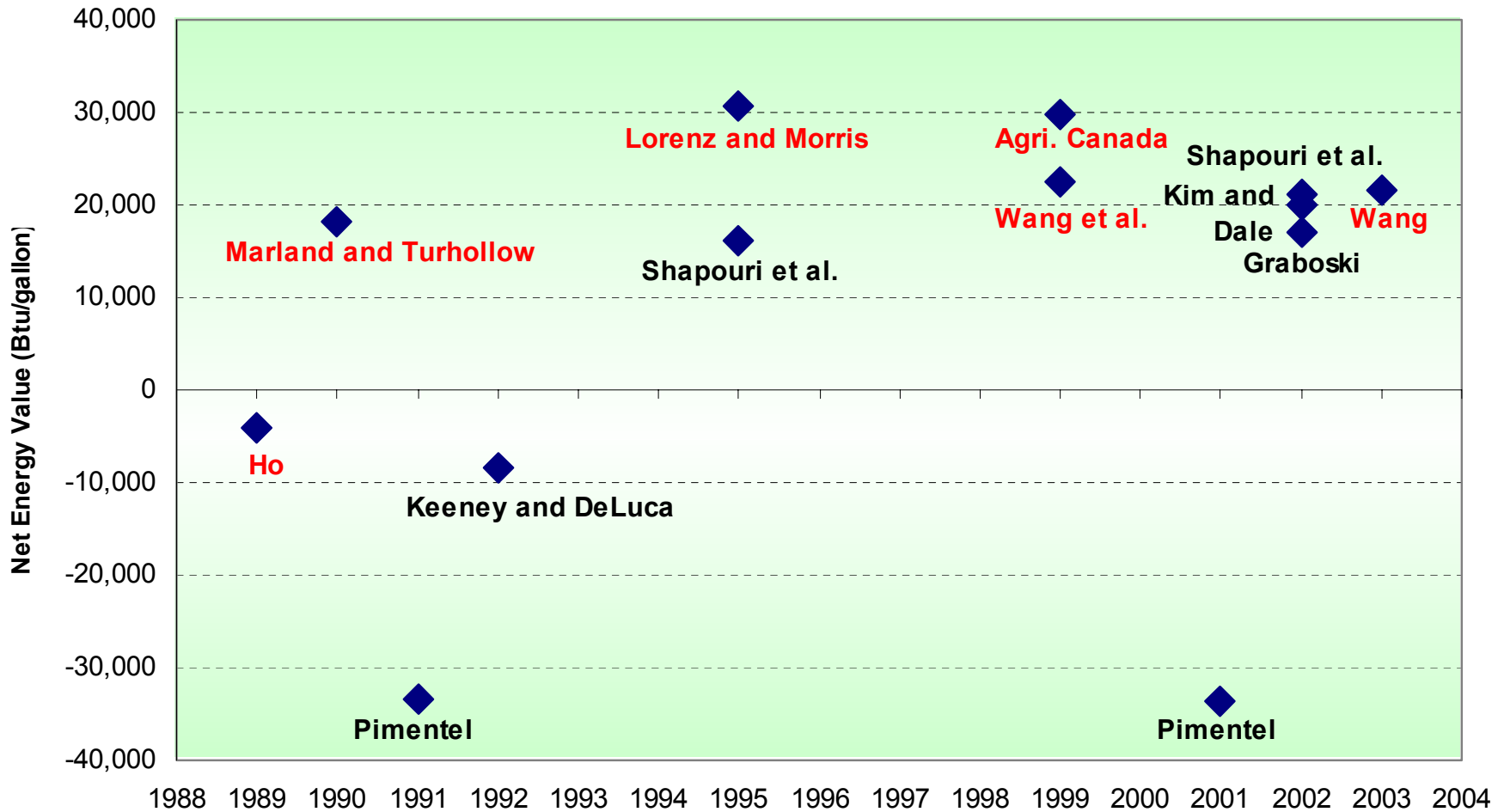


Energy Balance of Corn Ethanol Results (Btu in EtOH Minus Btu Used)



Ethanol Net Energy Value - Summary of Studies

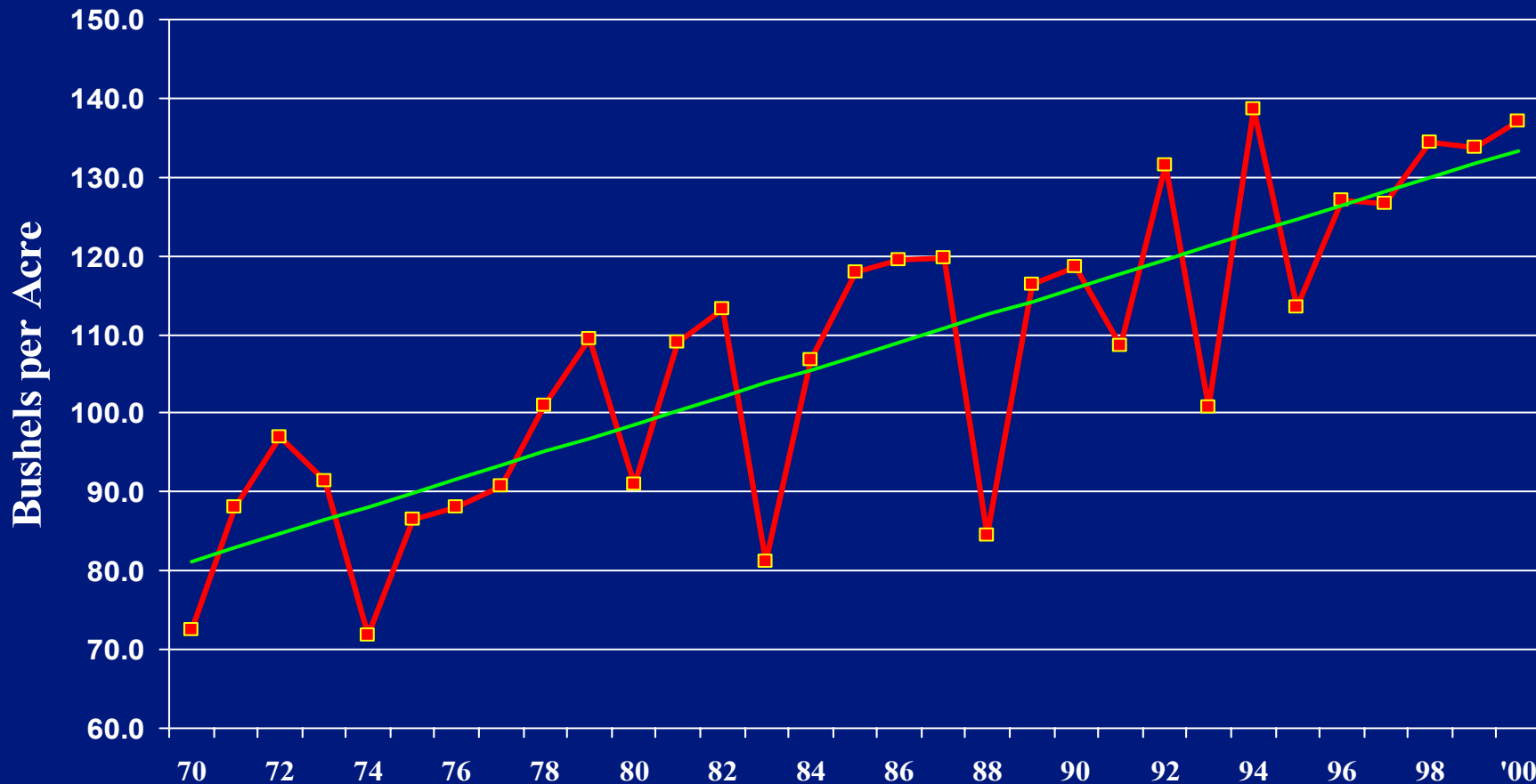
Authors and Date	NEV [Btu]
Pimentel (1991)	-33,517
Pimentel (2001)	-33,562
Keeney and DeLuca (1992)	-8,438
Marland and Turhollow (1990)	18,154
Lorenz and Morris (1995)	30,589
Ho (1989)	-4,000
Agri.and Agri-Food, CAN (1999)	29,826
Wang et al. (1999)	22,500
Shapouri et al. (1995)	20,436
Kim and Dale (2002)	23,886 – 35,463

Why do Pimentel's analyses stand out?

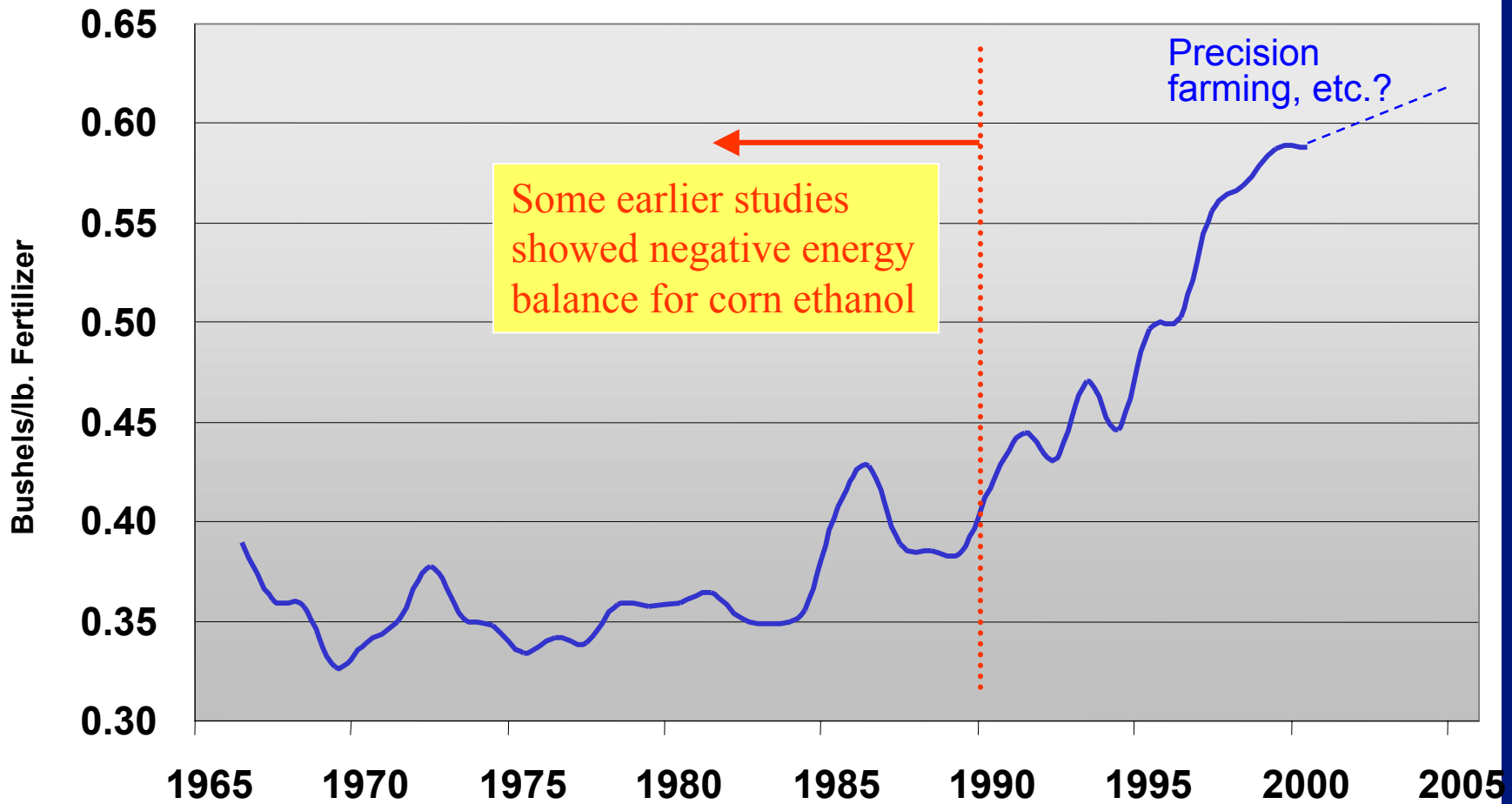
- His corn yields date from pre-1992
- His value for energy required to produce ethanol and the ethanol yield date from pre-1980
- His figures for energy to produce fertilizer are 1990 world-wide values, not recent U.S. values
- He assumes all corn is irrigated (only 16% is)
 - virtually no irrigated corn is converted to ethanol
- He does not properly assign an energy credit for the high protein DDGS co-product

Yield of Corn with Time

Linearly increasing since 1950 at 1.7bu/acre/yr



U.S. Corn Output per Pound of Fertilizer Used (3-year Moving Average)



Technology Has Reduced Energy Use Intensity of Modern Ethanol Plants

