Technical change in agriculture 1935-85:

using Farm Management Survey data from south-west England to explore processes of technical change

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Volume of UK agricultural output

Growth rate peaked 1945-65
Output and productivity

- Federico (2005)
  - C19 agricultural growth by increasing inputs
  - C20 growth by increasing TFP

  - 1953-1984: 1.68%
  - 1984-2000: 0.26%
The Farm Management Survey

- Was *not* designed to explain technical change
- 4987 fieldbooks entered in dataset
Distribution of fieldbooks

Number of fieldbooks in year

Fieldbooks in SPSS dataset
Methodology

For each farm
  - Analyse accounts
    - Farm history
    - Oral history (for survivors)
Analysing the accounts (2)

- Year
- Farm size
- Grass area
- Cereal output
- Other crops output
- Cattle output
- Sheep output
- Dairy output

- Fertiliser costs
- Pesticide costs
- Seed costs
- Concentrate costs
- Vet costs
- Labour costs
- Machinery costs
- Building costs
Comparison ratios

- Index of farm specialisation
- Output per £100 labour
- Output per £100 capital
- Real output per grazing acre
- Animal output per £100 concentrates
- Output per £100 total inputs
Where were the farms?
Farm sizes gradually increased
Fewer farms were rented
The big changes in dairying

- More milk per cow
- More milk per acre
- More milk per farm
More milk per cow

Annual Av. Milk Yield per Dairy Cows (gallons) England & Wales
More milk per acre
More milk per farm
What produced more milk per cow?

- Breed changes
- AI
- Feeds
Breed changes in England and Wales

Dairy Herd Breed Distribution England & Wales
June 1960

Dairy Herd Breed Distribution England & Wales
June 1970
Breed changes in the Far West

Dairy Herd Breed Distribution Far Western Region
June 1960

Dairy Herd Breed Distribution Far Western Region
June 1970

- Ayrshire
- Friesian
- Guernsey
- Jersey
- Shorthorn
- Other
Method of Mating in Dairy Herds

- Natural mating only
- AI only
- NM & AI
- Unspecified

1960 Eng & Wales
1960 Far West
1970 Eng & Wales
1970 Far West
More purchased feeds

Mean milk yield (Gallons) per £100 of concentrates
Mean milk yield (Gallons) per £100 of concentrates (3 yr moving average)
Increasing use of silage

- John Coleman – ‘Father made silage in the 1950s ... very hard work ... all hand work ... before the days of buckrakes ... it was about 1958 that people started using buckrakes’

- Paul Gluyas – ‘Hydraulics transformed materials handling. Hydraulic not hand-draulic’
And silage quality

- Paul Gluyas - ‘... a lot more feed value in well-made silage than in well-made hay’

- Michael Horrell – ‘... if you had better quality silage the cow would eat more, and every kilogramme she ate would nourish her more...’
What produced more milk per acre?

- More fertilizer
- Better grass varieties
- Better grazing management
Changing fertilizer use

![Graph showing changing fertilizer use from 1939 to 1984. The x-axis represents years, and the y-axis represents nitrogen use (units/acre) and moving average (3 years) for nitrogen use (units/acre). The graph shows a significant increase in nitrogen use over time, with a notable peak in the late 1970s and early 1980s.](image-url)
Dairy farms used more N than non-dairy farms
Mixed tenure farms used more Nitrogen
Grazing management and grass varieties

- Farm 744 – ‘we bought grass varieties by the advice of the seedsman’
- Farm 7/8 – ‘NAAS ... gave us advice on certain leys to use’

- But no mention of paddocks/electric fencing/forward creep grazing
How did farmers cope with more cows?

- Parlours
- Bulk tanks
- Cubicles
- Slurry

And specialisation.....
Farmers began to specialise from the late 1940s/early 1950s.
The importance of specialisation

IFS = [(E1/O1) x 100] + 1/n [(O1-E1)/O1 x 100]
The main change was the disappearance of pigs and poultry.
Capital inputs also increased

- Machinery
- Buildings
- Capital grants
Output per £100 of capital invested
Grant aid increased
Tractors replaced horses and farms were electrified.
Labour use decreased

- Farm 2/7 (Dorset, 680 acres)
  - 1945 – 19 workers
  - 1984 – 6 workers
Initial findings – from the whole Devon and Cornwall survey

Graph 2: realo/i (1962=100)

- Output per £100 input
- Linear (realo/i)
Conclusions (1)

- Most dairy farmers made the same changes
- But at different times
- Mixed farms specialised
- These changes were impossible before 1939
Conclusions (2)

- How much was due to
  - agricultural policy
  - Inflation
  - Tenure changes

- The development of knowledge networks