



WORKING PAPER 77

JUNE 1996

**Estimates of Gross and Net Output and Income Arising in
Agriculture in All Ireland and in the Free State Area in
Selected Years between 1900/01 and 1926/27**

by

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This is a revised (June 1996) version of a paper presented to the Historical National Accounts Group of Ireland on 26 January 1996 at the ESRI, Dublin. Revised versions of the other papers presented at that meeting which have been, or will be, included in the ESRI Working Paper Series, are as follows:

Authors	Title	WP No. and Date
F. Geary & T. Stark	Examining Ireland's Post-Famine Economic Performance: The Distribution of Gross Domestic Product Between the Countries of the United Kingdom, 1861-1911.	WP 71, Feb. 1996
M. Dowling	Report on the Database of Irish Historical Statistics 1911-1971.	
A. Bielenberg	An Estimate of Irish Industrial Output in 1907	
E. Birnie	A Review of Industrial Output Measures in Ireland in the Inter-War Period: Sectoral Comparisons of Real Product per Head 1935-38.	

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Acknowledgements

The authors wish to acknowledge valuable comments and suggestions received from Professor K. A. Kennedy of the ESRI, Mr Frank Geary of the New University of Ulster, Coleraine and from a number of other members of the Historical National Accounts Group which met in the ESRI on 26 January 1996. We are especially grateful to Mr T. P. Linehan for his valuable comments and for locating in the National Library the Agricultural Statistics for All Ireland in 1918 which were not published in the regular Agricultural Statistics series.

None of the above is responsible for the final manuscript. Any errors or omissions therein are the sole responsibility of the authors.

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Introduction

In the calculation of income arising in agriculture, it is usual to start by estimating gross agricultural output, which broadly speaking represents sales off farms and consumption of own farm produce in farm households. From the gross output is then deducted the non-labour expenses incurred in producing the output to obtain the income arising. Traditionally, in Irish accounting practice, the non-labour expenses were divided into two broad groups. The first, referred to as farm materials (and consisting of animal feeding stuffs, fertilisers and seeds) was deducted from gross output to give net output. This entity was used in the early years of farm accounting to give a rough idea of income arising in the agricultural sector. The second group of expenses, consisting of rates on land and farm buildings, repairs and depreciation of machinery, transport and marketing costs, etc., is deducted from net output to give income arising in agriculture. This income is also referred to as net value added in agriculture at factor cost. It represents the return to all labour and capital from the national farming activity.

Rent paid by farmers for land and farm buildings is not included as an expense in calculating Income Arising in Agriculture (see European System of Integrated Economic Accounts, Second Edition, 1979, p. 99). It is assumed that such rent is a transfer from one farmer to another. In national accounting an imputed rent is assumed for farm dwellings but it is not levied as a farm expense.

To obtain what is called Income from Self Employment and Other Trading Income in Agriculture, two further items are deducted from Income Arising in Agriculture. These are (a) the rent element in the land annuities, and (b) wages and salaries of hired workers. Presumably the rent element in the annuities is included as an expense because it is paid to the government and not to other farmers; the substantial conacre and 11-month rents are considered as inter-farm transactions and are not included as either an expense or a source of income for the sector. In this connection it seems paradoxical that what is described as the rent element in the land annuities is in fact the interest element in these payments (see National Income and Expenditure, 1994, p. 46).

Historical Background

The first official estimate of agricultural output for All Ireland was made for 1908 by the Department of Agriculture and Technical Instruction (*Agricultural Output of Ireland 1908*). It would appear that the main objective of this exercise was to prepare estimates of total agricultural production from all sources. The calculation of output figures seems to have been a secondary consideration.

In the report, output was defined as agricultural produce:-

- (1) Consumed as food by people in Ireland, or used as raw material in Irish industries other than agriculture.
- (2) Consumed by livestock in Ireland belonging to non-agriculturalists (e.g., by horses in towns).
- (3) Exported from Ireland.

Produce used for further agricultural production in Ireland (e.g., crops fed to livestock on farms or used as seed, milk fed to calves and pigs, etc.) was not included in output. This definition is largely that used over the years up to the present time.

The next official estimate of output relating to the year 1912/13 was specially prepared for the use of a Department Committee on Food Production in Ireland set up after the outbreak of the First World War. In this estimate the value of changes in livestock numbers between the beginning and end of the year was included in the output figures. These results were published in Appendix I of the Report of that Committee (*Statistics of the Production and Disposal of Irish Agricultural Products 1912/13*). No further official estimates of agricultural output for All Ireland were produced.

After the ratification of the Treaty in 1922, estimates of agricultural output were produced for Northern Ireland and the Irish Free State. The first estimate of output in Northern Ireland for the year 1925 was published in 1928 (*The Agricultural Output of Northern Ireland 1925*). That for the Free State area relating to 1926/27 appeared in 1930 (*The Agricultural Output of Saorstát Éireann 1926/27*). In these reports, the same definitions as those adopted in 1912/13 were used.

In more recent times, unofficial estimates of agricultural output for earlier years were produced by a number of historians. Barbara Solow (1971) produced figures for the gross value added in Irish Agriculture for the years 1876, 1881 and 1886. Cormac Ó Gráda (1984) produced figures for Irish agricultural output before and after the Famine. W. E. Vaughan (1980) calculated figures for output in the years 1850-1880. P. Solar (1987) produced output data for a number of years before the Famine, while Michael Turner (1987) has calculated output figures for every year from 1850 to 1914 in preparing an agricultural price index for

Ireland for those years. Turner's figures have been revised but the revised data had not been published at the time this paper was written.

In 1985, R. O'Connor and C. Guiomard (1985) made estimates of gross and net agricultural output for the Irish Free State area for 1912/13 and 1924/25. These authors produced volume and implied price indices for the years in question and linked them to the official indices available for 1926/27 and subsequent years.

Commenting on the O'Connor and Guiomard data, Professor K. A. Kennedy (1994) drew attention to the fact that there are no estimates of agricultural output for the years between 1912/13 and 1924/25, nor any well developed picture for industry and services in those years. Moreover, he says, "the relative level of income per capita North and South immediately before the First World War and its subsequent trend up to the mid-twenties is very uncertain. Clearly this period requires attention".

As a first step towards filling the statistical gap mentioned by Kennedy, the authors decided to produce output figures for the Free State area for 1908, and 1918/19 similar to those produced by O'Connor and Guiomard for the years 1912/13 and 1924/25. These estimates along with similar figures for all Ireland in 1919 were presented to a meeting of the Historical National Accounts Group (HNAG) in the ESRI in January 1995. They were later revised and published as ESRI Working Paper No. 58 along with estimates of income arising in Agriculture in these and a number of other years¹(O'Connor and Henry, 1995). At a subsequent meeting of the HNAG in January 1996 the authors produced a further set of output and income figures for All Ireland and the Free State Area for 1900/01. These data are presented in this paper.

¹ In this paper all Ireland figures were given for 1919 rather than for 1918/19 because the agricultural statistics which were collected for 1918 were not published in the regular agricultural statistics series. Later, these figures were discovered by Mr T. P. Linehan in the British Parliamentary Papers (BPP, Vol. 51, 1919) and this discovery enabled us to prepare All Ireland figures for 1918/19.

In the course of examining the available All Ireland output data, it was discovered that the official 1908 and the 1912/13 figures were not entirely comparable.

The differences which were described in some detail in O'Connor and Henry (1995) were briefly as follows:

- (1) The official 1908 figures do not include the value of livestock changes which were estimated by the authors as amounting to about +£315,000.
- (2) Imports of livestock for further feeding in Ireland were not included in the 1908 returns. However, the values involved, except for horses, were not very large.
- (3) The number of cattle consumed in the country in 1908 was deemed to be over 100,000 too high, while the consumption of potatoes was thought to be about 500,000 tons too low. Both these items were calculated by the Department of Agriculture and Technical Instruction as residuals after deducting exports from the total production of cattle, and exports and amounts fed to animals from the total production of potatoes. It should be stated that the use of residuals to estimate small numbers from very large ones is fraught with danger. These residuals which contain all the errors of the larger estimates could be very much off the mark. The price used to value the potatoes in the 1908 output statement was over £1 per ton lower than the published market prices. It was estimated that if potatoes consumed on farms had to be replaced by flour or oatmeal, the market prices would better reflect the opportunity cost of the potatoes.
- (4) The official 1908 figures for milk output included milk fed to calves and pigs. This conflicts with the definition of output given above which states that produce used for further agricultural production in Ireland is not included in output.

- (5) A value for buttermilk or skim milk consumed by persons was not included in the official 1908 figures, though the 1912/13 output statement included this item. The quantity and value in the latter year was 220 million gallons valued at £687,000.

Adjustments were made to the 1908 figures to take account of these differences while certain other adjustments were made to allow for the oat equivalent of oatmeal exports, for imported oats fed to non-agricultural horses and for the exports of vegetables and shrubs not included in the published volume.

On a first examination of the official 1908 output data we noticed that exports were valued at the prices appearing in the Import/Export statistics for that year (Imports and Exports for 1908). On the assumption that these were f.o.b. values, we concluded that the prices used were too high and we reduced them in most cases by 10 per cent to allow for transport and marketing costs. When we came to prepare the 1900/01 output figures, however, we discovered from reading the introduction to the 1904 foreign trade report (the first official such report produced) that in the returns received from harbour masters no values were recorded, and the Department of Agriculture and Technical Instruction had to do its own pricing. The report went on to state that "the work of valuation remains one of great difficulty and the figures presented can only be regarded as estimates affording a basis from which further inquiries may be made" (see Imports and Exports Report for 1904, p. 15).

On reading this statement we re-examined the 1908 export prices and discovered that they were nearer to market than to f.o.b. prices. We decided, therefore, that it would be safer to revert to the original output values given in the 1908 report except for a few items where prices seemed very much out of line with published market prices.

Table 1: *Original and Revised 1908 Gross Output Values for All Ireland*

	<i>Original</i>			<i>Revised</i>		
	<i>Consumed in Ireland</i>	<i>Exported</i>	<i>Total</i>	<i>Consumed in Ireland</i>	<i>Net Exports</i>	<i>Total</i>
<i>Livestock and Products</i>	<i>£'000</i>			<i>£'000</i>		
Horses, Mules, Jennets, Asses	117	1,353	1,470	117	1,127	1,244
Cattle	3,106	10,935	14,041	2,026	10,954	12,980
Liquid Milk	3,902	3	3,905	2,920	3	2,923
Other Milk Products	2,715	4,037	6,752	3,375	4,062	7,437
Pigs	2,162	3,706	5,868	2,162	3,706	5,868
Sheep and Goats	900	1,316	2,216	956	1,249	2,205
Wool	22	407	429	63	366	429
Poultry	363	797	1,160	363	797	1,160
Eggs	1,401	2,729	4,130	1,401	2,729	4,130
Other Livestock Products	77	2	79	77	2	79
Total Livestock and Products	14,765	25,285	40,050	13,460	24,995	38,455
<i>Crops</i>						
Wheat	226	24	250	226	24	250
Oats	942	435	1,377	872	456	1,328
Barley	766	14	780	766	14	780
Potatoes	1,525	396	1,921	4,089	387	4,476
Hay and Straw	706	64	770	620	58	678
Grass Seed*	421	-	421	107	314	421
Flax and Tow	404	+	404	404	+	404
Fruit	347	13	360	347	12	359
Other Crops	97	6	103	185	25	210
Timber	131	-	131	131	-	131
Total Crops	5,565	952	6,517	7,747	1,290	9,037
Total Gross Output	20,330	26,237	46,567	21,207	26,285	47,492
Value of Livestock Changes	-	-	-	-	-	+315
Gross Output including Livestock Changes						47,807

* In the 1908 publication all the grass seed output is given under the heading "consumed in Ireland" with a footnote saying "Considered as a raw material". There were almost 20,000 tonnes of grass seed exported in 1908 and we have included this amount at its output price under net exports, and reduced the home consumption accordingly.

+ Less than £500.

The original and revised output values for all items in 1908 are given in Table 1. This table shows that the overall value of gross output, excluding livestock changes, increased by about £900,000 as a result of the revisions (from £46.6 to £47.5 million). The estimated value of livestock changes worked out at +£315,000. When this was added to the value of disposals, the revised gross output figures, including the value of livestock changes but excluding turf, came to £47.8 million.

GROSS AGRICULTURAL OUTPUT IN ALL IRELAND IN 1900/01

The estimation of agricultural output for 1900/01 presented special difficulties and the results must be taken with great caution. No foreign trade data were available for 1900 or 1901. As indicated above, the first official import/export statistics were produced for 1904. This meant that in many cases the level of exports had to be assumed on the basis of past trends. On the positive side, there were crop acreages and production figures available as well as comprehensive livestock data in the Agricultural Statistics for 1900 and 1901 (See Agricultural Statistics of Ireland 1900-04). The latter enabled us to estimate livestock output on the basis of acceptable productivity ratios or by using disappearance figures or cohort analysis. A considerable range of agricultural market prices were available also in Agricultural Statistics for Saorstát Éireann 1927/33. The prices for All Ireland in this volume cover the years 1881 to 1932 while of those for Saorstát Éireann cover the years 1911 to 1933. The two price series are almost identical for most items and we have used the All Ireland prices for the Free State Area transactions in 1900/01. The output figures, quantities and values for 1900/01 are given in Table 2 where they are compared with the revised figures for 1908 and with those for 1912/13 and 1918/19.

The methods of estimating the various output items are described below.

Horses, Asses, Mules and Jennets

For horses the trends in exports and imports between 1904 and 1908 were related each year to the numbers of horses in the country used for Traffic and Manufacture (T & M) and amusement and recreation (A & R). The average of these ratios was used to estimate exports and imports for 1900/01. Replacements in Ireland were taken as in 1908 as 7 per cent of the number of horses used for T & M and A & R. Prices in all cases were taken as 0.952 of corresponding 1908 prices. This was the ratio of store cattle prices 2-3 years and 3 years and over in the two years. The output of asses, mules and jennets was taken as being in the same ratio to the number of these animals on farms as in 1908. As for horses, the prices used were taken as 0.952 of the corresponding 1908 prices. Table 2 shows that combined outputs of horses, asses, mules and jennets were estimated at £1.24 million, the same as in 1908.

Cattle

Cattle output excluding stock changes is equal to home consumption plus net exports. The Department of Agriculture and Technical Instruction had published figures for exports of cattle of 745,500 in 1900 and 642,600 in 1901, giving an average for the split year of 694,000. The 1901 export figure appears rather low compared with the number of cows on farms in those years. It would seem that for some reason there were low exports in the Autumn of 1901 and a big build up of stocks in June 1902, when total cattle were 4.78 million compared with 3.87 million in 1901. Accordingly, we have taken the 1900 export figure of 746,000 as being the more realistic number for 1900/01.

For home consumption we took the 1908 figure of 0.044 cattle per person which gave a total consumption of 197,000 cattle. Adding this to the exports gave an output, excluding

stocks, of 943,000 cattle.² Stocks of cattle increased by 64,700 between June 1900 and June 1901 and when this figure is added, output, including stock changes, came to 1.008 million. This worked out at 0.69 cattle per cow compared with 0.72 in 1908.

Having determined the level of exports, we broke them down in the same ratio as in 1908 into fats, stores, cows, calves and other cattle. We then adjusted the 1908 prices for these categories by the ratio of the corresponding prices (as far as available) in 1900/01 and applied these prices to the 1900/01 numbers. We adjusted the 1908 prices for home consumed cattle by the ratio of the prices of store cattle 3 years old and over in the two years. Adding the different values gave a figure of £11.105 million for cattle output excluding stocks in 1900/01. This compared with a corresponding value of £12.98 million in 1908. When stock charges were included the values rose to £11.7 million in 1900/01 and to 13.3 million in 1908.

Milk and Milk Products

For milk and milk products the same ratios were used as in 1908. At a milk yield of 380 gallons per cow, total milk production was 559 million gallons, compared with 568 million in 1908. Milk fed to calves and pigs worked out at 47.1 million gallons, giving a total milk output in 1900/01 of 511.6 million gallons. This compared with 521.6 million in 1908. Household consumption at 20 gallons per person totalled 89 million gallons valued at £2.7 million, giving a residual of 422.4 million gallons for other milk products. Of this amount, it was estimated that 10.5 million gallons were used for cream, cheese and condensed milk and 411.9 million gallons for butter. Using a figure of 337 gallons per cwt., butter production was estimated at 1.22 million cwt., valued at £5.8 million. At an estimated consumption per

² Beef exports and live imports of cattle were very low in those years and it was assumed that they cancelled each other out.

Table 2: *Agricultural Output and Income Arising in All Ireland in 1900/01, 1908, 1912-13 and 1918/19*

<i>Livestock and Livestock Products</i>	<i>Unit of Quantity</i>	<i>Quantity ('000)</i>				<i>Value £'000</i>			
		<i>1900/01</i>	<i>1908</i>	<i>1912/13</i>	<i>1918/19</i>	<i>1900/01</i>	<i>1908</i>	<i>1912/13</i>	<i>1918/19</i>
Horses, Mules, Jennets, Asses	No	32	30	36	26	1,241	1,244	1,521	1,331
Cattle	No	943	1,058	1,012	933	11,105	12,980	13,052	27,128
Milk Consumed by Persons	Gals ('000)	89	88	92	99	2,705	2,923	2,492	5,897
Other Milk Products	Gals ('000) ^(a)	422	434	529	479	6,612	7,437	9,888	19,791
Pigs	No	1,812	1,731	1,920	1,409	5,997	5,868	8,328	15,473
Sheep and Goats	No	1,456	1,313	1,636	1,274	2,200	2,205	3,296	5,165
Wool	lb	15,490	15,263	15,530	16,709	397	429	696	1,632
Poultry	No	10,246	10,552	12,955	12,431	928	1,160	1,575	4,306
Eggs	Gt Hds	9,234	9,686	9,342	11,976	3,128	4,130	4,312	19,749
Other Livestock Products	-	-	-	-	-	77	79	182	236
Total Livestock and £ Livestock Products	-	-	-	-	-	34,390	38,455	45,342	100,708
<i>Crops and Turf</i>									
Wheat	cwts	848	706	790	2,759	243	250	306	2,345
Oats	"	5,247	5,011	5,140	4,762	1,360	1,328	1,715	3,948
Barley	"	2,085	2,279	2,613	2,831	672	780	1,126	2,430
Potatoes	tons	1,314	1,291	1,318	1,397	4,214	4,476	4,780	9,424
Hay and Straw	tons	231	223	233	201	670	678	770	1,505
Grass Seed	cwts	508	523	586	679	382	421	385	1,257
Flax and Tow ^(b)	stones	2,036	1,584	2,591	3,154	556	404	894	3,967
Fruit	-	-	-	-	-	332	359	436	2,043
Other Crops	-	-	-	-	-	200	210	245	2,015
Timber	-	-	-	-	-	115	131	167	302
Turf	Tons	4,904	4,645	4,554	4,487	3,838	3,817	3,886	9,311
Total Crops, and Turf						12,582	12,854	14,710	38,547
Gross Output excluding Livestock Changes						46,972	51,309	60,052	139,255
Value of Livestock Changes						+423	+315	-126	+1,739
Gross Output including Livestock Changes						47,395	51,624	59,926	140,994
<i>Farm Materials</i>									
Feeding Stuffs						5,848	6,487	7,801	12,851
Fertilisers						597	616	1,035	1,975
Seeds						677	592	729	2,365
Total Farm Materials						7,122	7,695	9,565	17,191
Value of Net Output including Livestock Changes						40,273	43,929	50,361	123,803
Other Expenses						3,431	3,700	4,994	13,783
Income Arising in Agriculture						36,842	40,229	45,367	110,020

(a) Whole milk equivalent of milk products.

(b) Includes dressed tow.

person of 50.5 gallons, total buttermilk output was 225.1 million gallons, valued at £669,000

The total value of other milk products was estimated at £6.6 million compared with £7.4 million in 1908. Prices in 1900/01 were obtained by reducing the 1908 prices by the ratio of butter prices in the two years.

Pigs

Output of pigs, including stock changes, was taken at 13.3 per sow, the same as in 1908. This ratio gave an output, including stock changes, of 1,762,000 pigs in 1900/01 and 1,637,000 in 1908. When these figures were adjusted for stock changes, the outputs excluding stocks were 1,812,000 in 1900/01 and 1,731,000 in 1908. To obtain values in 1900/01 the 1908 prices were reduced by a factor of 0.9765 which was the ratio of pork prices in the two years. This gave a value for total output, excluding stock changes, of £6.0 million in 1900/01 compared with £5.9 million in 1908.

Sheep, Goats and Wool

In Agricultural Statistics for Ireland in 1900 and 1901, an average figure of 853,000 was given for the number of sheep and lambs exported in those years. From this we deducted estimated imports of 38,000 (the figure given for sheep and lamb imports in the 1904 Report on the Trade at Irish Ports) to obtain net exports of 815,000. Home consumption was taken as 0.133 sheep and lambs per person as in 1908. This gave a total consumption of 591,000 which when added to net exports gave an output excluding stocks changes of 1.406 million. There was a reduction in stocks of 8,000 between the beginning and end of the year so that output including stock changes came to 1.398 million. This worked out at 0.8 per ewe compared with 0.84 in 1908.

The value of the sheep output was calculated by multiplying the estimated exports, imports and home consumption by prices obtained by adjusting the corresponding 1908 prices by 0.8985. This was the ratio of store sheep prices 1-2 years old in the two years. When the prices were applied to the numbers, gross output of sheep excluding livestock changes in 1900/01 came to £2.2 million compared with a similar figure for 1908.

The output of goats was taken as one-sixth the number of goats on farms in both 1900/01 and 1908. They were valued at £0.25 each in 1908. To obtain the 1900/01 price the 1908 price was multiplied by 0.8985, the same as for sheep prices. Total output of goats was 50,000 in 1900/01 valued at £11,000. This was slightly higher than the output in 1908 which was 40,000 valued at £10,000.

Wool output was taken, as in 1908, at 6.4 lb per sheep over 1 year old. The total value in 1900/01 worked out at £397,000 compared with £429,000 in 1908.

Poultry and Eggs

It was decided that the output of poultry should be related to the number of young birds (under 6 months) of the different breeds on farms in June. Unfortunately, this category of bird was not enumerated in 1900 or 1901 and the number had to be based on the 1908 ratio of young to old birds. However, it did not seem that the 1908 figures, particularly those for ordinary fowl, were comparable with those for the earlier years. The enumeration of young birds took place for the first time in 1907 and in that year the number of ordinary fowl on farms increased by about 5 million and remained at this higher level in 1908 and subsequent years. We concluded that the increased numbers were due to the change in the enumeration classification rather than to a general increase in numbers. To allow for this anomaly we increased the 1900/01 figure for ordinary fowl by 5 million and divided the new total into

young and old birds in the same ratio as in 1908. The output of poultry, as in 1908, was taken as being 0.9 times the number of young turkeys and geese, 0.95 times the number of young ducks and 1.07 times the number of young ordinary fowl. Total poultry output came to 10.25 million in 1900/01 valued at £928,000 compared with 10.55 million in 1908 at £1.16 million. The 1900/01 prices were obtained by adjusting the 1908 prices by the ratio of egg prices in the two years.

After allowing for eggs for hatching, output of hen eggs was estimated at 94.5 eggs per adult bird in 1900/01, the same as in 1908. This value was applied to the adjusted number of adult ordinary fowl, as described above. For ducks, the net yield was taken as 62 eggs per adult bird, as in 1908 also. The prices used were the 1908 prices adjusted by the ratio of the published prices of eggs in both years. Total output of eggs in 1900/01 was 9.23 million great hundreds valued at £3.13 million. The corresponding output in 1908 was 9.69 million great hundreds valued at £4.13 million.

Other Livestock Products

These consist of honey and casualty cattle and horse hides. The amount of honey produced in 1900/01 was given as 671,000 lb in the Agricultural Statistics Report for 1902. This was valued by us at £15,600. The price used was obtained by adjusting the 1908 price in the ratio of 2-3 yr old store cattle prices in the two years.

The number of casualty cattle hides, was taken as 2.5 per cent of the total cattle in the country in June, while the number of casualty horse hides was estimated at 2.25 per cent of the number of broken agricultural horses in that year. These were the same ratios as those used in 1908. Prices for cattle and horse hides in 1900/01 were related to the 1908 prices in

the ratio of 2-3 year old store cattle prices in the two years. The value of all hides in 1900/01 was £61,000 compared with £68,000 in 1908.

Crops

Though annual production figures for all major crops are available for 1900/01, these data have limitations in calculating crop outputs. Except for wheat, barley and flax, the other crops are mainly fed to livestock on farms and these amounts do not enter into output. For all crops the outputs had to be estimated mainly by reference to the 1908 figures. It should be stated, that in cases where output quantities are based on crop production, the production taken for split years is that for the first of the years (i.e., 1900 for 1900/01). The values, on the other hand, are based on the average prices obtaining in the two years.

Wheat

In 1908 the output of wheat was estimated at 95 per cent of total production. We used the same ratio in calculating the 1900/01 wheat output, which was based on 1900 production. This output includes the amount of home grown seed sold to merchants and re-purchased the following Spring. In calculating net output this seed is included as a farm cost. The price used for wheat sold was the 1908 price reduced in the ratio of published wheat prices in 1900/01 and 1908.

The total output of wheat in 1900/01 was estimated at 848,000 cwt. and valued at £243,000. This compared with 706,000 cwt. valued at £250,000 in 1908.

Oats

As most oats are fed to farm animals, output in 1908 was estimated directly as (a) household consumption of the oat equivalent home produced oatmeal, (b) exports of

whole oats and the out equivalent of oatmeal and (c) oats fed to non-agricultural horses less imported oats fed to these animals. It was assumed that 0.566 cwts. of oatmeal were produced from 1 cwt. of oats.

The trend in household consumption from 1926/27 to 1908 showed that oatmeal consumption was higher in the earlier than the later years. Accordingly, consumption of oats was taken as 0.36 cwt. per person in 1900/01 compared with 0.32 cwts. per person in 1908. The consumption of oats by non-agricultural horses in 1900/01 was estimated at 38 cwt. per horse as against 37 cwt. in 1908. This variation is due more to the mix of non-agricultural horses than to a changed pattern of feeding, the working horses receiving more oats than those used for amusement and recreation. As no foreign trade figures were available for 1900/01, we took the 1904 data for exports and imports.

Summing the different items gave an output of 5.2 million cwts. valued at £1.36 million in 1900/01. The corresponding figures for 1908 were 5.0 million cwts. at £1.33 million. The same price was used for the different items. It was obtained by reducing the 1908 price by 0.98 which was the ratio of the published prices of oats in both years.

Barley

In the years in question practically all the barley in Ireland was grown for malting but there was always a surplus which was used for animal feed. The output/production ratio was 0.75 in 1908 and we used this ratio in calculating the 1900/01 output. It was assumed that this output includes seed sold to the malsters and re-purchased for sowing the following Spring. The total output of barley in 1900/01 (based on 1900 production) was 2.09 million cwt. valued at £672,000. This compared with an output of 2.28 million cwt. in 1908 valued at £780,000.

The price for 1900/01 was taken as the 1908 price reduced by a factor of 0.94 which was the ratio of published barley prices in both years.

Potatoes

Potato output consists of household consumption and estimated exports. For 1900/01 we used the same coefficient for household consumption as in 1908, i.e., 0.27 tons per person, and we entered a figure of 110,000 tons for exports which had been fairly constant over the years. In both years we valued potatoes at the published prices which were £3.5 per ton in 1908 and £3.208 in 1900/01. Applying these prices to the outputs, gave a value of £4.2 million for 1900/01 and £4.5 million for 1908 with quantities of 1.3 million tons in both years.

Hay and Straw

The hay and straw making up output are the amounts exported and used by non-agricultural horses. Exports of hay and straw in 1908 were 18,000 tonnes and the amount used by non-agricultural horses was 191,000 tonnes, giving a total output of 223,000 tonnes. This amount was valued at £678,000. We used the same amount per head for non-agricultural horses in 1900/01 while exports were taken at 20,000 tons. This gave a total output for hay and straw in that year of 231,000 tons valued at £670,000. The prices used for 1900/01 were the 1908 prices adjusted by the ratio of published hay prices in both years.

Grass Seed

The output of grass seed in 1900/01 was calculated by adjusting the 1908 output quantity by the ratio of the acreage of hay in 1901 and 1908. The area of first year's hay was not collected in 1901. The price of grass seed in 1900/01 was taken as the 1908 output price

multiplied by the ratio of published grass seed prices in the two years. Applying this price to the 1900/01 output quantity gave a value of £382,000 compared with a figure of £421,000 in 1908.

Flax and Tow

The quantity of scutched flax produced every year is published in the annual Agricultural Statistics reports. The figure given for 1900 was 1.6 million stones. This compared with 1.3 million stones in 1908. The price of flax in 1900/01 was taken as the 1908 output price multiplied by the ratio of published flax prices in 1900/01 and 1908. The quantity of tow was taken as being one-quarter the amount of scutched flax and the price was taken as one-twelfth the flax price. These were the same as the ratios used in 1908. Adding the flax and tow figures gave values of £556,000 in 1900/01 compared with £404,000 in 1908.

Fruit

The output of fruit was based on the relationship between the area under fruit in 1908 and an estimated area in 1900 which was slightly less than the 1908 area. The value was adjusted by the index of the other crop prices in the two years. The value in 1900/01 was estimated at £332,000 compared with a value of £359,000 in 1908.

Other Crops

Other crops, which consist mainly of vegetables for human consumption, were adjusted in relation to the populations in 1900/01 and 1908 and the relation between crop prices in these years. Included in this group are beans, peas, turnips, carrots, parsnips, onions,

cabbage and plants and shrubs exported. The total value in 1900/01 was estimated at £200,000 compared with £210,000 in 1908.

Timber

The value of timber output in 1900/01 was based on the relationship between the forest areas cleared in 1900 and 1908 adjusted by the index of crop prices in those two years. The value in 1900/01 was £115,000 compared with £131,000 in 1908.

Turf

Turf output in 1908 was estimated at 1.06 tons per head of the population. The output of turf per person in 1900/01 was taken as 1.10 tons per person. The price in 1900/01 was related to the index of crop prices in 1900 and 1908. The total value of turf in 1900/01 worked out at £3.838 million compared with £3.817 million in 1908.

Aggregate Results All Ireland

Gross Output

Reference to Table 2 shows that the value of gross output, including turf but excluding livestock changes, came to £46.972 million in 1900/01 compared with £51.309 million in 1908. The main items of output were cattle, milk and pigs. Cattle output in 1900/01 accounted for about 24 per cent of gross output, excluding livestock changes. This was slightly less than the 1908 ratio. Liquid milk and milk products combined accounted for about 20 per cent of output in both 1901 and 1908 while the pig output was about 13 per cent of the total in 1900/01 compared with about 11 per cent in 1908. Poultry and eggs were also a large item in those years, as were potatoes. Poultry and eggs combined accounted for about 9 per cent of output in 1900/01 and 10 per cent in 1908. Potatoes made up about 9 per cent of output in both years.

Net Output

Net output is obtained by deducting the value of farm materials (feeds, fertilisers and seeds) from gross output. No figures were available for feeds and fertilisers in 1900/01 and we had to estimate their value as a per cent of livestock and crop outputs. These proportions were about 17 and 7 per cent respectively in 1908 and we used similar ratios for 1900/01. We were able to estimate the value of seeds purchased using figures for amounts of seed used per acre for the different crops. A high proportion of seeds, however, was home grown on the farms where used and were therefore not included in farm inputs. We assumed that all potato oats and rye seeds fell into this category. On the other hand, about 90 per cent of wheat and barley seeds were treated as being purchased from merchants as were all turnip, mangel, flax, vegetable and grass seeds. The wheat, barley and flax seeds were valued at the corresponding crop output prices plus 25 per cent for a mark-up. The vegetable and root crop seeds were valued at 1908 prices deflated by the 1900/01/1908 crop price index (1.06).

Table 2 shows that the value of farm materials was £7.1 million in 1900/01, compared with £7.7 million in 1908. When these values were deducted from the gross outputs the value of net output, including stock changes, was £40.3 million in 1900/01 compared with 43.9 million in 1908.

Income Arising

As stated in the Introduction, income arising is obtained by deducting from net output the other expenses, other than rent, incurred in producing output. Except for rates, no figures are available for the other expenses in the early years of the century and we had to estimate their amount as a percentage of net output including livestock changes based on the 1908 percentages. We estimated that rates paid in 1900/01 were £650,000 compared with £750,000 in 1908 (see O'Connor and Henry, 1995, *op. cit.* p. 22). The other expenses were reckoned to

be £2.8 million in 1900/01 compared with about £3 million in 1908. Adding these figures to the rates gave total other expenses of £3.4 million in 1900/01 and £3.7 million in 1908. Deducting these totals from net output gave income arising of £36.8 million in 1900/01 and £40.2 million in 1908.

THE FREE STATE AREA RESULTS

The results for the Free State area were calculated by adjusting the All Ireland data in proportion to livestock numbers, crop areas and human population in the two regions (see Table 3 for important livestock numbers, crop areas and production in all Ireland and the Free State area in 1900, 1901 and 1908). Foreign trade estimates caused many problems but in some cases it was possible to avoid having to make such estimates.

For items where total output quantities could be calculated by using productivity ratios and where export prices could be taken as being the same as those for home consumption (poultry, eggs and wool) the output values were obtained by valuing the quantities at a single selected price. However, for most crops, where output was estimated as the sum of home consumption and exports, and for items where consumption and export prices were not the same (store and fat animals, animal equivalent of meat and milk products, etc.) it was necessary to make estimates of foreign trade. In these cases we had to assume that trade with overseas countries bore the same relation to output as in 1908. For trade between the North and South of the country we used as a first approximation the Saorstat Éireann trade returns available for 1924/25 (see Trade and Shipping Statistics for Saorstat Éireann in 1925). It was assumed that post-Treaty trade patterns between the two areas should be similar to those in the pre-Treaty period.

Table 3: *Agricultural Statistics for All Ireland and for the Free State Area in 1900, 1901 and 1908*

	<i>ALL IRELAND</i>			<i>Free State Area</i>		
	<i>1900</i>	<i>1901</i>	<i>1908</i>	<i>1900</i>	<i>1901</i>	<i>1908</i>
Livestock ('000)						
Milch Cows	1,458	1,482	1,498	1,157	1,178	1,206
Total Cattle	4,609	4,673	4,792	3,804	3,868	4,020
Ewes for breeding	1,798	1,692	1,635	1,622	1,525	1,450
Total Sheep	4,387	4,379	4,126	3,980	3,981	3,703
Sows	n.a.	131	124	n.a.	108	106
Total Pigs	1,269	1,219	1,218	1,015	1,015	1,046
Total Poultry	18,547	18,811	24,031	14,084	14,084	18,103
Horses	567	565	605	435	435	472
Crops ('000 acres)						
Wheat	54	43	37	38	32	29
Oats	1,105	1,099	1,060	725	723	706
Barley	174	162	154	171	158	150
Potatoes	654	635	587	472	459	418
Flax	47	55	47	11	12	8
Other Root and Green	444	444	422	353	356	345
Hay	2,166	2,179	2,299	1,748	1,758	1,841
Crop Production						
Wheat ('000 cwt.)	901	788	747	628	589	609
Oats "	17,512	17,783	18,240	11,444	11,732	12,481
Barley "	2,779	2,915	3,055	2,720	2,851	2,963
Potatoes ('000 tons)	1,842	3,372	3,200	1,253	2,340	2,100
Flax ('000 stones)	1,629	2,124	1,267	356	457	229
Hay ('000 tons)	5,214	4,750	4,917	4,199	3,783	4,038

Source: Agricultural Statistics of Ireland 1900-04 and 1908. Agricultural Statistics Saorstát Éireann 1847-1926.

As a check on the North-South trade results, we made rough estimates of Northern Ireland outputs in the same year. From this check we learned that in many cases the 1924/25 North-South trade figures had to be adjusted to keep household consumption per person similar in the Free State area and in the North. Keeping the consumption figures similar in both areas may not have been entirely correct but it was the best we could do in the circumstances.

In calculating farm materials, feeding stuffs and fertilisers were related to livestock and crop outputs respectively in the same proportions as in 1908. Seeds were estimated as for All Ireland using the amounts of seed used per acre for the relevant crops, i.e., wheat, barley, flax, root and green crops and grass seed. These were valued at All Ireland prices.

Figures for the quantities and values of the different output items and for net output and income arising in the Free State area for the years 1900/01, 1908, 1912/13, 1918/19, 1924/25 and 1926/27 are given in Table 4. This table shows that the value of gross output including livestock changes at current prices increased from £36.7 million in 1900/01 to £40.5 million in 1908, to 47.0 million in 1912/13 and to £110.0 million in 1918/19. It then declined to £59.7 million in 1926/27.

The value of farm materials increased from £5.1 million in 1900/01 to £5.7 million in 1908 to £7.1 million in 1912/13 and to £11.6 million in 1918/19. There was a decline after this to £8.6 million in 1926/27. The relatively low value in 1918/19 when prices were exceptionally high was due to a scarcity of imports of feeds and fertilisers due to the Great War.

When the value of farm materials was deducted from gross output, net output at current prices was £31.6 million in 1900/01, £34.8 million in 1908, £39.8 million in 1912/13 and £98.5 million in 1918/19. There was a decline thereafter to £51.1 million in 1926/27.

Other expenses, for 1900/01, which were related to net output in the same proportions as for All Ireland increased from £2.6 million in 1900/01 to £2.9 million in 1908 to £3.9 million in 1912/13 and to £10.7 million in 1919, declining thereafter to £6.0 million in 1926/27. Deducting other expenses from net output gave values for income arising of £29.0 million in 1900/01, £31.9 million in 1908, £35.9 million in 1912/13, £87.7 million in 1918/19, and £45.1 million in 1926/27.

Table 4: Agricultural Output and Income Arising in Agriculture in the Free State Area in Selected Years

	Unit of Quantity	Quantity (000)							Value £000						
		1900/01	1908	1912/13	1918/19	1924/25	1926/27	1900/01	1908	1912/13	1918/19	1924/25	1926/27		
Livestock and Livestock Products															
Horses, Mules, Jennets, Asses	No	23	22	28	18	21	12	883	885	1,200	914	1,472	1,235		
Cattle	No	736	850	802	763	955	754	8,746	10,423	10,399	23,432	16,964	12,791		
Milk Consumed by Persons	Gal.(000)	64	63	66	71	83	82	1,955	2,097	1,780	4,204	3,550	3,196		
Other Milk Products	Gal.(000) ^(a)	342	357	428	404	359	366	5,293	6,045	7,996	16,610	9,905	8,726		
Pigs	No	1,483	1,480	1,582	1,252	1,300	1,337	4,871	4,976	6,883	13,684	8,533	8,271		
Sheep and Goats	No	1,302	1,129	1,441	1,189	1,032	1,005	1,987	1,943	3,000	4,769	3,443	2,634		
Wool	lb.	15,079	13,791	14,080	13,859	13,289	14,459	386	388	631	1,353	782	685		
Poultry	No	7,691	7,947	9,726	9,664	11,874	12,000	697	876	1,182	3,386	2,452	2,300		
Eggs	Gt Hd	6,973	7,297	6,769	8,701	10,532	10,791	2,362	3,111	3,125	14,353	7,588	6,690		
Other Livestock Products	-	-	-	-	-	-	-	65	66	146	201	184	185		
Total Livestock and Products		27,245	30,810	36,342	82,906	54,873	46,713								
Crops and Turf															
Wheat	cwt	594	576	659	2,370	234	233	170	204	255	2,014	153	142		
Oats	cwt	3,900	3,783	3,871	3,868	2,694	2,753	1,011	1,003	1,292	3,206	1,200	1,066		
Barley	cwt	2,040	2,222	2,567	2,801	2,123	2,256	658	759	1,106	2,404	1,380	902		
Potatoes	tons	896	874	860	762	653	652	2,874	3,031	3,121	5,204	4,847	3,334		
Other Crops	-	-	-	-	-	-	-	1,060	1,082	1,464	4,698	2,702	2,501		
Turf	tons	4,189	3,983	3,904	3,837	3,250	3,567	3,278	3,273	3,331	7,962	3,453	3,317		
Total Crops and Turf		9,051	9,352	10,569	25,488	13,735	11,262								
Value of Livestock Changes		+386	+293	+39	+1,654	-4,753	+1,717								
Gross Output including Livestock Changes		36,682	40,455	46,950	110,048	63,855	59,692								
Farm Materials															
Feeding Stuffs		4,145	4,772	5,739	8,539	7,273	6,559								
Fertiliser		462	509	897	1,352	1,430	1,301								
Seeds		447	391	490	1,690	859	775								
Total Farm Materials		5,054	5,672	7,126	11,581	9,562	8,635								
Net Output including Livestock Changes		31,628	34,783	39,824	98,467	54,293	51,057								
Other Expenses		2,622	2,886	3,895	10,748	6,070	5,994								
Income Arising in Agriculture		29,006	31,897	35,929	87,719	48,223	45,063								

(a) whole milk equivalent of milk products

Comparison of the Data in the Two Areas

The All Ireland and the Free State area data for the years in question are compared in Tables 5 and 6. Table 5 gives the output quantities while Table 6 gives the output values, the value of livestock changes, the various expenses and the income arising in the different years in both areas.

The relationships between the quantities in the two areas vary depending on the product involved. A very high proportion of the barley output was produced in the Free State area, the barley area in Northern Ireland being rather small in those years. On the other hand, the vast bulk of the flax and grass seed was produced in Northern Ireland. The potato output in All Ireland is much higher than that in the Free State area, not because there was an unusually large area of potatoes in Northern Ireland, but because there were relatively high exports of potatoes from this region compared with the Free State area. These exports are recorded as output (as defined here) and increase the output from the export area. The potatoes fed to farm animals do not enter output and this is reflected in the relatively small potato output in the Free State area where the vast bulk of the crop was fed to animals.

The Free State area values as percentages of All Ireland values for certain aggregates in 1900/01 and 1908 are as follows:

	<i>1900/01</i>	<i>1908</i>
Livestock and Livestock Products	79.2	80.1
Crops and Turf	71.9	72.8
Gross Output including Livestock Changes	77.4	78.4
Income Arising	78.7	79.3

Table 6: Comparison of Agricultural Output Values and Income Arising in Agriculture in All Ireland and the Free State Area in Selected Years

	All Ireland				Free State Area					
	1900/01	1908	1912/13	1918/19	1900/01	1908	1912/13	1918/19	1924/25	1926/27
<i>Livestock and Livestock Products</i>				£000				£000		
Horses, Mules, Jennets, Asses	1,241	1,244	1,521	1,331	883	885	1,200	914	1,472	1,235
Cattle	11,105	12,980	13,052	27,128	8,746	10,423	10,399	23,432	16,964	12,791
Milk Consumed by Persons	2,705	2,923	2,492	5,897	1,955	2,097	1,780	4,204	3,550	3,196
Other Milk Products	6,612	7,437	9,888	19,791	5,293	6,045	7,996	16,610	9,905	8,726
Pigs	5,997	5,868	8,328	15,473	4,871	4,976	6,883	13,684	8,533	8,271
Sheep and Goats	2,200	2,205	3,296	5,165	1,987	1,943	3,000	4,769	3,443	2,634
Wool	397	429	696	1,632	386	388	631	1,353	782	685
Poultry	928	1,160	1,575	4,306	697	876	1,182	3,386	2,452	2,300
Eggs	3,128	4,130	4,312	19,749	2,362	3,111	3,125	14,353	7,588	6,690
Other Livestock Products	77	79	182	236	65	66	146	201	184	185
Total Livestock and Products	34,390	38,455	45,342	100,708	27,245	30,810	36,342	82,906	54,873	46,713
<i>Crops and Turf</i>										
Wheat	243	250	306	2,345	170	204	255	2,014	153	142
Oats	1,360	1,328	1,715	3,948	1,011	1,003	1,292	3,206	1,200	1,066
Barley	672	780	1,126	2,430	658	759	1,106	2,404	1,380	902
Potatoes	4,214	4,476	4,780	9,424	2,874	3,031	3,121	5,204	4,847	3,334
Hay and Straw	670	678	770	1,505	473	472	545	999	524	333
Grass Seed	382	421	385	1,257	69	76	62	184	111	99
Flax and Tow	556	404	894	3,967	122	73	179	903	183	84
Other Crops	647	700	848	4,360	396	461	678	2,612	1,884	1,985
Turf	3,838	3,817	3,886	9,311	3,278	3,273	3,331	7,962	3,453	3,317
Total Crops and Turf	12,582	12,854	14,710	38,547	9,051	9,352	10,569	25,488	13,735	11,262
<i>Value of Livestock Changes</i>										
Gross Output including Livestock Changes	+423	+315	-126	+1,739	-386	+293	+39	+1,654	-4,753	+1,717
Feed, Fertilisers and Seeds	47,395	51,624	60,052	140,994	36,682	40,455	46,950	110,048	63,855	59,692
Net Output	7,122	7,695	9,565	17,191	5,054	5,672	7,126	11,581	9,562	8,635
Other Expenses	40,273	43,929	50,361	123,803	31,628	34,783	39,824	98,467	54,293	51,057
Income Arising	3,431	3,700	4,994	13,783	2,622	2,886	3,895	10,748	6,070	5,994
	36,842	40,229	45,367	110,020	29,006	31,897	35,929	87,719	48,223	45,063

Except for crops, the aggregate values in the Free State area in 1900/1 and 1908 were around 77-80 per cent of those in All Ireland. Because of the high production of flax and grass seed in Northern Ireland and the high potato exports from that region, the crop output values in the Free State area were only 72-73 per cent of those in All Ireland in those years.

Implied Volume and Price Indices

Volume and price indices for All Ireland and the Free State area are given in Table 7.

Volume Indices

For All Ireland the implied volume indices of gross output including stock changes and turf to base 1900/01 = 100 were 101.4 in 1908, 109.2 in 1912/13 and 104.3 in 1918/19. The implied volume indices for Income arising to base 1900/01 = 100 were 101.4 in 1908, 106.2 in 1912/13 and 104.5 in 1918/19.

For the Free State area the implied volume indices of gross output to base 1900/01 = 100 were 102.7 in 1908, 110.5 in 1912/13, 103.0 in 1918/19 and 104.6 in 1926/27. The implied volume indices of income arising showed a similar trend to those for gross output.

Price Indices

The implied price index of gross output in All Ireland rose from 100 in 1900/01 to 108.1 in 1908 to 117.1 in 1912/13 and to 284.5 in 1918/19. The implied price indices for income arising show a somewhat similar trend.

In the Free State area the implied price index for gross output rose by 8 per cent between 1900/01 and 1908, by a further 9 per cent between 1908 and 1912/13 and by 142 per cent between 1912/13 and 1918/19. It declined thereafter by about 45 per cent between

1918/19 and 1926/27. The implied price indices for income arising show the same general trend as those for gross output.

Table 7: *Implied Volume and Price Index Numbers for Gross Agricultural Output, Livestock + Livestock Products, Crops and Turf, and Income Arising, in All Ireland and in the Free State Area in selected years.*

	ALL IRELAND				FREE STATE AREA					
	1900/01	1908	1912/13	1918/19	1900/01	1908	1912/13	1918/19	1924/25	1926/27
<i>Volume Indices (include. Stocks)</i>										
Livestock and Products	100	102.7	111.5	101.1	100	104.3	113.9	102.0	103.4	109.9
Crops and Turf	100	96.5	101.0	113.2	100	97.8	100.8	106.0	83.3	88.6
Gross Output	100	101.4	109.2	104.3	100	102.7	110.5	103.0	96.3	104.6
Income Arising	100	101.4	106.2	104.5	100	102.5	107.3	103.1	92.0	100.1
<i>Price Indices (exclud. Stocks)</i>										
Livestock and Products	100	108.5	116.9	289.6	100	108.1	117.7	291.9	174.6	157.1
Crops excluding turf	100	106.1	117.6	264.5	100	106.0	118.6	255.1	206.4	150.7
Gross Output	100	108.1	117.1	284.5	100	107.7	117.8	285.5	180.1	156.7
Income Arising	100	107.9	116.2	284.4	100	107.6	116.0	285.5	180.0	154.0

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