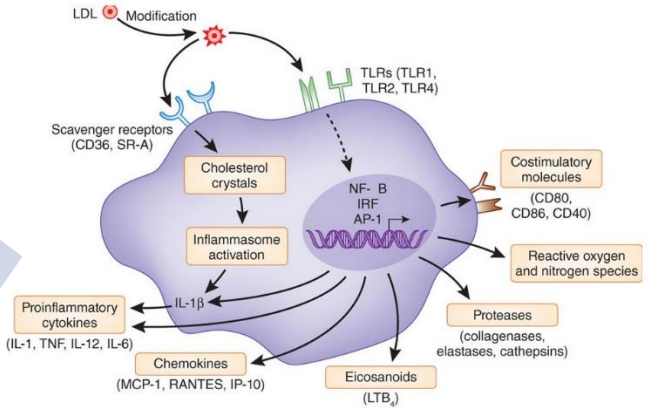
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SEM	0.40	0.23	0.26	0.28	0.26	0.26	0.28	0.23	0.30	0.26	0.24	0.21	0.22	0.12	0.23	0.24	0.23	0.23	0.19	0.16	0.19	0.15	0.14	0.14
P-value	0.61	<0.01	0.02	0.08	0.07	0.01	0.06	<0.01	0.11	<0.01	0.01	0.05	<0.01	<0.01	0.01	<0.01	0.04	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

How does it work

Improved intestinal development (crypt and villi)



Stimulation of innate immune system through PAMP



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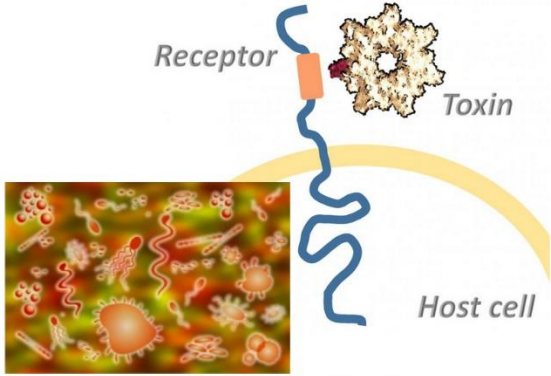
Stimulation of positive microflora (lactic and entrobacteria)

Competition



Inhibition of bad bacteria and mycotoxin binding capacity

Thank You

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