

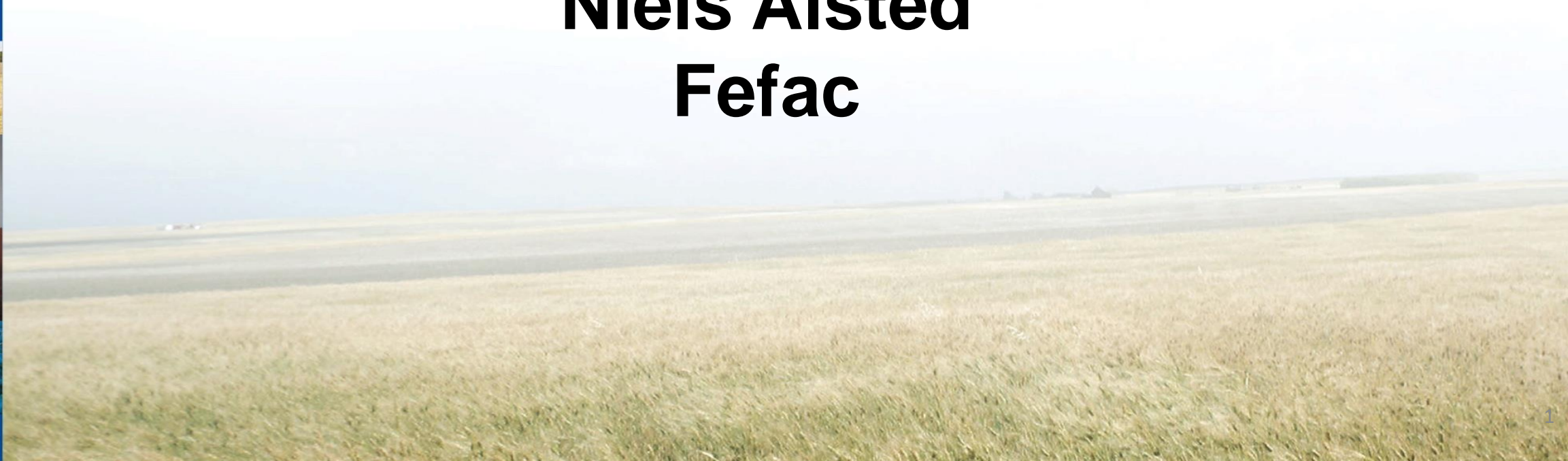
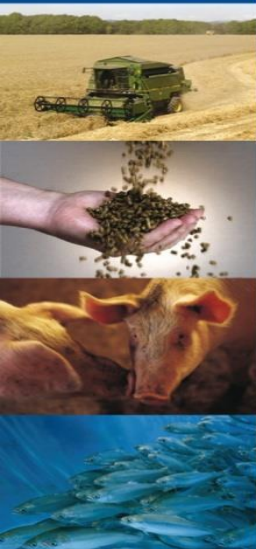


Fish feed trends

Ireland

September

Niels Alsted
Fefac



FEFAC in a nutshell

- Created in 1959
- Represents industrial compound feed and premixtures manufacturers
- 33 Members:
 - 24 Member Associations from 23 EU Member States
 - 2 Observer Members (Serbia, Russia)
 - 7 Associate Members (Turkey, Switzerland, Norway (3), EMFEMA, EFFPA)
- 153 mio. t of industrial compound feed in EU-28 in 2013
- 7 Technical Committees to assist the FEFAC Council
 - Animal Nutrition
 - Industrial Compound Feed Production
 - Premix & Mineral Feed
 - Feed Safety Management
 - Fish Feed
 - Milk Replacers
 - Sustainability



FEFAC Praesidium

FEFAC Presidet

Nick Major - AIC

FEFAC Vice-Presidents

Alberto Allodi – ASSALZOO

Jean-Michel Boussit – Treasurer – EUROFAC

Cristina de Sousa – IACA

Anton Einberger – DVT

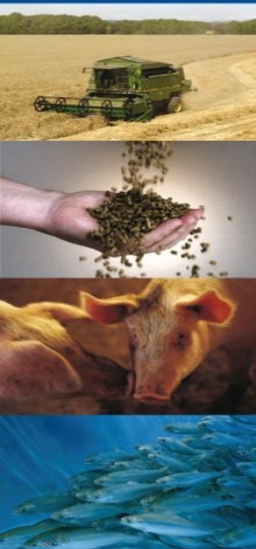
Witold Obidzinski – IZBA

Zoltan Pulay – HGFA

Ruud Tijssens – NEVEDI

Patrick Vanden Avenne – APFACA/BEMEFA





Animal Nutrition

Chairperson: P. Peršak (CFIA)
Vice-Chair: P. Radewahn (DVT)

Industrial Compound Feed Production

Chairperson: P. Musil (SKK)
Vice-Chair: J. Piçarra (IACA)

Milk Replacers

Chairperson: G. Kleinhout (EUROFAC)
Vice-Chair: H. Swinkels (NEVEDI)

Premix and Mineral Feed

Chairperson: R. Sijtsma (NEVEDI)
Vice-Chair: J.F Labarre (EUROFAC)

Fish Feed

Chairperson: N. Alsted (DAKOFO)
Vice-Chair: T.A. Molland (NSF)

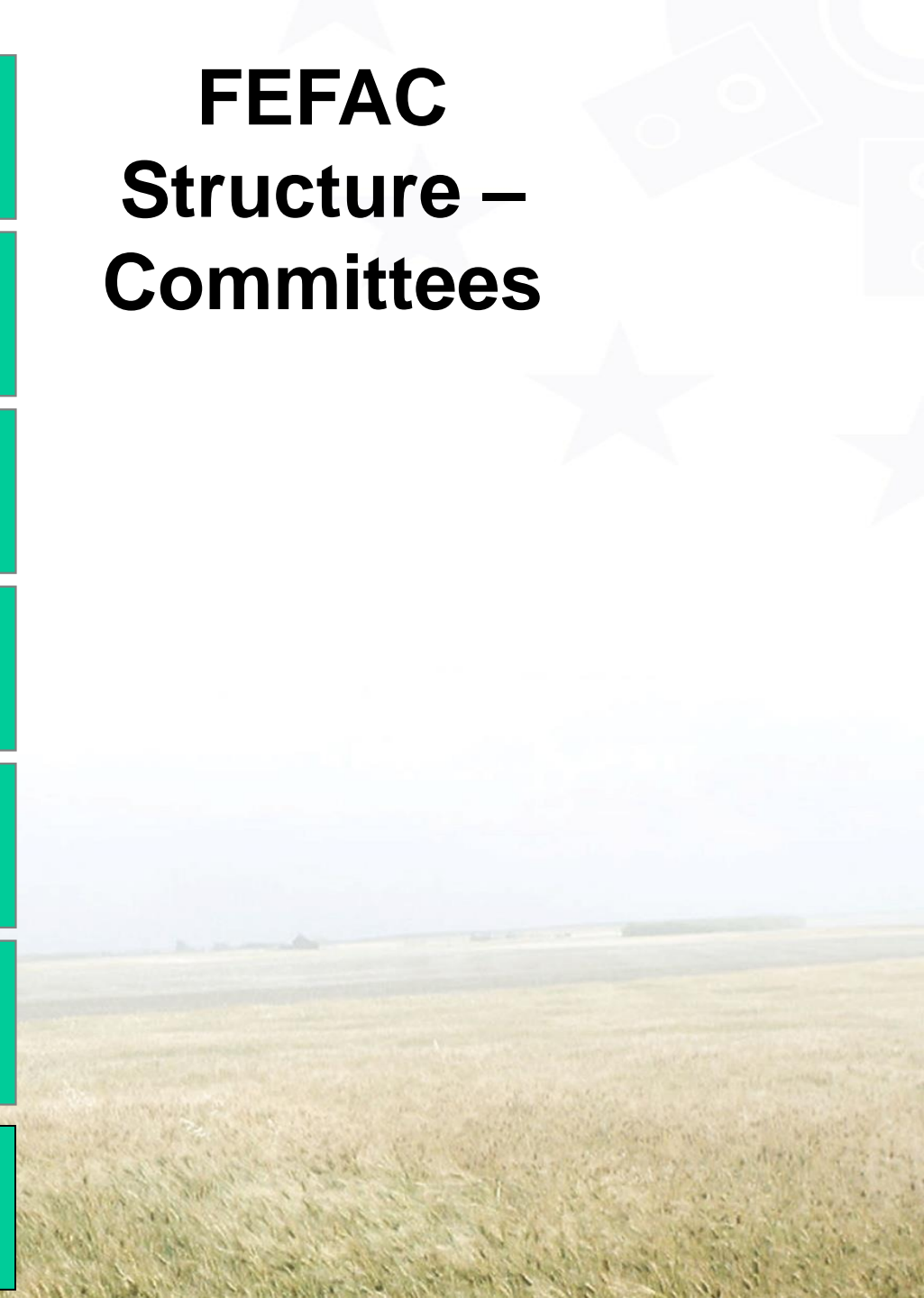
Feed Safety Management Committee

Chairperson: Y. Dejaegher (BEMEFA)
Vice-Chair: n.n.

Sustainability

Chairperson: A. Booth (AIC)
Vice-Chair: n.n.

FEFAC Structure – Committees



Memberstates

Active Members

VFÖ	Austria	1995 (1964)
APFACA/BEMEFA	Belgium	1959
BFMA	Bulgaria	2013
CFIA	Croatia	2013 (2008)
CAFM	Cyprus	2004 (2003)
SKK	Czech Republic	2004 (2000)
DAKOFO	Denmark	1973
FFDIF	Finland	1995 (1993)
EUROFAC*	France	1959
DVT	Germany	1959
HGFA	Hungary	2012
IGFA	Ireland	1973
ASSALZOO	Italy	1959
LGPA	Lithuania	2005
NEVEDI	The Netherlands	1959
IZP	Poland	2004 (2001)
IACA	Portugal	1986 (1976)
ANFNC	Romania	2014
AFPWTC	Slovakia	2004 (2003)
GZS	Slovenia	2004
CESFAC	Spain	1986
FS	Sweden	1995
LANTMÄNNEN	Sweden	1995
AIC	United Kingdom	1973

[observer as from ...]

*EUROFAC took over from SNIA in 2016

Observer Members

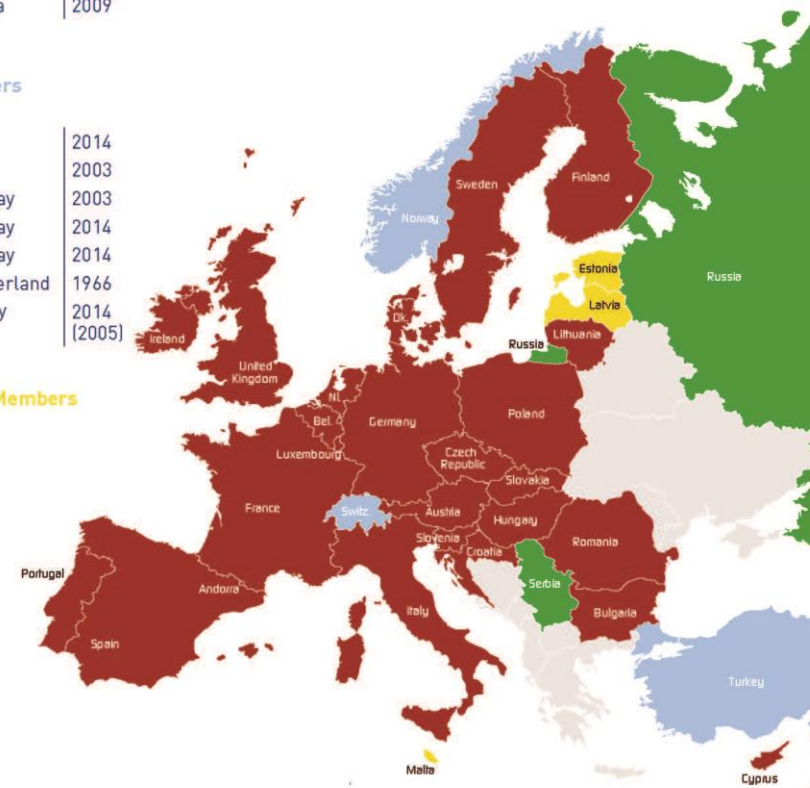
RUFM	Russia	2010
SFMA	Serbia	2009

Associate Members

EFFPA		2014
EMFEMA		2003
NSF	Norway	2003
FKF AS	Norway	2014
Norkorn	Norway	2014
VSF	Switzerland	1966
TURKIYEM	Turkey	2014 (2005)

Potential Active Members

Estonia
Latvia
Malta



Main raw materials used in salmonid feed production

Vegetable raw materials



Marine raw materials



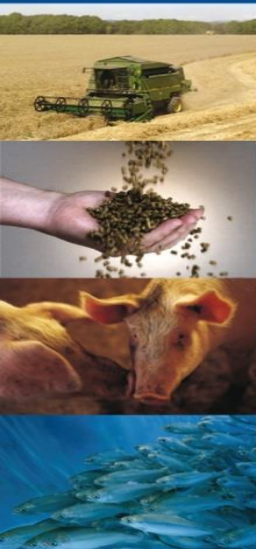
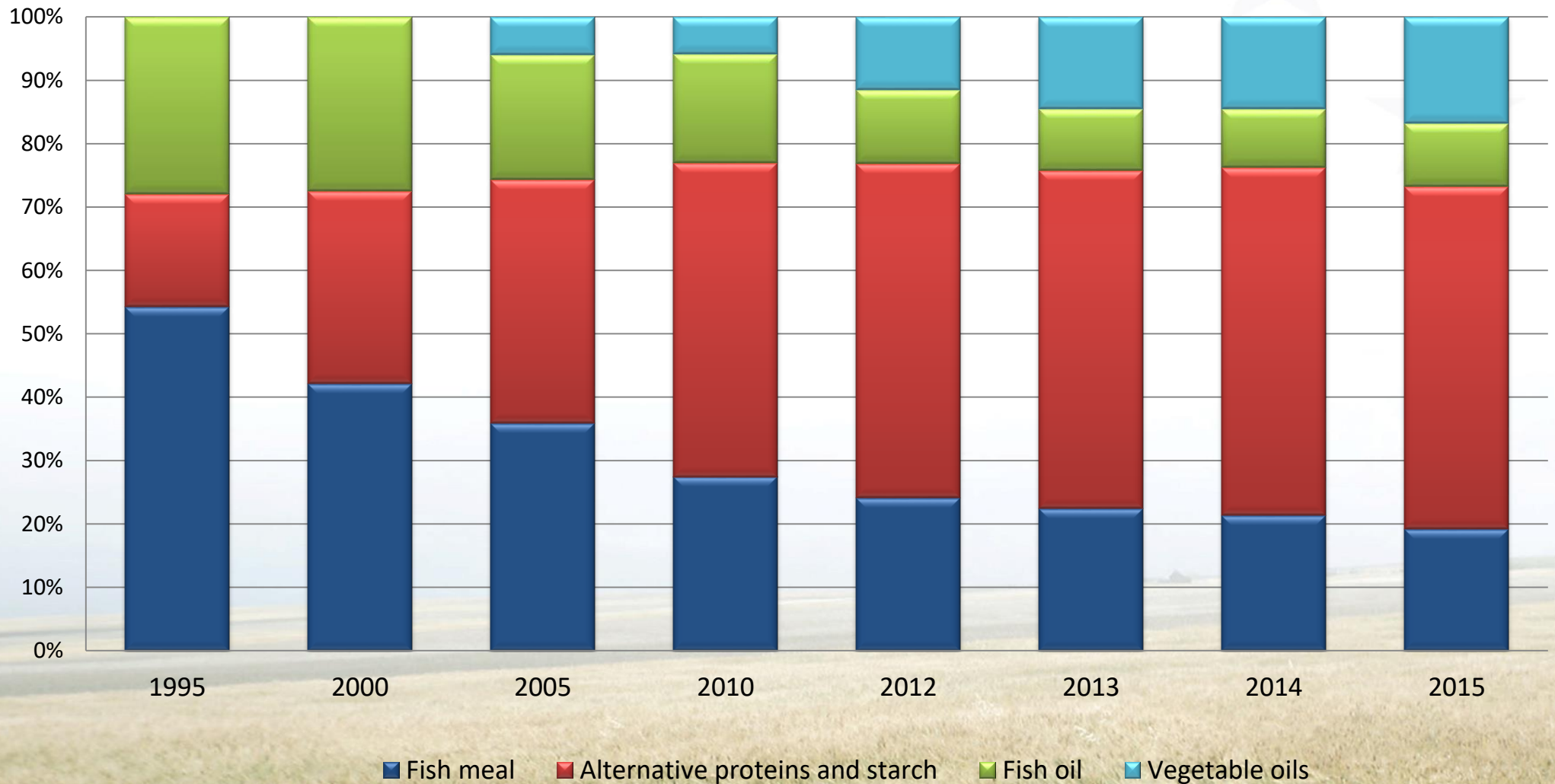
Land animal bi-products



Additives



Major changes in raw material usage

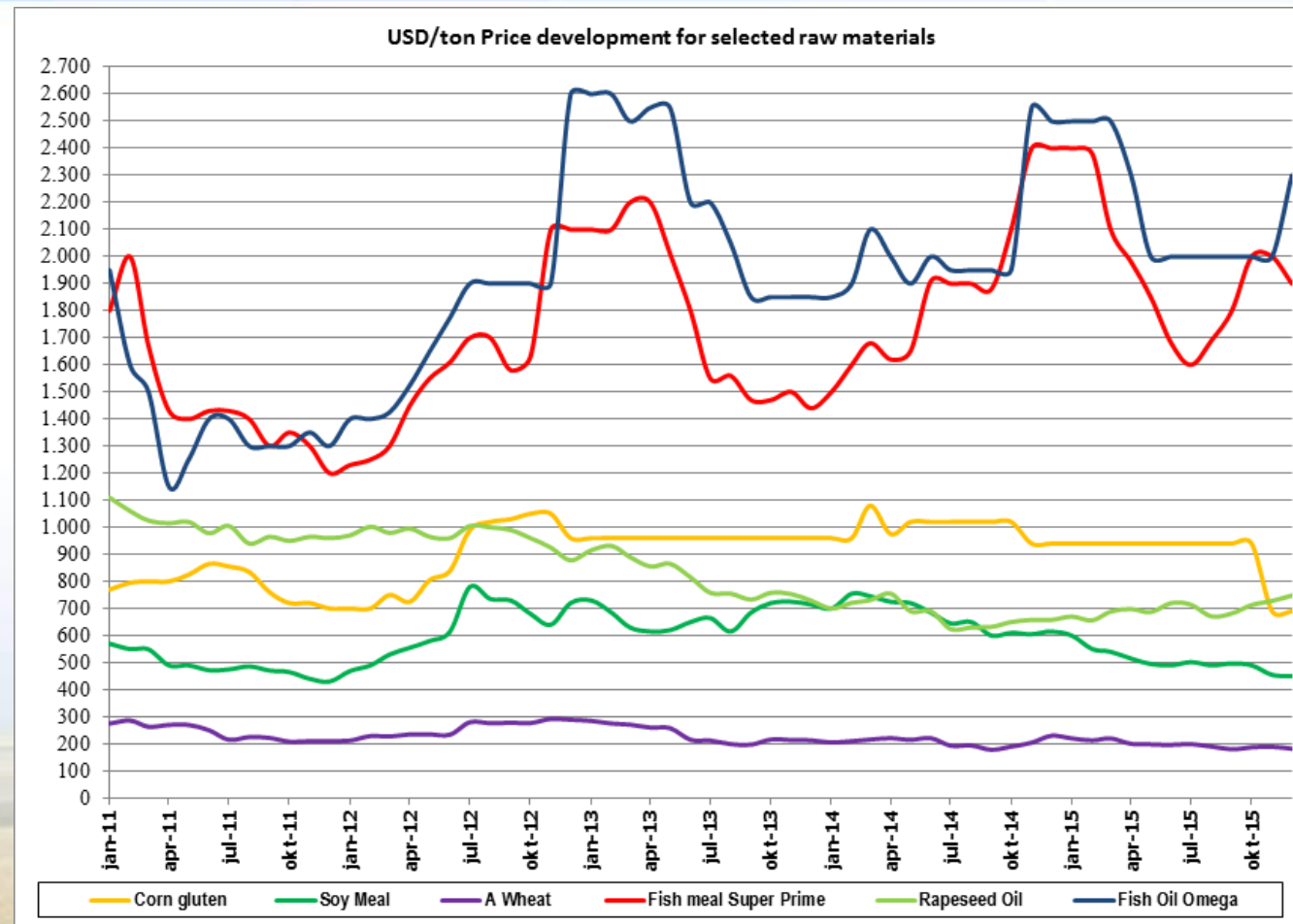


Why did we change composition

- Price, competition, volatility
- Availability
- Sustainability
- Certification (ASC)
- Knowledge created via R&D.
 - That's the real competition
- Cannot be dependent on a limited resource with huge variability in price and availability.



Raw materials used in fish feed are commodities with high price volatility



FFDR for fishmeal and oil defined by ASC

eFCR = Feed used/ Fish harvested

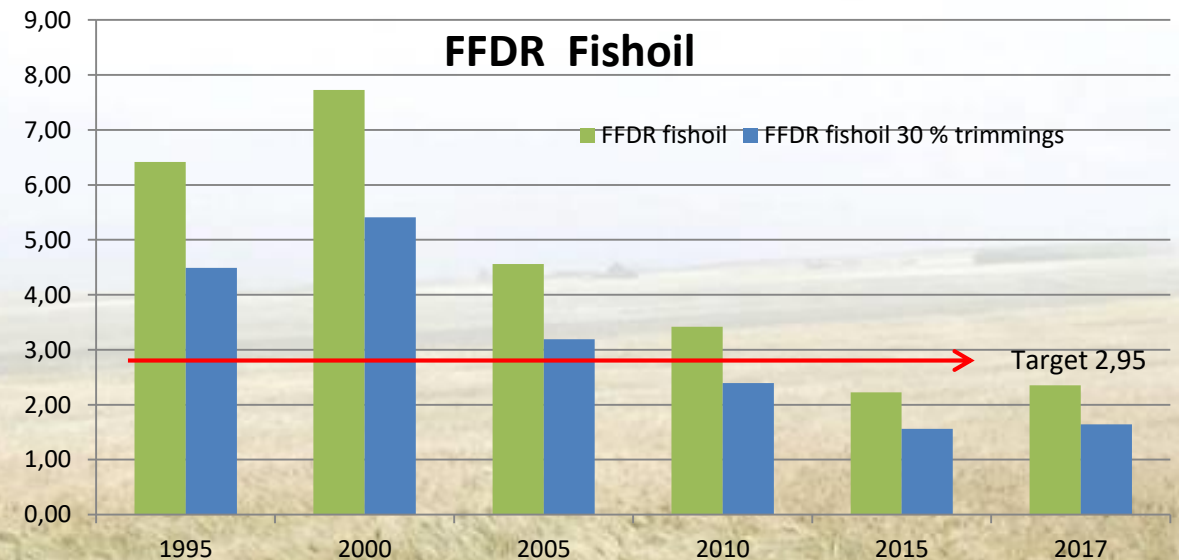
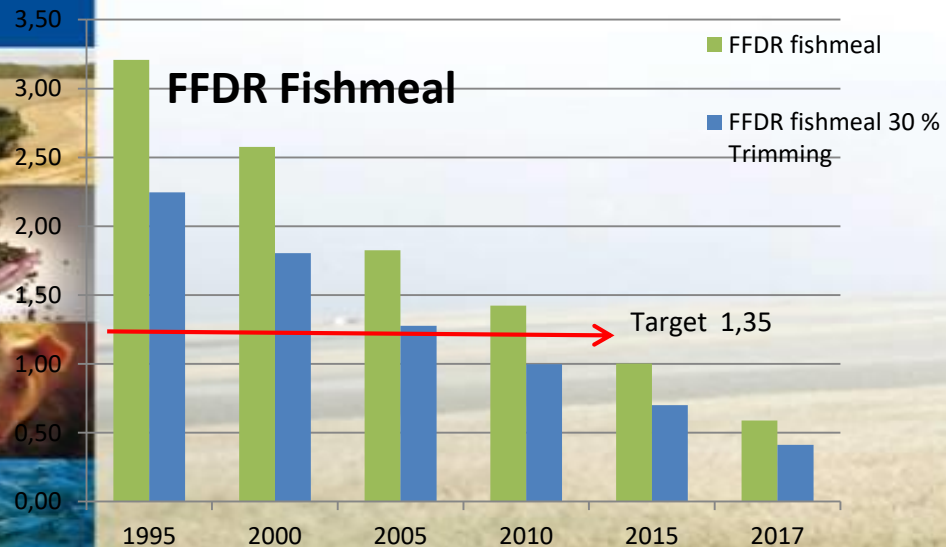
Trimming meal/oil can be excluded from the calculation

FFDR Meal= (eFCR x Fishmeal incl %)/24% (fishmeal yield)

5 % oil if South America fish

7 % oil if European fish (has higher oil yield)

FFDR oil = (eFCR x Fishoil content%)/ 5 / 7 % (fishoil yields)

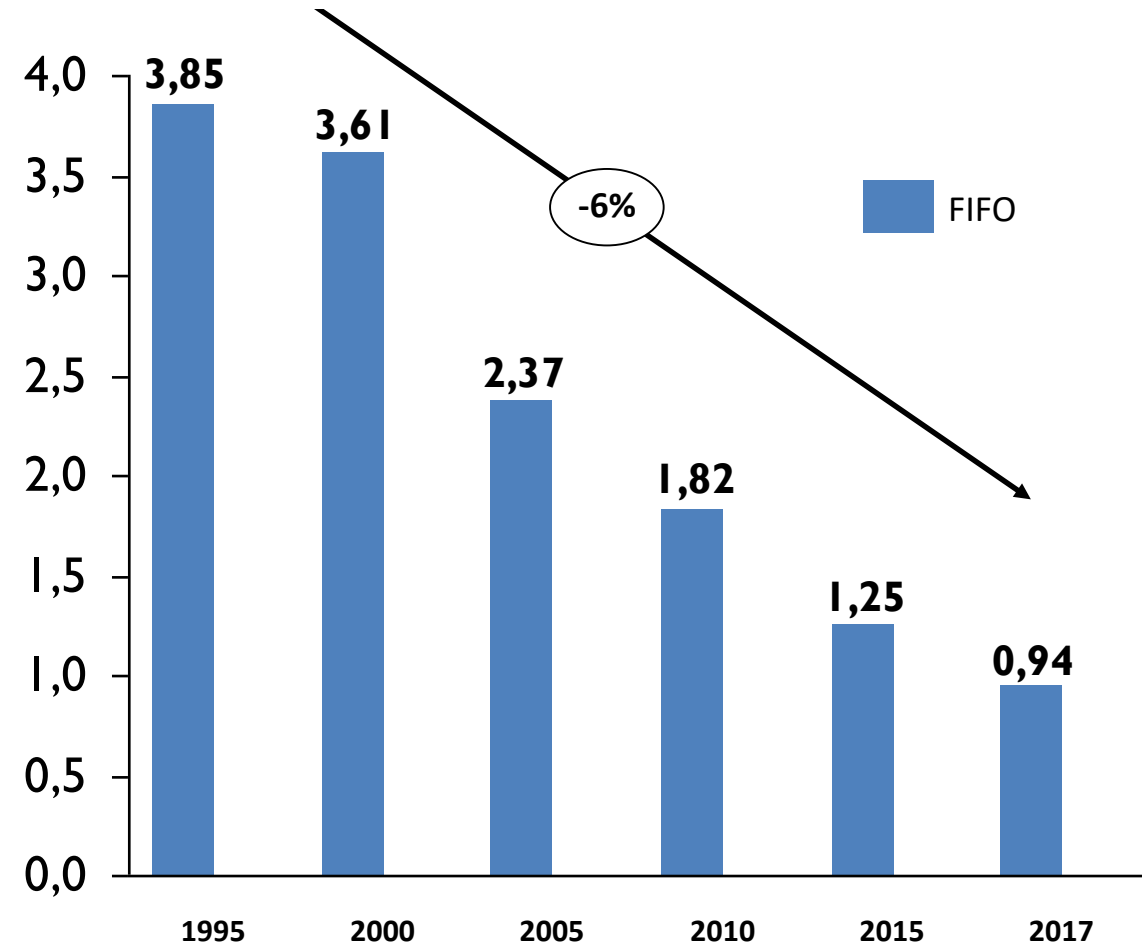


Fish In – Fish Out Ratio (FIFO) – Net producer of fish in 2017



IFFO view on calculation

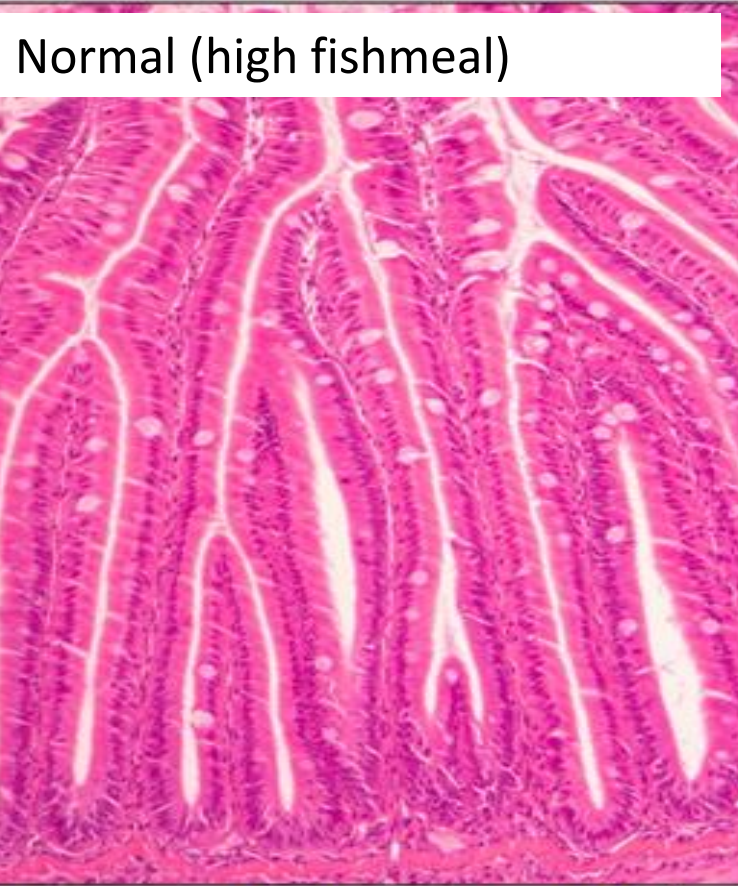
$$\text{FIFO ratio} = \frac{(\text{Level of fishmeal in diet} + \text{Level of fish oil in the diet}) \times \text{FCR}}{\text{Yield of fishmeal from wild fish} + \text{Yield of fish oil from wild fish}}$$



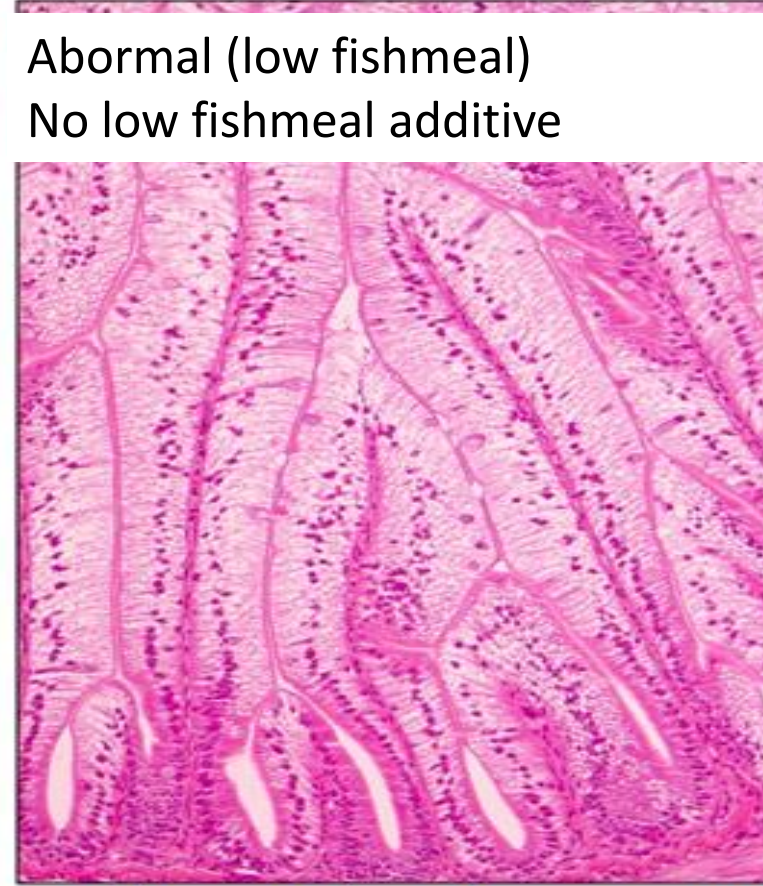
Effect of Vegetable protein is not always positive



Effect fishmeal on enterocyte histology

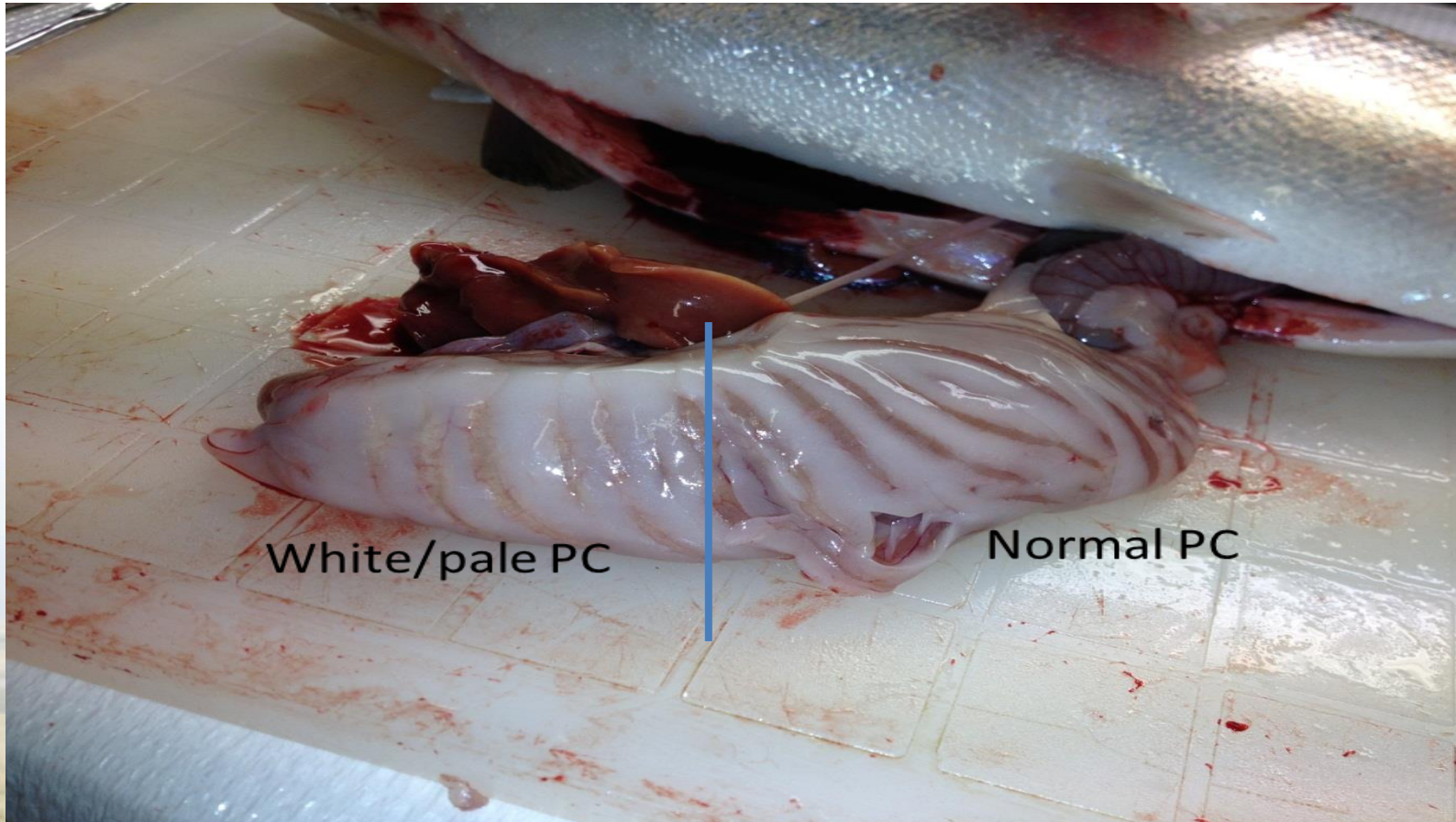


Enterocyte without vacuoles
(100X)

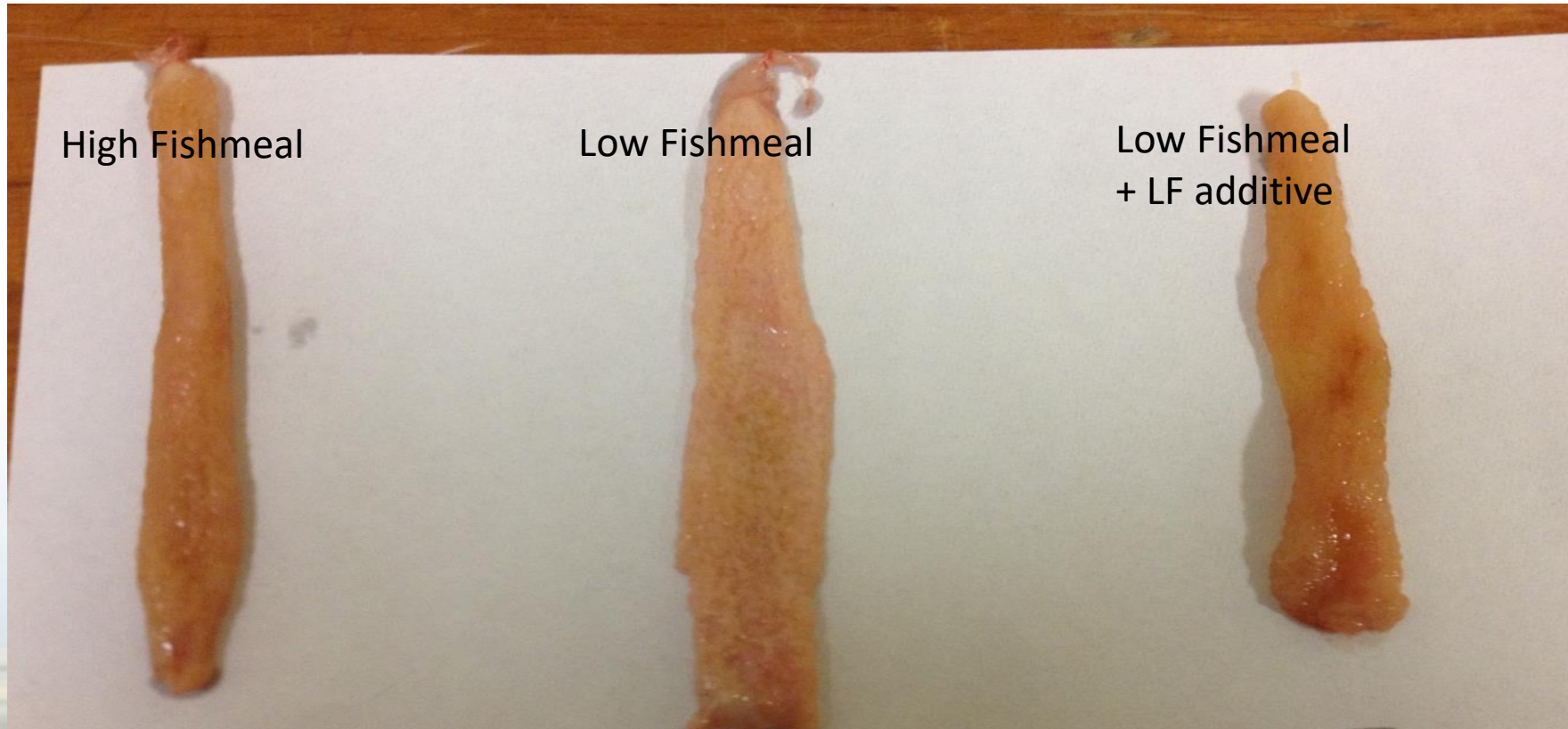


Highly vacuolated enterocytes
(100X)

Pyloric ceaca effect.

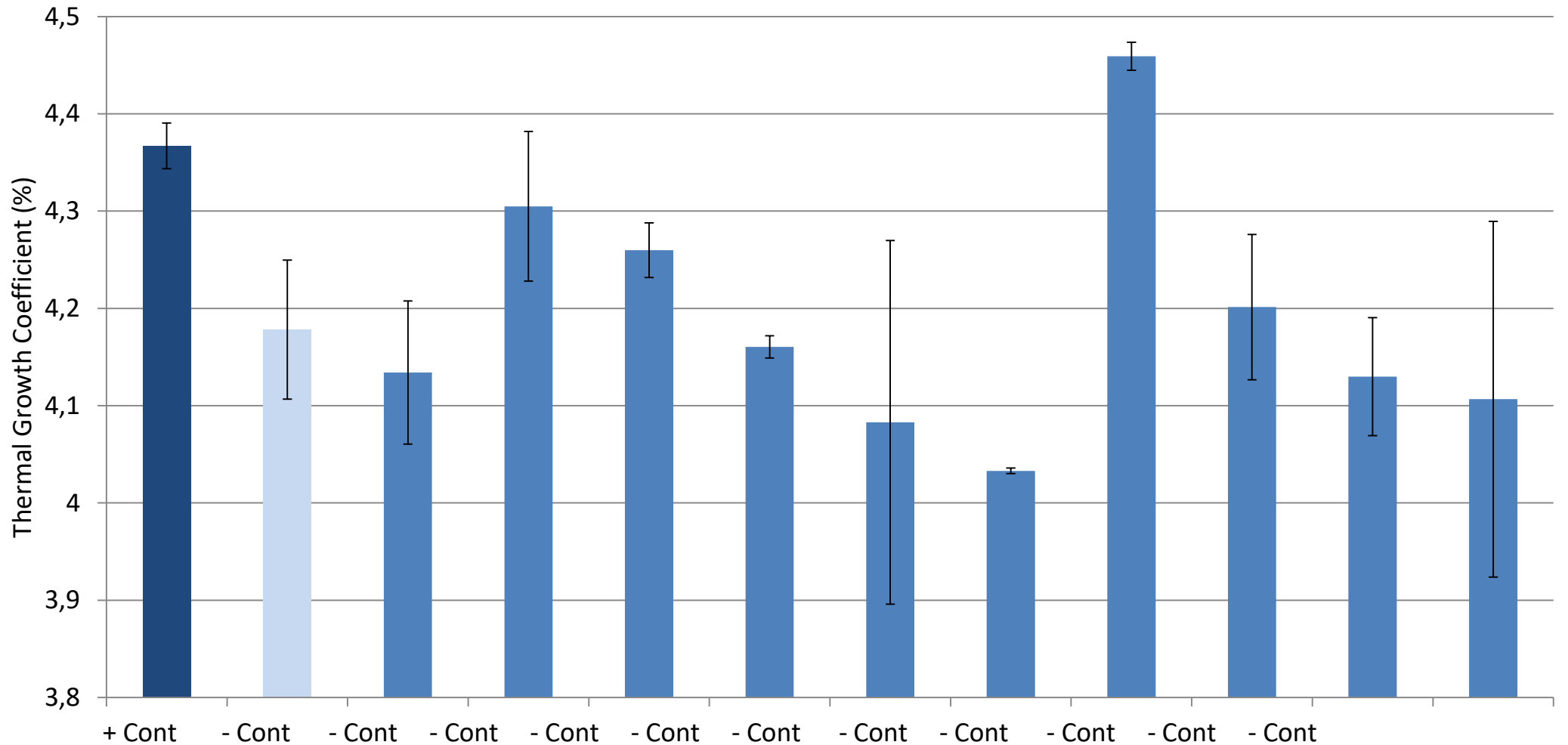


Major negative effects can be eliminated

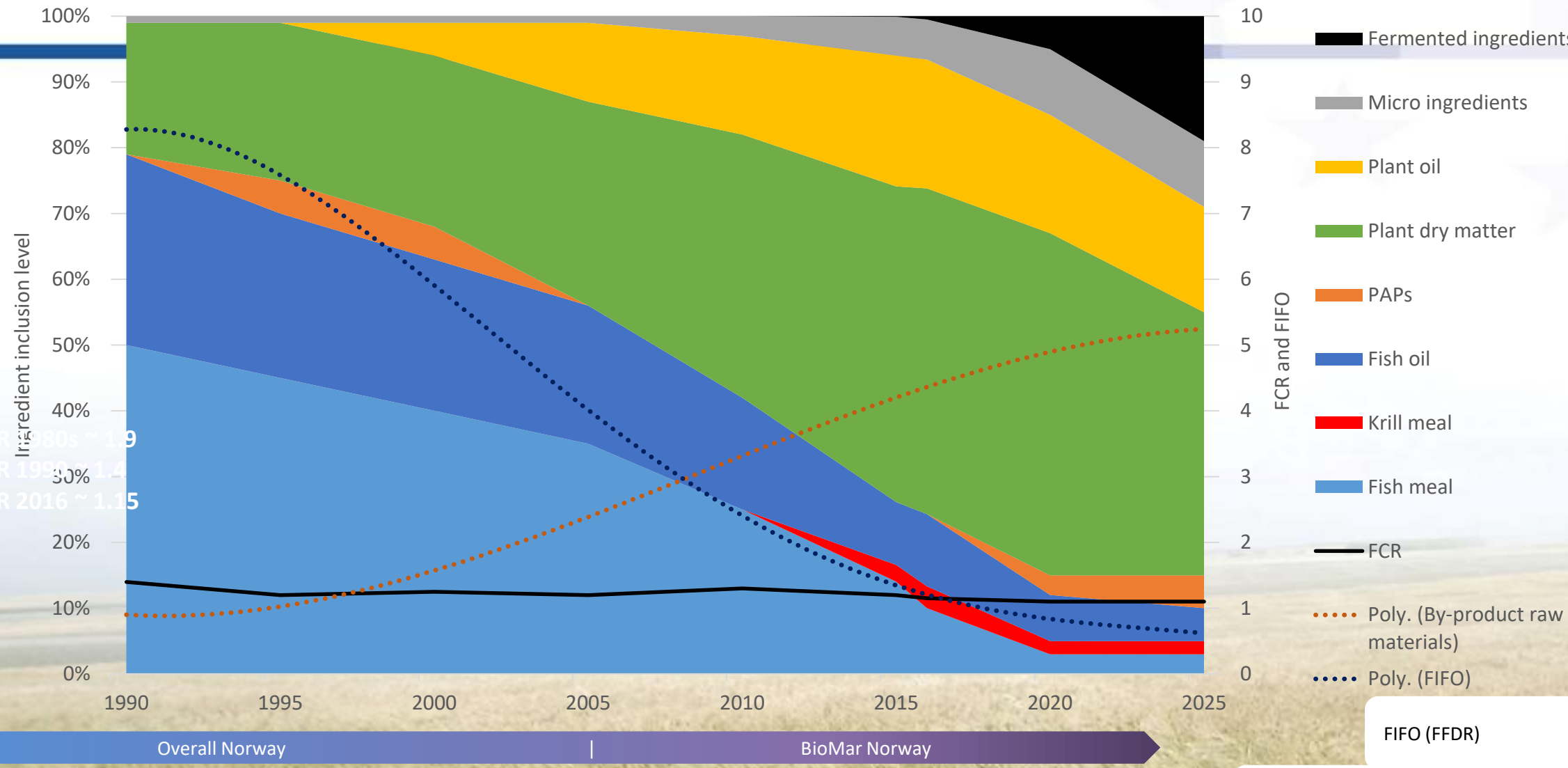


Effect of LF additives on growth in Salmon

+Cont 30 % FM -Cont 10 %FM



Salmon Feed Development in Norway & Feed Conversion Ratio (FCR)



By-product raw materials

FIFO (FFDR)

If we did not do anything THE ALTERNATIVE

- **Historical** 40% fishmeal og 30 % olie in the diets
- Today's recipes would be 700 USD/ton higher in price or 50 % higher
- **Assumptions** 5 mill ton salmonid / seabass/bream feed.
- **FISH MEAL**
- 15 % incl => 750.000 ton
- 40 % incl => 2.000.000 ton 1,250.000 ton dif
-
- **FISH OIL**
- 10 % olie => 400.000 ton
- 30 % olie=> 1.500.000 ton World volume MAX. 800.000 ton .
- **Salmon could max get** 500.000 ton => 1,6 mill to foder with 30 % fish oil.
- **Fish meal**
- 15 % Indbl 255.000 ton
- 40 % indbl 680.000 ton
- If we should use only fish oil i our diets we would only be buying 255.000 ton fishmeal



Trends in salmon feed

- No Growth in volume in last few years.
- Chile recovering somewhat
- High prices for salmon => strong demand side,
- **Quality of fishmeal**
- Cadaverin/ Histamin in grower diets less of importance ??
- Dillution effect
- Huge variation in Digestibility 83-94 %
- **TODAY's shadow price 1200 USD / ton May 2017**
- **We (Biomar) used significant more fishmeal in 2017 than in 2016 DUE TO COMPETTIVE PRICES**
- **Higher degree of differentiation**
- w3 – EPA/DHA
- Origen of soures
- Verlasso AquaChile, Biomar Lerøy,
- Whole foods custom made product
- No etoxyquin.
- Level of Dioxins etc based on legal limits
- Bespoke products with higher margins which substitute growth
- Certification BAP, ASC, label R, private standards



Thanks for you attention

Niels Alsted

Fefac

