Increased output in UK 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

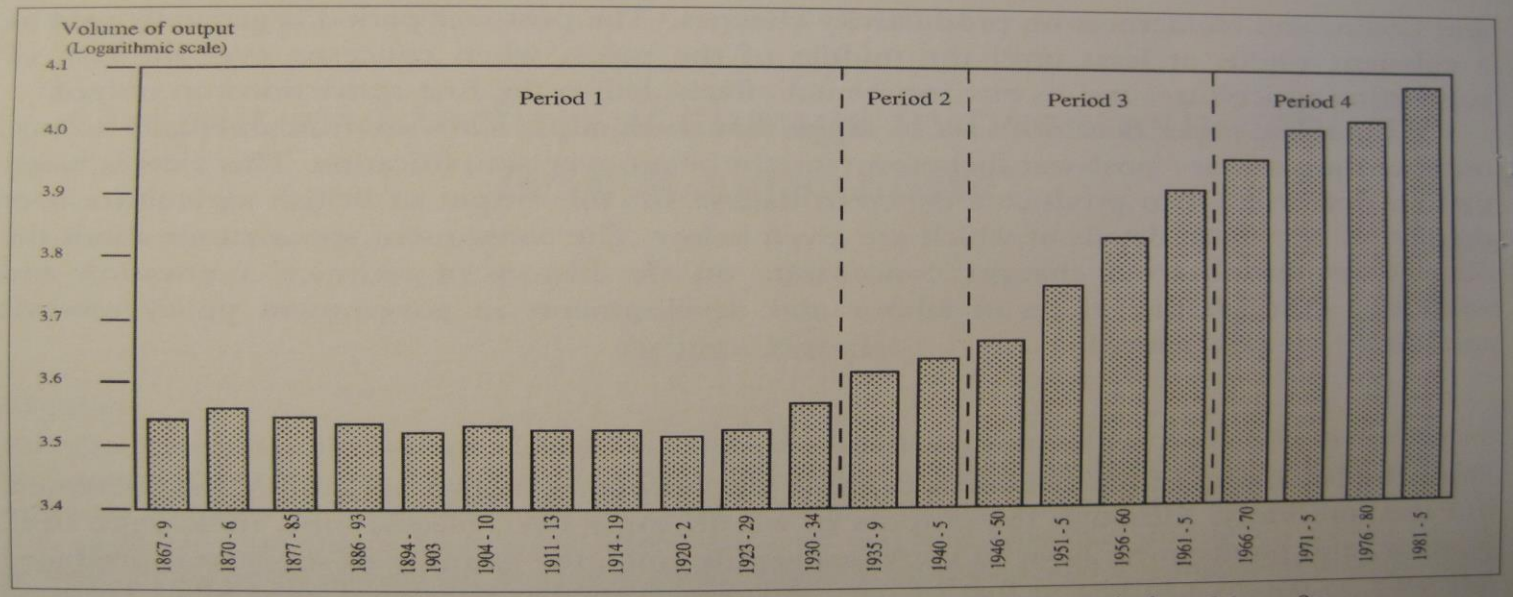


FIGURE 1. Changes in the volume of agricultural output in Britain, 1867–1985.
Source: See Table A4 below.

Growth rate peaked 1945-65

Sources of output growth

- Change the output mix
- Change inputs
  - Because output prices change
  - Because input prices change
- Increase output per unit of input
  - By increasing output
  - By decreasing inputs

What do we already know?

- A lot about what happened at the *national* level
  - More output with less labour and more capital
  - Arable expanded more than grazing livestock

Agricultural output in England and Wales

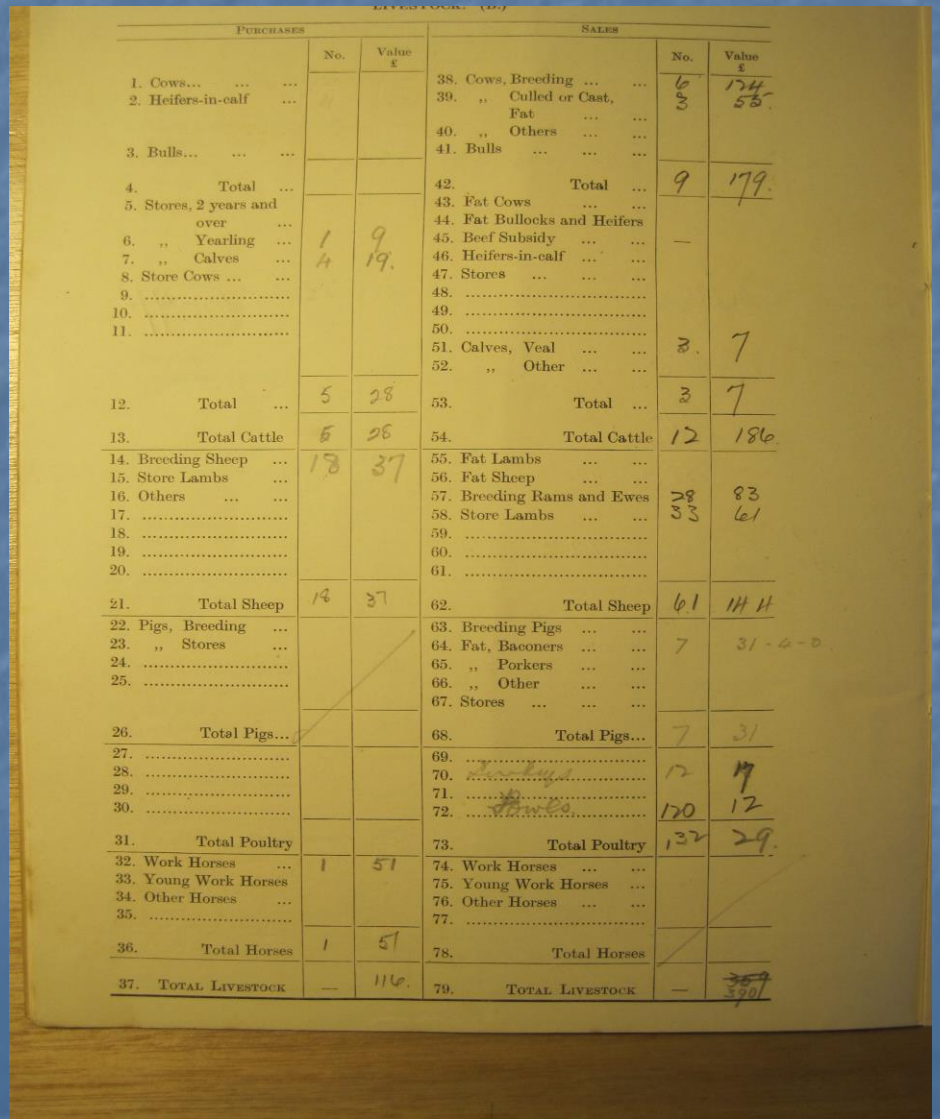
	1940	*1960*	*1979*
Cereals (m.tons)	5.5	7.9	16.9
S. beet (m.tons)	2.7	7.3	7.7
Cattle (millions)	7.0	8.8	9.7
Sheep (millions)	17.7	18.4	21.6
Pigs (millions)	3.4	4.3	6.6
Poultry (millions)	51.8	82.7	108.6
Milk (billion litres)	8.1	11.9	15.4

What do we already know (2)

- Less about the differences between
  - Expanders
  - Survivors
  - Failures
- Not much about *why* it happened
  - Interwar/postwar price response differences
  - Impact of external influences

We need a farm-level dataset

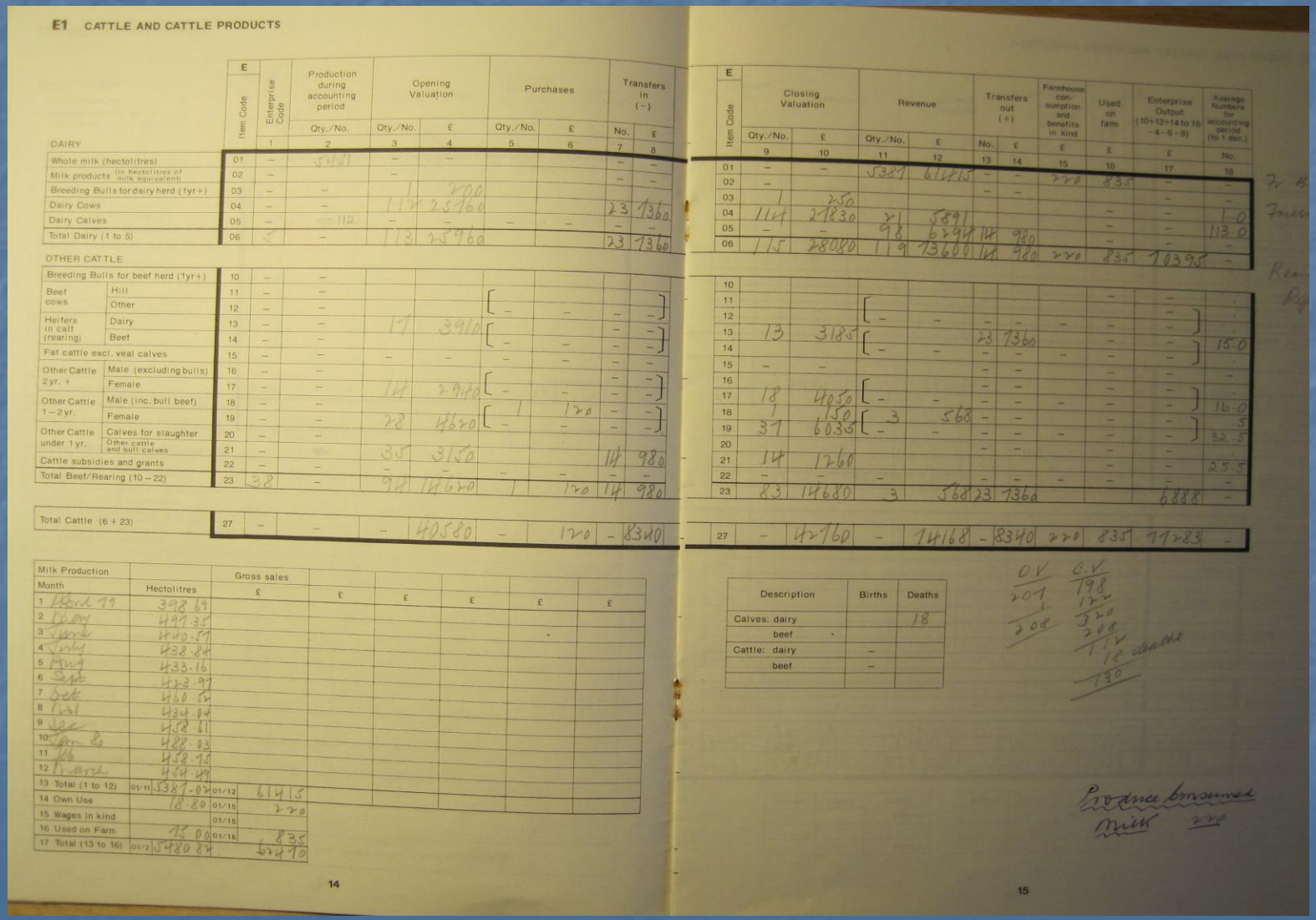
- The UK Farm Management Survey was established in 1937



Purchases	No.	Value £
1. Cows...		
2. Heifers-in-calf ...		
3. Bulls...		
4. Total ...		
5. Stores, 2 years and over ...		
6. ,, Yearling ...	1	9
7. ,, Calves ...	4	19.
8. Store Cows		
9.		
10.		
11.		
12. Total ...	5	28
13. Total Cattle	5	28
14. Breeding Sheep ...	18	37
15. Store Lambs ...		
16. Others		
17.		
18.		
19.		
20.		
21. Total Sheep	18	37
22. Pigs, Breeding ...		
23. ,, Stores ...		
24.		
25.		
26. Total Pigs...		
27.		
28.		
29.		
30.		
31. Total Poultry		
32. Work Horses ...	1	51
33. Young Work Horses		
34. Other Horses ...		
35.		
36. Total Horses	1	51
37. Total Livestock	—	116.

Sales	No.	Value £
38. Cows, Breeding	6	174
39. ,, Culled or Cast, Fat	3	58.
40. ,, Others		
41. Bulls		
42. Total ...	9	179.
43. Fat Cows		
44. Fat Bullocks and Heifers		
45. Beef Subsidy	—	
46. Heifers-in-calf		
47. Stores		
48.		
49.		
50.		
51. Calves, Veal	3.	7
52. ,, Other		
53. Total ...	3	7
54. Total Cattle	12	186
55. Fat Lambs		
56. Fat Sheep		
57. Breeding Rams and Ewes	28	83
58. Store Lambs	33	61
59.		
60.		
61.		
62. Total Sheep	61	144
63. Breeding Pigs		
64. Fat, Baconers	7	31-4-0
65. ,, Porkers		
66. ,, Other		
67. Stores		
68. Total Pigs...	7	31
69.		
70. [illegible]	12	19
71.		
72. [illegible]	120	12
73. Total Poultry	132	29.
74. Work Horses		
75. Young Work Horses ...		
76. Other Horses		
77.		
78. Total Horses		
79. Total Livestock	—	~~359~~ 390

And is still going



E1 CATTLE AND CATTLE PRODUCTS

		Item Code	Enterprise Code	Production during accounting period Qty./No.	Opening Valuation Qty./No.	Opening Valuation £	Purchases Qty./No.	Purchases £	Transfers in (−) No.	Transfers in (−) £
			E							
			1	2	3	4	5	6	7	8
DAIRY										
Whole milk (hectolitres)		01	–	5481	–	–			–	–
Milk products (in hectolitres of milk equivalent)		02	–		–				–	–
Breeding Bulls for dairy herd (1yr+)		03	–	–	1	700				
Dairy Cows		04	–	–	114	25760			23	1360
Dairy Calves		05	–	112	–	–	–	–	–	–
Total Dairy (1 to 5)		06	–	–	115	26460			23	1360
OTHER CATTLE										
Breeding Bulls for beef herd (1yr+)		10	–	–						
Beef cows	Hill	11	–	–						
	Other	12	–	–						
Heifers in calf (rearing)	Dairy	13	–	–	17	3910				
	Beef	14	–	–						
Fat cattle excl. veal calves		15	–	–	–	–				
Other Cattle 2 yr. +	Male (excluding bulls)	16	–	–						
	Female	17	–	–	14	2940				
Other Cattle 1–2 yr.	Male (inc. bull beef)	18	–	–			1	170		
	Female	19	–	–	22	4620				
Other Cattle under 1 yr.	Calves for slaughter	20	–	–						
	Other cattle and bull calves	21	–	–	35	3150			14	980
Cattle subsidies and grants		22	–	–	–	–	–	–	–	–
Total Beef/Rearing (10–22)		23	32	–	91	14620	1	170	14	980
Total Cattle (6 + 23)		27	–	–	–	40580	–	170	–	8340

		Item Code	Closing Valuation Qty./No.	Closing Valuation £	Revenue Qty./No.	Revenue £	Transfers out (+) No.	Transfers out (+) £	Farmhouse consumption and benefits in kind £	Used on farm £	Enterprise Output (10+12+14 to 16 −4−6−8) £	Average Numbers for accounting period (to 1 dec.) No.
			E									
			9	10	11	12	13	14	15	16	17	18
DAIRY												
Whole milk (hectolitres)		01	–	–	5327	61415	–	–	770	835	–	–
Milk products (in hectolitres of milk equivalent)		02	–				–	–			–	–
Breeding Bulls for dairy herd (1yr+)		03	1	250							–	–
Dairy Cows		04	114	27830	81	5891					–	1.0
Dairy Calves		05	–	–	98	6294	14	980			–	113.0
Total Dairy (1 to 5)		06	115	28080	119	73600	14	980	770	835	10395	–
OTHER CATTLE												
Breeding Bulls for beef herd (1yr+)		10									–	–
Beef cows	Hill	11									–	–
	Other	12									–	–
Heifers in calf (rearing)	Dairy	13	13	3185			23	7360			–	15.0
	Beef	14									–	–
Fat cattle excl. veal calves		15	–	–			–	–			–	–
Other Cattle 2 yr. +	Male (excluding bulls)	16					–	–			–	–
	Female	17	18	4050			–	–			–	–
Other Cattle 1–2 yr.	Male (inc. bull beef)	18		150	3	568	–	–			–	16.0
	Female	19	37	6035			–	–			–	.5
Other Cattle under 1 yr.	Calves for slaughter	20					–	–			–	32.5
	Other cattle and bull calves	21	14	1260			–	–			–	–
Cattle subsidies and grants		22	–	–	–	–	–	–			–	25.5
Total Beef/Rearing (10–22)		23	83	14680	3	568	23	7360			6888	–
Total Cattle (6 + 23)		27	–	42760	–	74168	–	8340	770	835	17283	–

Milk Production Month	Hectolitres	Gross sales £	£	£	£	£	£
1 March 79	398.69						
2 April	491.35						
3 May	440.57						
4 June	438.84						
5 July	433.16						
6 Aug	428.97						
7 Sept	460.58						
8 Oct	434.04						
9 Nov	458.61						
10 Dec	488.03						
11 Jan 80	458.75						
12 Feb	454.49						
13 Total (1 to 12)	01/11 5387.07	01/12 61415					
14 Own Use	18.80	01/15 770					
15 Wages in kind		01/15					
16 Used on Farm	75.00	01/16 835					
17 Total (13 to 16)	01/2 5480.87	62470					

Description	Births	Deaths
Calves: dairy		18
beef		
Cattle: dairy	–	
beef	–	

OV 207 1 208

CV 198 122 320 208 112 18 cattle 180

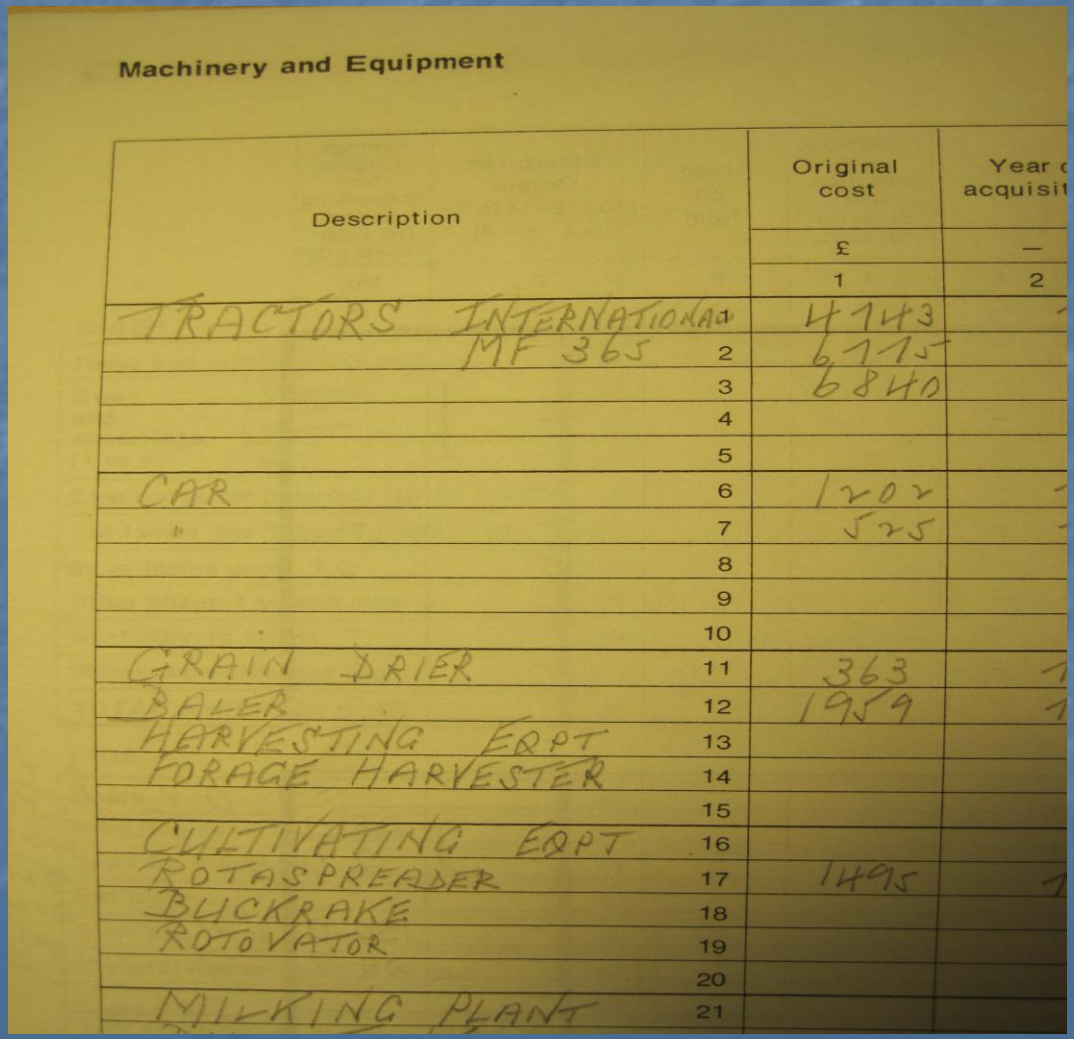
Produce consumed milk 770

14

15

The FMS contains information on

- Outputs
- Inputs
- Labour
- Capital



Machinery and Equipment

Description		Original cost	Year of acquisition
		£	—
		1	2
TRACTORS INTERNATIONAL	1	4143	
MF 365	2	6115	
	3	6840	
	4		
	5		
CAR	6	1202	
"	7	525	
	8		
	9		
	10		
GRAIN DRIER	11	363	
BALER	12	1959	
HARVESTING EQPT	13		
FORAGE HARVESTER	14		
	15		
CULTIVATING EQPT	16		
ROTASPREADER	17	1495	
BUCKRAKE	18		
ROTOVATOR	19		
	20		
MILKING PLANT	21		

Preliminary analysis of the Farm Management Survey

- 10,000 field books
- Farms remained in the survey for 15 years – in theory
- But some farms stayed in for 40 years
- Full or partial data extraction

Analysing the accounts for changes

- Outputs
- Yields
- Inputs / costs
- Performance measures
  - Purchased inputs / £100 labour cost
  - Output per £100 labour cost
  - Output per £100 input

Output per acre indices for dairy farms (*1940 = 100*)

Farm code number	*1960*	*1979*
101	216	304
115	135	177
192	186	378
209	162	87
466	173	184
515	228	472
524	230	442

Output per acre indices for livestock farms (*1940 = 100*)

Farm code number	*1960*	*1979*
106 lowland	224	400
469 lowland	136	115
497 lowland	156	214
162 upland	349	422
324 upland	307	420

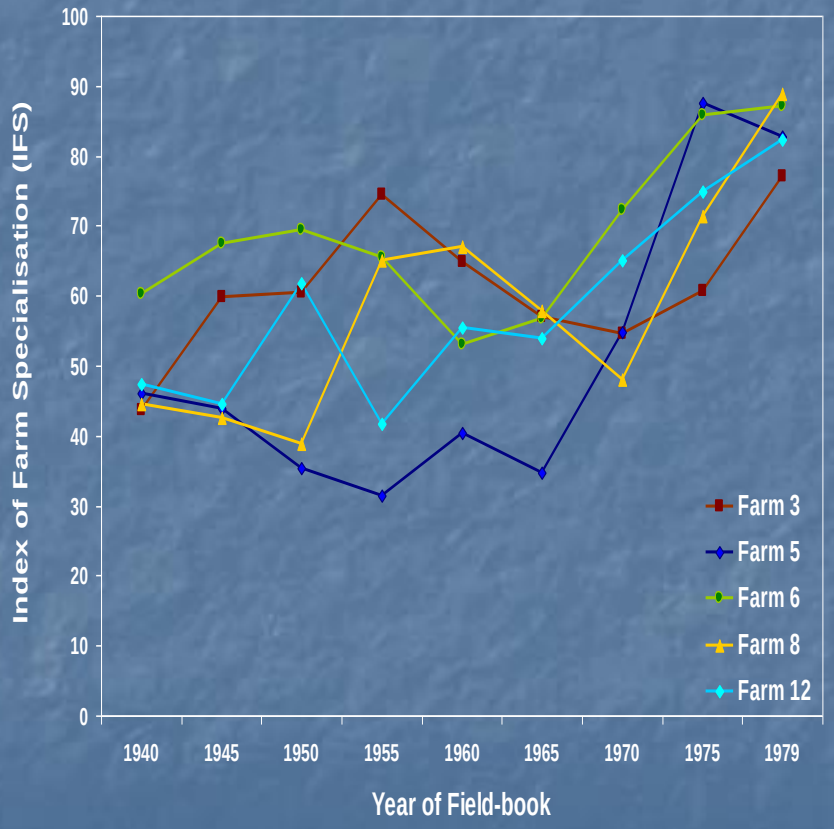
Some unexpected cost ratios

	1940	*1960*	*1979*
Purchased inputs / £100 labour	329	310	309
Output / £100 labour	384	421	388
Output / £100 input	115	135	130

But specialisation increases as expected

- Average index of farm specialisation for 12 farms
  - 1940 = 50.6
  - 1979 = 74.6

Changes for 5 mainly dairy farms →



Consistent results for mechanisation

- 9 out of 12 farms had horses in 1950
- None had horses in 1955
- 10 of the 12 farms bought tractors during the war

Conclusions (1)

- Should we use the whole archive to produce comparative data?
- Or produce individual farm histories year by year supported by oral history

Conclusions (2)

- We are interested in the *processes* of technical change
  - Is south-west England typical? -we can use Reading data for comparison with other regions
  - We are also analysing official promotion of technology, extension and education, and the impact of the media

Conclusions (3)

- Still working on the big question – was output increase the result of
  - More inputs, or
  - More outputs per unit of input