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Volume Author/Editor: Harold Barger and Hans H. Landsberg

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Chapter Author: Harold Barger, Hans H. Landsberg

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Appendix C

Comparison with Other Indexes of Output

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IN ADDITION to the index presented in this volume (Tables 1 and 5), three other indexes of agricultural output have been published for recent years: by the Bureau of Agricultural Economics; by Frederick Strauss and L. H. Bean of the Department of Agriculture; and by the National Research Project. These indexes are compared with our own, on a 1929 base, in Table C-1. The four indexes resemble each other closely in general movement. Two of them—the BAE index and the Strauss-Bean index —attempt to measure net output (i.e., exclude crops used for seed and feed, and milk fed to calves) and use prices as weights (i.e., are based upon one, or a series of comparisons in constant prices): in these respects their construction resembles that of our own output index. In contrast, the series published by the National Research Project was computed from gross output and used labor requirements as weights: in its methods of construction it therefore differs radically from the other indexes mentioned.

Unlike our own index, that computed by the Bureau of Agricultural Economics [1] takes no account of changes in livestock inventories. The differences on this account may be gauged from the comparison in Table C-2, where both indexes are broken down into their crop and livestock components. It will be seen that the series for crops agree much more closely than do the series for livestock products. The differences between the combined indexes (NBER and BAE) in Table C-1 are largely the result of this difference in the treatment of livestock. Thus, whenever we have allowed for a decrease in inventory, our livestock index falls below the corresponding BAE index—most strikingly

[1] *The Farm Income Situation* (U. S. Bureau of Agricultural Economics, Nov. 1941), p. 10.

TABLE C-1

INDEXES OF AGRICULTURAL OUTPUT, 1897–1939

1929:100

Year	NBER[a]	BAE[b]	Strauss-Bean[c]	NRP[d]	Year	NBER[a]	BAE[b]	Strauss-Bean[c]	NRP[d]
1897	66.0	..	69.4	..	1918	90.2	91.6	89.7	89
1898	69.5	..	73.2	..	1919	87.1	91.9	89.1	87
1899	69.5	..	72.3	..					
					1920	90.0	93.1	95.5	95
					1921	81.9	84.6	84.3	81
1900	70.1	..	73.0	..	1922	90.3	92.3	90.1	88
1901	68.8	..	70.7	..	1923	91.9	95.9	91.1	90
1902	71.8	..	74.1	..	1924	94.9	98.9	93.2	92
1903	72.5	..	73.6	..	1925	95.8	98.5	94.5	98
1904	75.7	..	77.5	..	1926	101.3	101.5	100.6	102
1905	75.3	..	77.5	..	1927	98.2	98.9	97.1	96
1906	81.7	..	82.3	..	1928	102.4	103.3	102.0	101
1907	76.3	..	76.2	..	1929	100.0	100.0	100.0	100
1908	78.1	..	79.6	..					
1909	77.4	79.9	78.1	78	1930	100.4	99.2	100.9	97
					1931	104.0	103.3	108.9	107
1910	79.4	80.2	79.9	82	1932	100.0	97.9	101.7	100
1911	81.5	83.8	81.7	85	1933	97.4	97.3	96.2	95
1912	85.6	86.2	85.5	90	1934	83.5	93.9	77.5	80
1913	82.8	82.5	83.4	84	1935	92.2	92.3	87.4	94
1914	89.6	87.5	91.2	92	1936	93.0	94.1	88.0	88
1915	89.9	87.7	90.4	89	1937	106.3	106.6	104.6	..
1916	82.3	84.1	82.3	85	1938	105.4	103.6	..	..
1917	85.9	86.6	84.9	89	1939	110.7	107.9	..	..

[a] Table 5; computed from data in Table A-1, Appendix A.

[b] Not available until 1909. For 1909–39 source is *The Farm Income Situation* (U. S. Bureau of Agricultural Economics, Nov. 1941), p. 10.

[c] Frederick Strauss and L. H. Bean, *Gross Farm Income and Indices of Farm Production and Prices in the United States, 1869–1937,* Technical Bulletin 703 (U. S. Department of Agriculture, 1940), Table 60, variant entitled "ideal index."

[d] Not available until 1909. For 1909 and following years source is R. G. Bressler, Jr., and J. A. Hopkins, *Trends in Size and Production of the Aggregate Farm Enterprise, 1909–36* (National Research Project, Philadelphia, 1938), Table 4.

during the period 1918–27—while it catches up with or exceeds the BAE index in years during which herds were being built up —e.g., 1913–18, 1928–33. In a number of years these discrepancies lead not merely to different rates of change, but to actual divergence in direction. This is not surprising. For the period 1909–16, for example, our livestock index shows an uninterrupted rise, while the BAE index records three years of decrease—1910, 1912 and 1914—decreases in the volume of slaughterings were more than compensated for by increases in number on hand. Thus, while slaughter of hogs fell by 7 percent between 1909 and 1910, there was an increase of 15 percent for hogs on farms during 1910, so that on balance net output of hogs increased 9 percent between 1909 and 1910. A similar situation exists between 1913 and 1914, except that in this instance decreases in slaughter and increases in herds occurred not only in hogs, but also in cattle. The quantitatively most important discrepancy develops for the period 1933–35. Inventory changes during those years were large, and their omission results in a rise in the BAE index from 1933 to 1934 and a sharp fall from 1934 to 1935, while our index records a contrary movement.

As is pointed out elsewhere [2] our index would show a smaller decline between 1933 and 1934, if we had included in our slaughter series the volume slaughtered for government account. Even then, however, there would still remain a drop instead of the increase shown by the BAE index. It is perhaps idle to argue over the "true" production index for this three-year stretch, 1933–35, since it presents very anomalous conditions which allow of a variety of interpretations. Once we have explained the difference between the two indexes in terms of their scope, the choice between them may be left to the reader.

We turn now to a comparison between our index and that advanced by Strauss and Bean.[3] The two indexes (Table C-1) resemble each other closely and observable differences of 2 or 3 points are difficult to trace; probably they result from

[2] P. 106, above.

[3] Frederick Strauss and Louis H. Bean, *Gross Farm Income and Indices of Production and Prices in the United States, 1869–1937*, Technical Bulletin 703 (U. S. Department of Agriculture, 1940), Table 60.

the combined effect of small differences in data and in weights.[4] Thus, the slightly faster rise shown by our index up to 1906 might be due to our higher estimates, for the later years, of corn and livestock production, and a smaller drop in non-citrus fruit. A somewhat larger difference occurs in 1920 when the Strauss-Bean index exceeds ours by more than 5 percentage points. This seems traceable to a discrepancy between the two livestock indexes, which in turn must be ascribed—as far as the authors can determine—to some errors, typographical or otherwise, in the Strauss-Bean bulletin.[5] But for these discrepancies, the Strauss-Bean index would not, for instance, exceed our index in 1920 and 1931 by around 5 percentage points.

Differences between our index and the National Research Project index [6] remain within 5 percentage points, but are hard to track down since they are due to differences not only in data but also in weights. Indeed, it must be considered astonishing that the use of an entirely different weighting system—manhours per unit instead of value per unit—results in an index which reports very similar movements for the period as a whole.

[4] The Strauss-Bean index takes account of changes in livestock inventories, as does our own. However, the former uses Fisher's "ideal" formula (Strauss and Bean, *op. cit.*, pp. 19-20) instead of the Edgeworth formula used here (pp. 326-27 above).

[5] From the data as given in Strauss and Bean, *op. cit.*, Tables 72 and 89, it is not possible to reconstruct the series for the "ideal" index, for 1910 and later years, given in Table 73.

[6] R. G. Bressler, Jr., and J. A. Hopkins, *Trends in Size and Production of the Aggregate Farm Enterprise, 1909–36* (National Research Project, Philadelphia, 1938), Table 4.

TABLE C-2

NET OUTPUT OF CROPS AND LIVESTOCK PRODUCTS, 1909-39[a]

1929:100

Year	*Crops*		*Livestock Products*	
	NBER	BAE	NBER	BAE
1909	84.7	82.5	71.5	78.4
1910	86.2	83.5	73.9	78.2
1911	89.2	86.6	75.3	81.9
1912	97.9	95.3	75.9	80.5
1913	88.4	85.4	78.0	80.7
1914	102.8	101.0	79.7	79.0
1915	100.0	96.4	82.1	82.2
1916	83.0	83.0	82.4	84.8
1917	90.2	89.6	82.5	84.7
1918	95.1	93.7	86.4	90.4
1919	93.2	93.1	82.1	91.2
1920	101.6	104.5	81.0	86.1
1921	79.5	81.7	83.1	86.4
1922	91.1	92.0	89.3	92.4
1923	91.7	92.5	91.9	98.0
1924	99.0	97.6	91.2	99.7
1925	102.1	101.0	90.7	96.9
1926	109.5	107.3	95.0	97.8
1927	98.4	98.2	97.8	99.2
1928	108.0	107.6	98.4	100.6
1929	100.0	100.0	100.0	100.0
1930	99.3	98.0	101.2	99.9
1931	106.9	106.5	102.8	101.3
1932	94.5	94.3	103.2	100.1
1933	87.0	86.3	104.4	104.1
1934	72.8	73.7	91.2	106.5
1935	90.6	90.6	93.3	93.3
1936	83.0	83.7	100.1	100.7
1937	121.3	119.7	97.4	98.3
1938	108.4	106.6	102.8	101.8
1939	111.1	109.0	109.4	107.0

[a] For the National Bureau of Economic Research indexes see Table A-3, above. For the Bureau of Agricultural Economics indexes see *The Farm Income Situation* (U. S. Bureau of Agricultural Economics, Nov. 1941), p. 10.