Fisheries and Farming: Interdependence of Fisheries, Animal Production and Aquaculture

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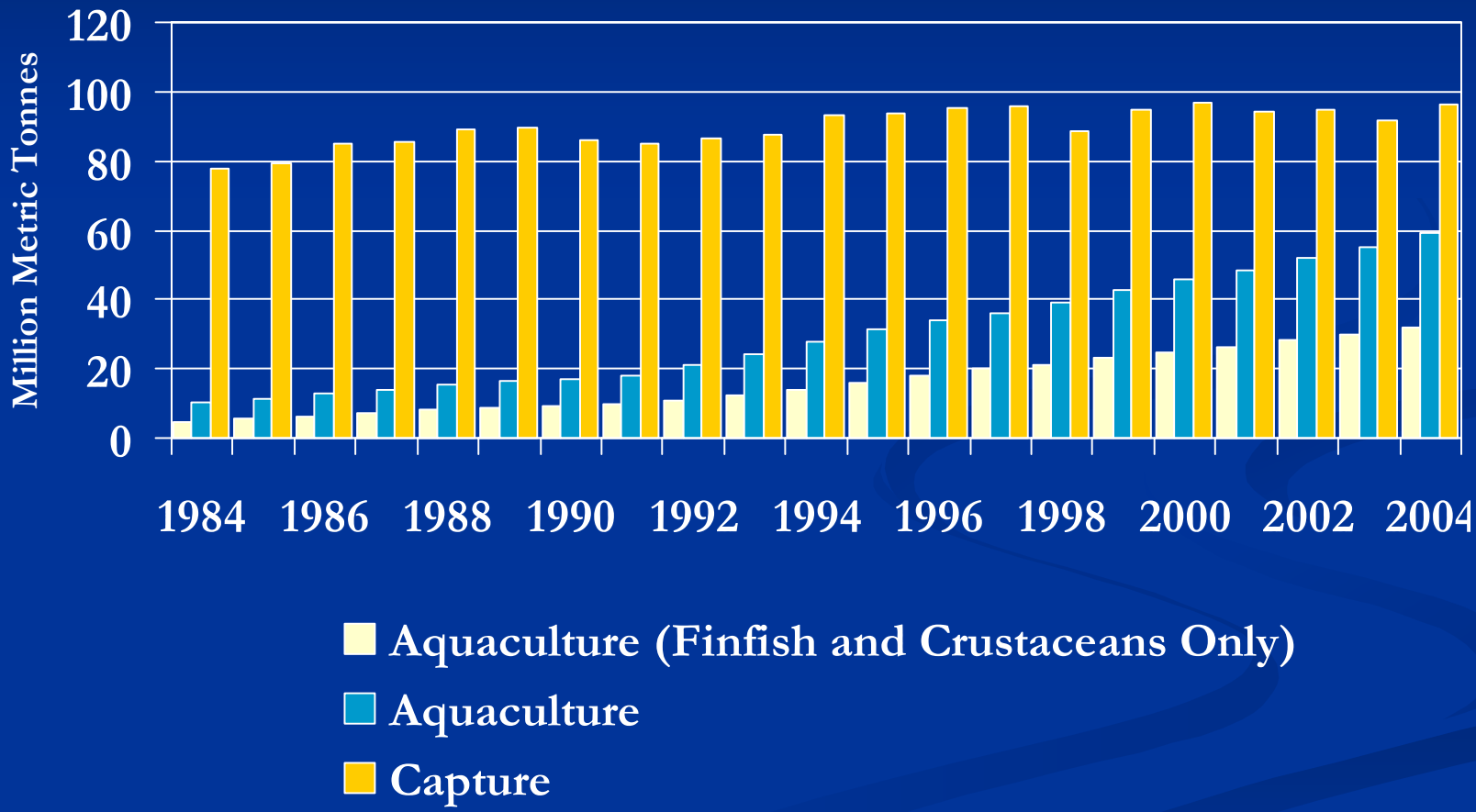
Introduction

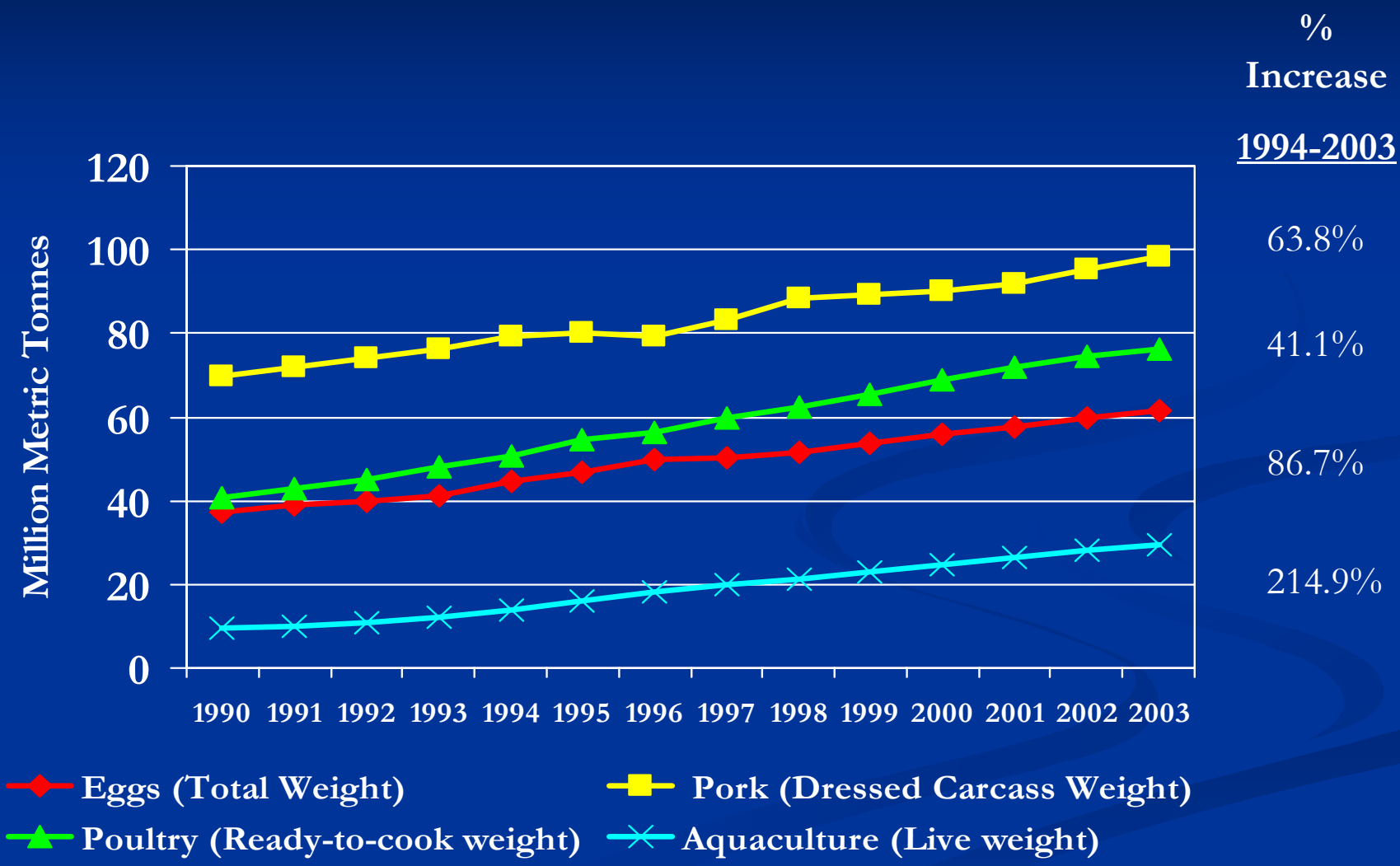
- Fishmeal is a critical feed component for:
  - Poultry
  - Pork
  - Aquaculture (Salmon, trout and shrimp)
- Relatively fixed supply vs. increasing demand
- Issues regarding substitutability across protein sources

Trends in Global Aquaculture Production



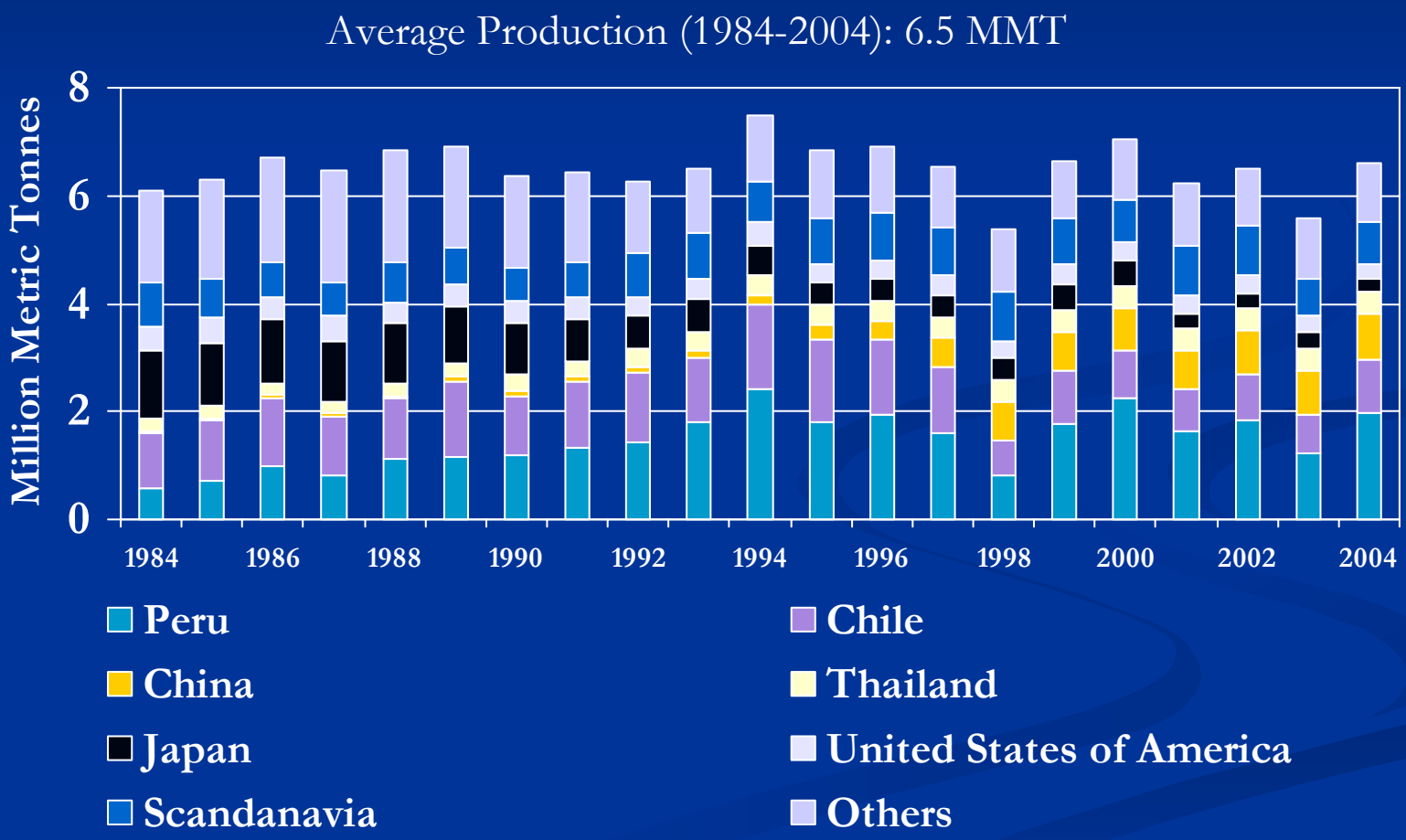
Source: FAO FISHSTAT 2006

Trends in Global Animal Production



Source: FAO FISHSTAT 2006; FAOSTAT 2006

Trends in Global Fishmeal Production



Source: FAO FISHSTAT 2006

Fishmeal Production

- Peru is the major supplier of both fish meal and fish oil.
- In Peru the major species harvested are anchovy (*Engraulis ringens*) and jack mackerel (*Trachurus symmetricus*)
- Both species are small in size, have a short life span, and are highly influenced by El Niño events.

El Niño Events

- Calculating El Niño /La Niña Events:
  - Measured as the departure in monthly sea surface temperature from its long-term mean averaged over the NINO 3.4 region.
  - El Niño and La Niña typically develop between April and June

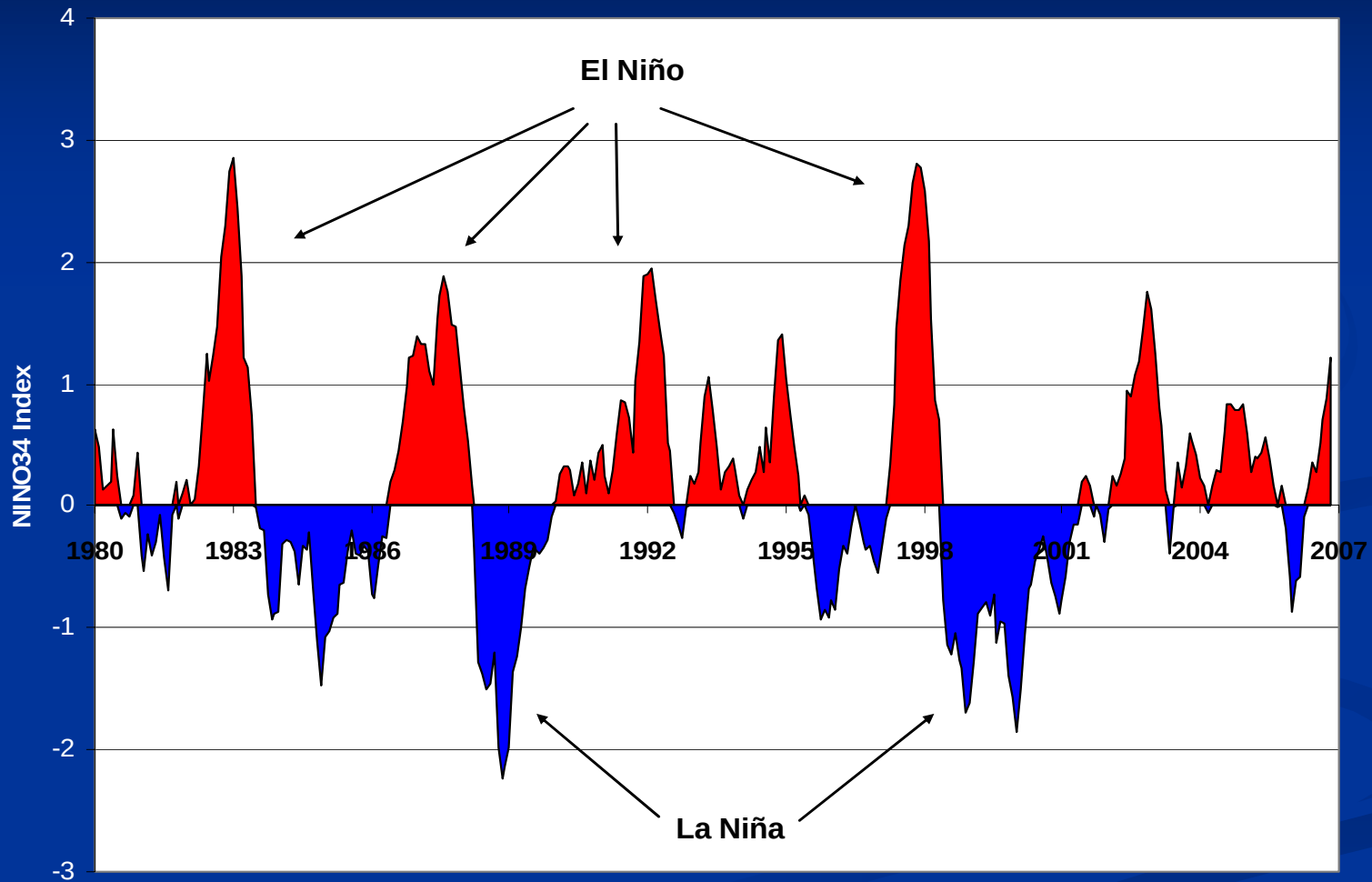
    (Spring in the Northern Hemisphere /Autumn in the Southern Hemisphere)
  - The duration of El Niño and La Niña events can vary substantially from event to event

El Niño Events

- Strong El Niño Events
  - 1982-83
  - 1987-88
  - 1993-94
  - 1994-95
  - 1997-98
- Mild El Niño Events
  - 1991-92
  - 1992-93
  - 2002-03
  - 2004-05
- Strong La Niña Events
  - 1988-89
  - 1998-99
- Mild La Niña Events
  - 2000-01

Source: Western Regional Climate Center http://www.wrcc.dri.edu/enso/ensodef.html

El Niño Events



Source: NOAA--National Weather Service--Climate Prediction Center
http://www.cpc.ncep.noaa.gov/data/indices/sstoi.indices

Has the price relationship changed?

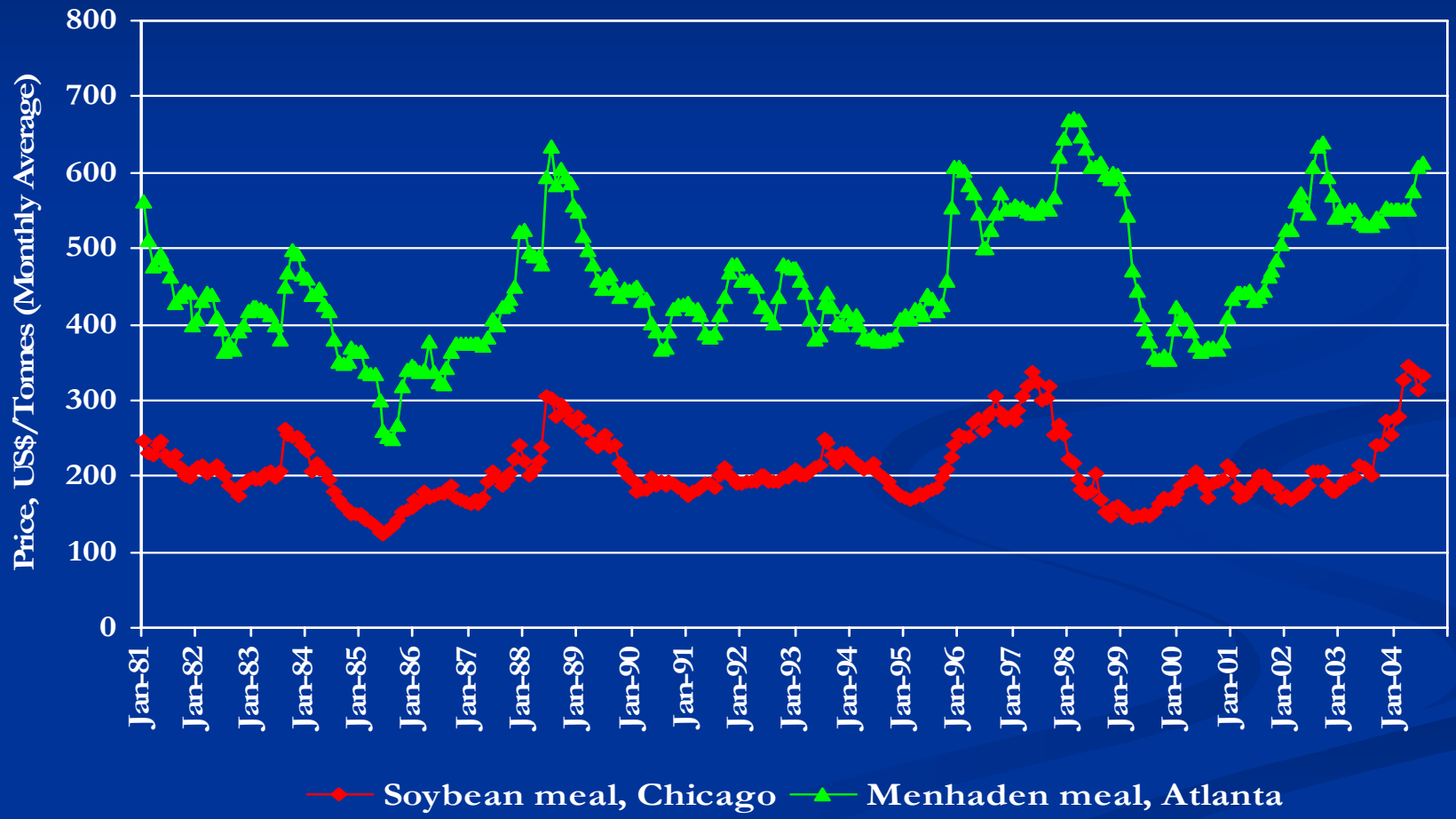
- Given the rapid growth in poultry, pork and aquaculture sectors---
- Has the historic relationship between fishmeal and soybean meal prices broken down?

Issues of Substitutability

The critical question is:

Does fishmeal have unique nutritional properties that distinguish it form the general oilseed market?

Prices of Fishmeal (Atlanta) and Soybean Meal (Chicago)

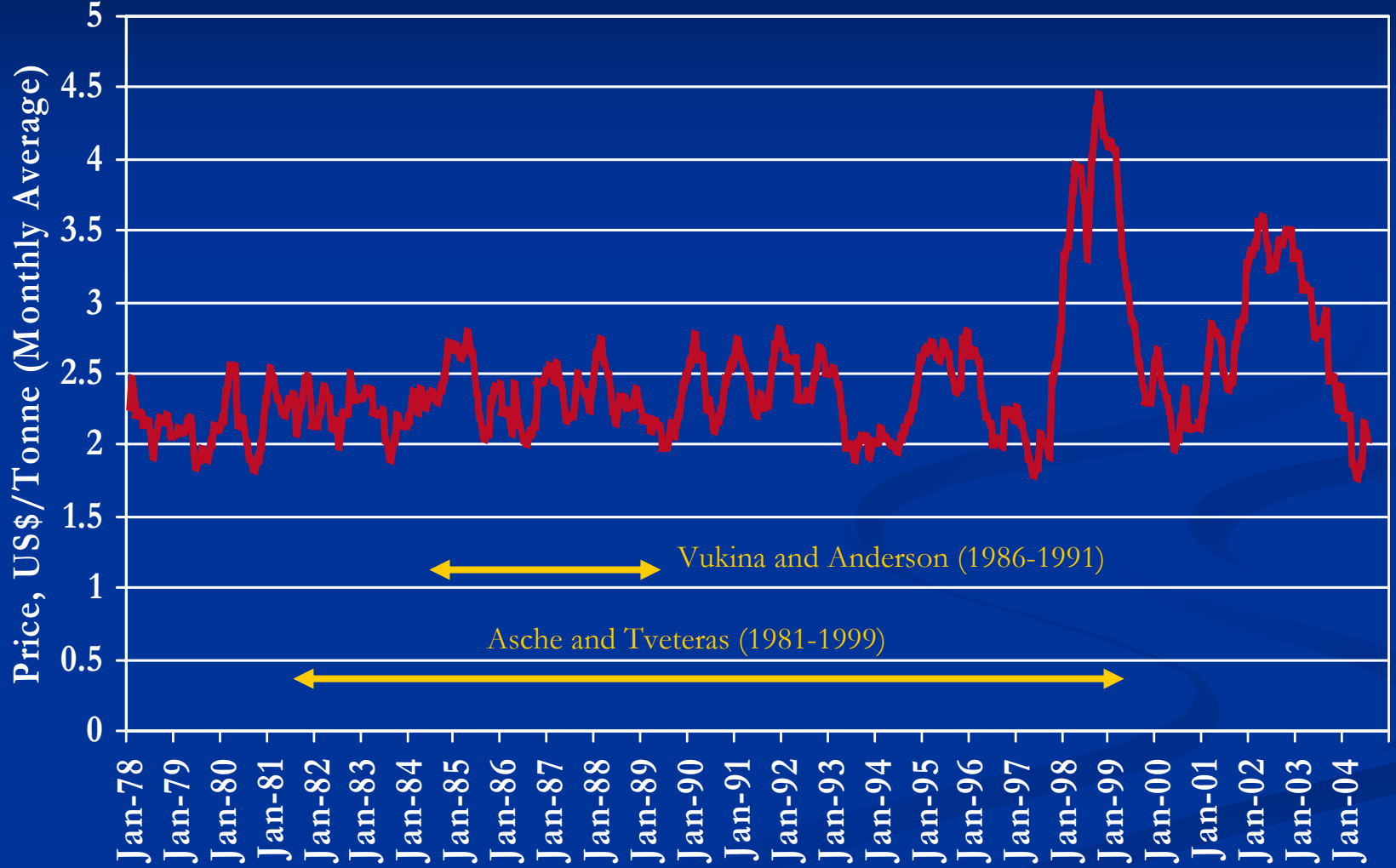


Source: Feedstuffs and CBOT

Has the price relationship changed?

- Vukina & Anderson (1993) (Data 1986-1991, weekly)
  - Cross-commodity hedging with soybean meal.
- Asche & Tveteras (2004) (Data 1981-1999, monthly)
  - Fishmeal and soybean meal are strong substitutes.

Price Ratio of Fishmeal (Atlanta) to Soybean Meal (Chicago)

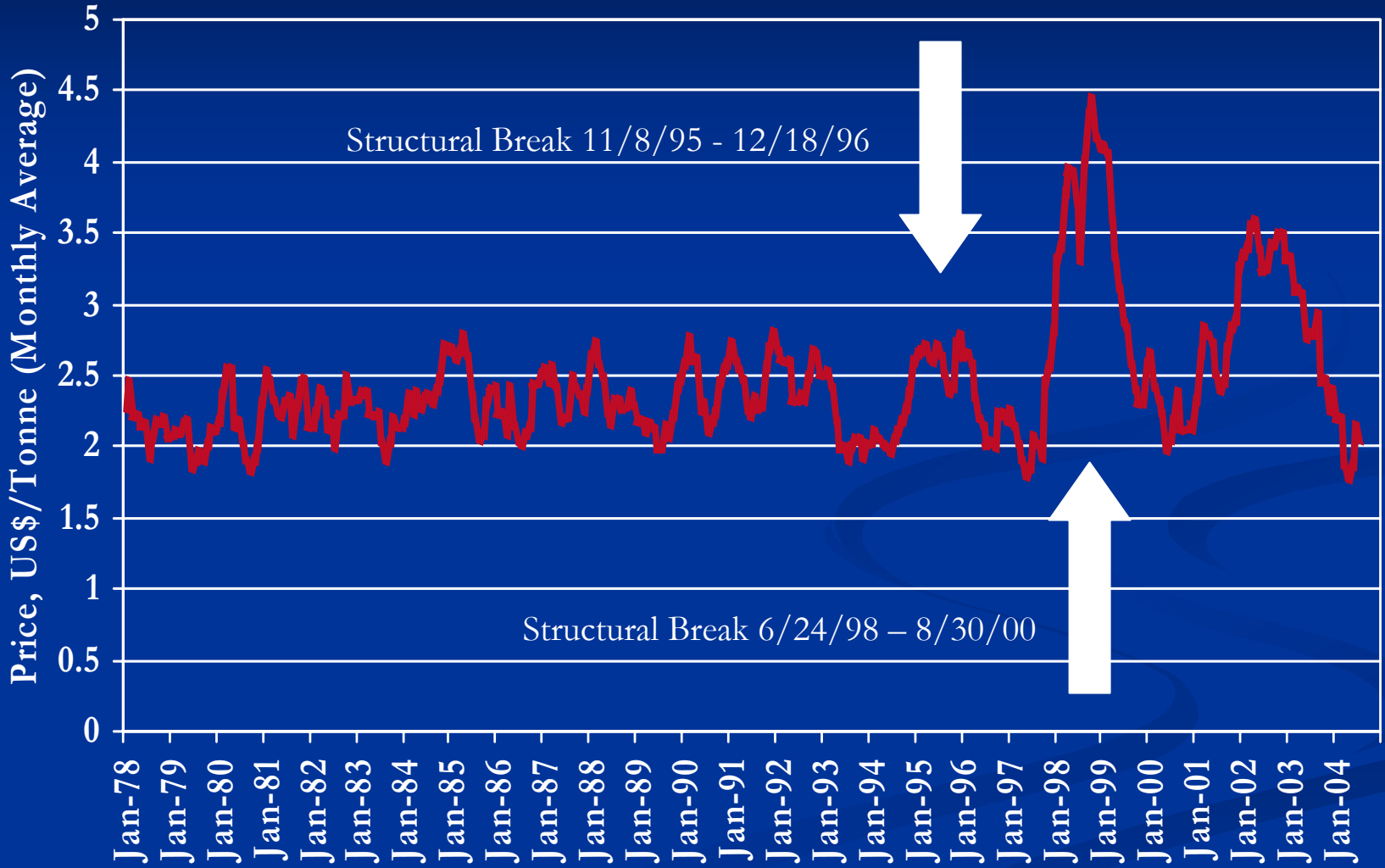


Source: Feedstuffs and CBOT

Findings

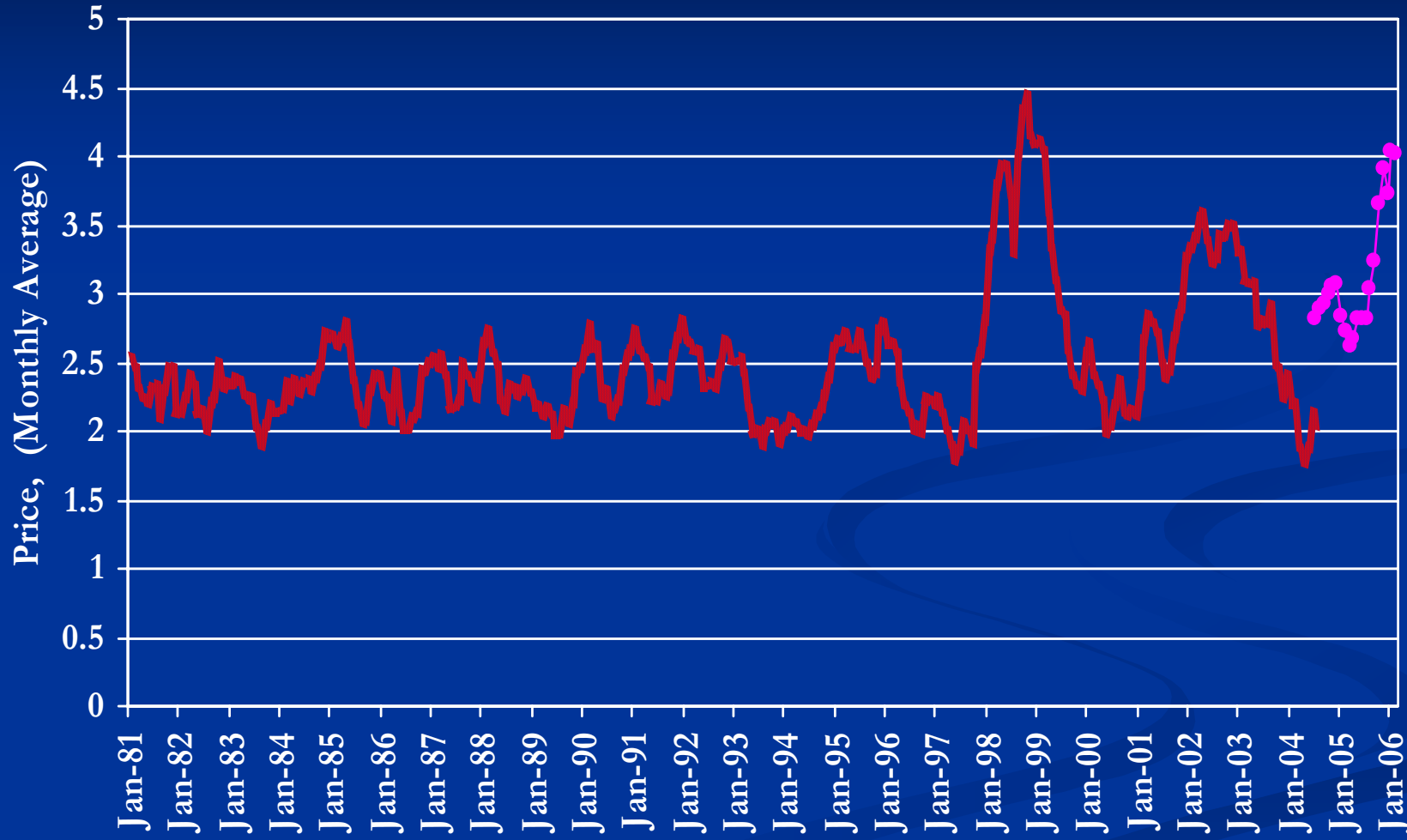
- Kristofersson and Anderson (2006) identify two structural breaks (1996, 1998). Used Bai-Perron test for structural change
- It appears the historic price relationship has broken down.

Price Ratio of Fishmeal (Atlanta) to Soybean Meal (Chicago)



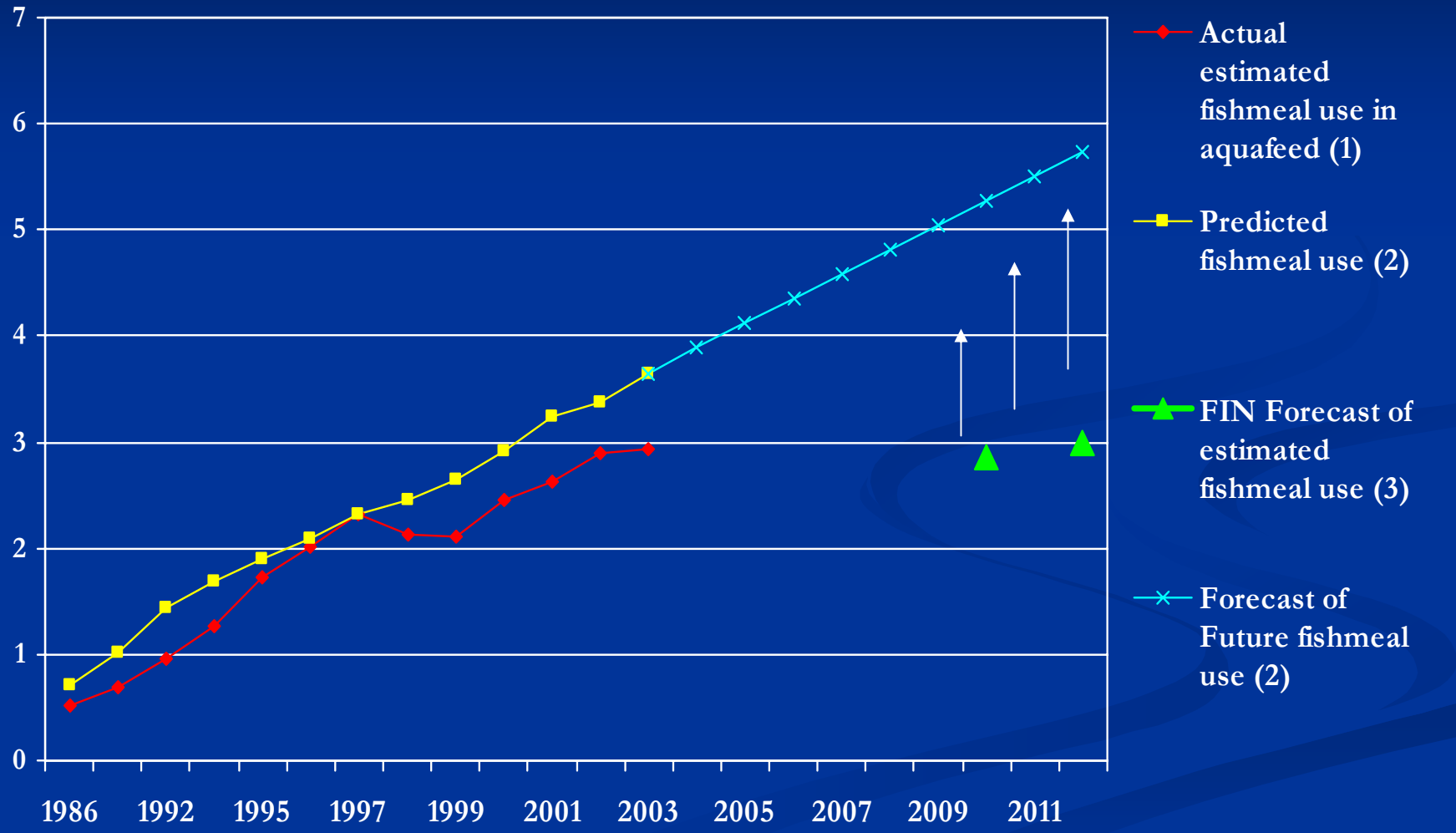
Source: Feedstuffs and CBOT

Price Ratio of Fishmeal (Atlanta) to Soybean Meal (Chicago) with additional Fishmeal (Hamburg) and Soybean Meal (Rotterdam/Hamburg) data (July 2004 – February 2006)



Source: Feedstuffs and CBOT (1978-2004); Globefish (2004-2006)

Predicted fishmeal use vs. Estimated actual fishmeal use



Sources: (1) Various Sources (2) Based on 1997 fishmeal/aquaculture production ratio (Naylor et al. 2000) (3) 2010, Pike and Barlow (2002); 2012, Pike (2005)

Explanations for divergence

- Change in Species Mix? NO
  - The share of carnivores raised has not changed. Has remained 18.8-24.8% over past 20 years.
- Change in FCR? YES
  - FCRs have declined for salmon from over 2.0 to 1.3 over the past 20 years
- Better use of fishmeal, better farm management practices? YES

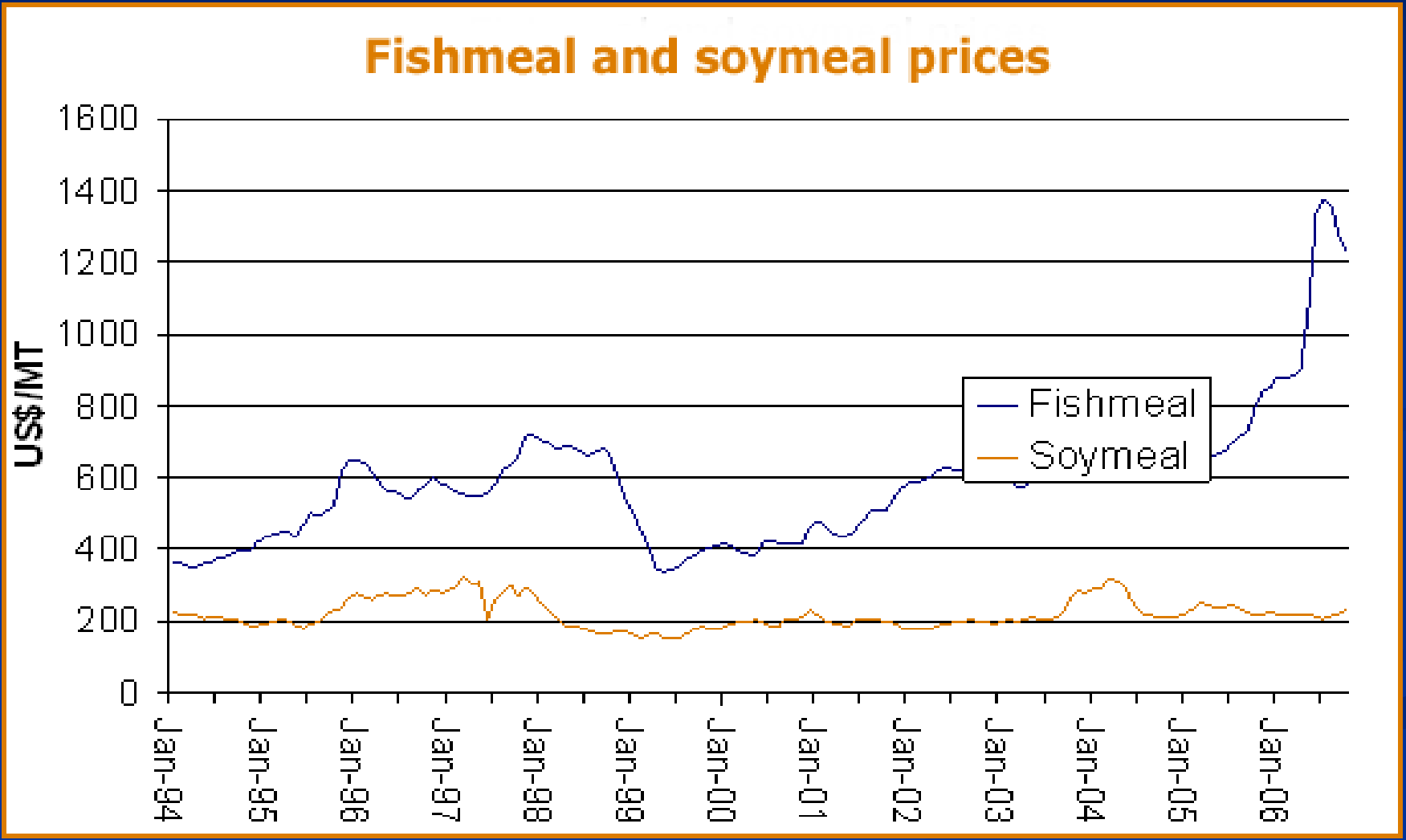
Conclusions

- Empirical evidence supports hypothesis of a structural change.
- This is due to increased demand for fishmeal from poultry, pork, and aquaculture in specialty diets.
- Provides economic incentive for innovation.
- Evidence of such innovations include
  - Declining FCR, new feed formulations, better farm management practices.

Recent Industry Developments

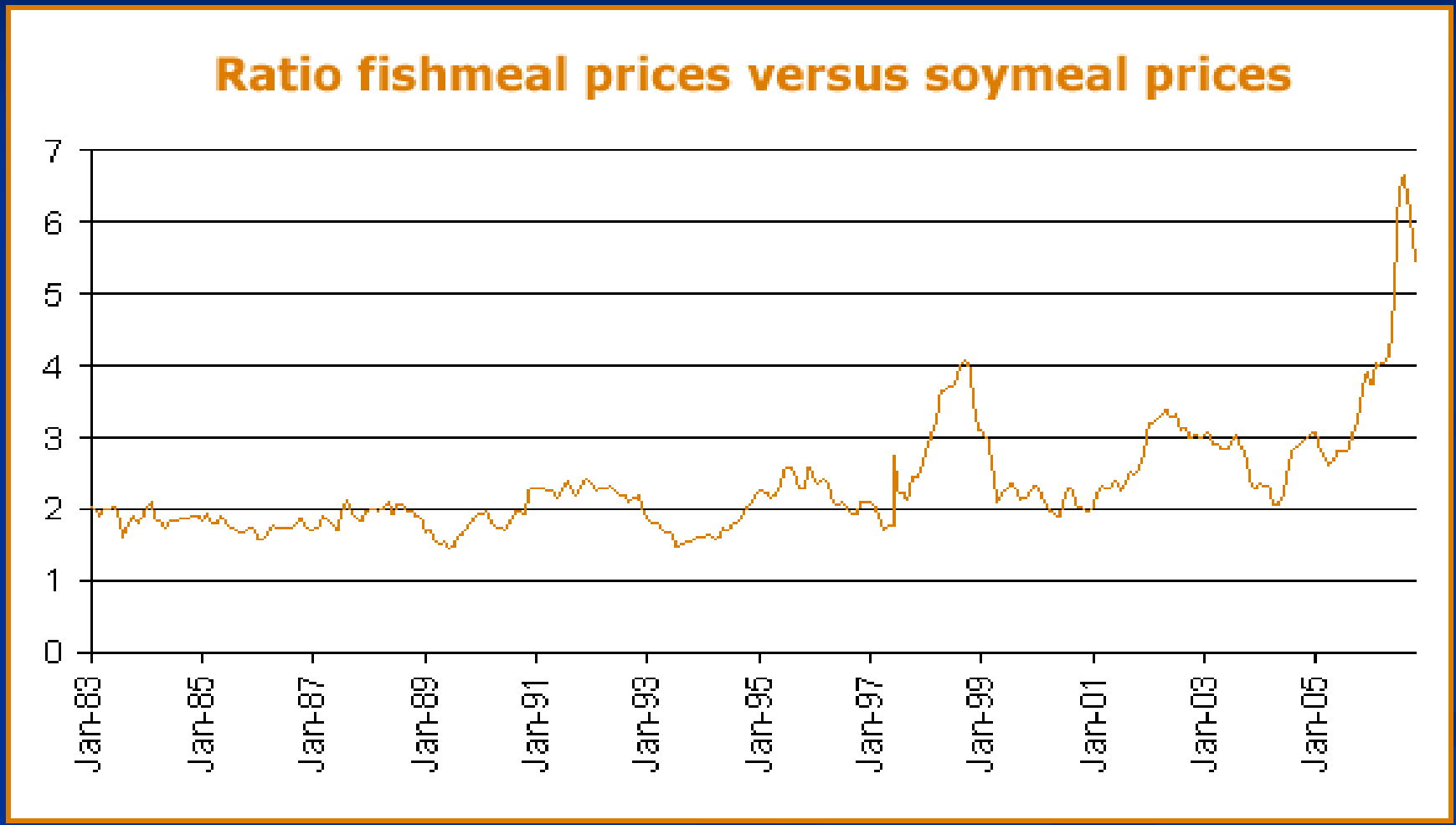
- Fishmeal prices skyrocketed in May 2006 to almost $1400/tonne. (USD)
- Soymeal prices are relatively stable around $210/tonne (USD) over the course of 2006.
- Fishmeal/Soybean meal price ratio is normally around 2; during this past year it exceeded 6.
- El Niño Event confirmed for 2006 and was strong than initially forecast.
  - Catches for 2007 not expected to be much higher than 2006 harvest levels)

Recent Industry Developments



Source: FAO Globefish: Fishmeal Market Report - November 2006

Recent Industry Developments



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