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LIVESTOCK CAPITAL FORMATION—A PRELIMINARY ESTIMATION*

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This paper presents the first quantification of a partial capital flows account to show the formation and disposition of "natural" capital in cattle production.¹ The analysis suggests that roughly \$5.1 billion of annual cattle capital formation lies buried in the USDA statistical series and perhaps \$2.6 billion of this goes unrecorded.

A capital flows account is a vehicle for tracing how the cattle industry trades between current and future production, and it is an important tool for monitoring the farming sector's economic performance.² This paper also illustrates the impact of a different accounting treatment of livestock capital formation on the estimate of 1973 farm income.

Perspective

A significant amount of presently unrecorded or confusingly classified production and utilization takes place within the farming sector. This includes both intrasectoral transfers (farmer-to-farmer transactions) and "own-account" activity (same-farm production and utilization). Production on own-account can be used for consumption, for further production, or for capital formation. Consumption is measured officially by the Value of Home Consumption Series. If resulting further production is marketed, its net value is measured. But production for capital formation is entirely unmeasured output. Adding measures of farm-produced capital to the present farm income accounting system would improve that system by identifying investment behavior. In particular, if the expenses farmers incur when producing this capital are included in the current-account expense category, our statistical picture of the farming sector does not clearly portray the effects of today's receipts and

expenditures on either today's or tomorrow's output. Own-account capital formation must be measured to identify the trade-off between production for current account and production for building and maintaining capacity.

To illustrate the above concept, consider that a steer raised for slaughter has a "period-input, point output" accounting life. A milk cow, by contrast, has a "period-input, period-output" accounting life—she incurs costs throughout her life, and those costs must be covered by the stream of receipts from milk and the salvage value of the "used up" asset (cow) when scrapped (sold to slaughter). The fundamental distinction between the two cases is whether the commodity is used up in the immediate period or if it yields benefits into some future period.

Cattle Capital Flows

During 1974, ERS sponsored surveys to begin measuring farm-produced, e.g., own-account, capital formation in the cattle sector.³ This survey information supplements the SRS cattle reports, enabling estimates of cattle production to be separated into its uses as either consumption or capital formation.

Change in stocks shown in Table 1 are as reported by SRS.⁴ Inventory changes can be computed by individual

³ As with any survey results, we might possibly have a highly unusual sample. Without a consistent time series, we cannot identify aberrant observations. Second, the only set of consistent prices available in the form needed is the SRS series pertaining to dairy cows. Other prices used are imputed. A specific limitation is the exclusion of bulls from the results presented because the price variation was too severe to allow meaningful aggregation. This biases all the estimated values downward by an unknown but significant amount. Similarly, in all other cases, we will show the conservative estimate of any impact or change offered.

⁴ Because the estimators from the survey are based on July 1, 1973, to July 1, 1974, we constructed an inventory change table for that period. The reader may feel uncomfortable with the statistical discrepancy; the author does not feel it is necessary to defend these numbers as they are not crucial to any argument in this paper. The likely source of discrepancy is probably the estimated calf crop. Inventory and slaughter estimates are official. Some valuable research could be done on the measurement and reporting of inventories.

*The views expressed are the author's and do not necessarily represent those of the U.S. Department of Agriculture.

¹ While the subject of this paper is restricted to cattle, the logic can be extended to include other farm-produced "natural" capital, such as hogs, sheep, home-built machinery, buildings, or equipment.

² This framework has been presented as an alternative or supplement to currently used farm income accounts by other authorities, once at the WAEA meetings. For detail, see [2], [4], [5].

Table 1. Inventory movements (thousand head), fiscal year 1974¹

July 1, 1973 calf inventory		38,416
PLUS: calf crop ²	49,944	
LESS: calf slaughter ³	2,786	
calf deaths ²	4,250	
EQUALS: calves available		81,324
LESS:		
A. Cattle slaughter ³	34,529	
B. Net additions to inventory	4,402	
(1) Beef cows	3,016	
(2) Milk cows	-196	
(3) Beef cow repl.	678	
(4) Milk cow repl.	-18	
(5) Other heifers	69	
(6) Steers	589	
(7) Bulls	264	
C. Cattle deaths	2,050	
D. Net exports	-592	
PLUS: Discrepancy	938	
EQUALS: July 1, 1974 calf inventory		41,873

¹ Based on July, 1974, and February, 1975, SRS reports

² 1973-1974 average used

³ Total slaughter

classification, as shown. What Table 1 cannot tell us is the actual number of animals moving into and out from each class; that is, the gross flow. To show this, we construct Table 2 by applying the gross replacement rates for beef cows (14%) and milk cows (12.4%) to the July 1, 1973, stock. Table 2 illustrates the difference between measuring only net inventory changes, reflected in Table 1, as opposed to gross flows. It is apparent from Table 2 that a substantial amount of activity resulting in the production of capacity cannot be computed from official statistics.⁵ What remains is to incorporate our information into a capital flows account, Table 3.

⁵ Bulls are not represented in Table 2. Perhaps 400 to 700 thousand bulls were added to the herds, 100 to 400 thousand of which were never marketed. That is, the value of those animals represents further unrecorded own-account activity.

In Table 3 the own-account production numbers equal the gross flows into the beef cow and milk categories (from Table 2) valued at, respectively, the 48-state liveweight average price of a 1,000 pound slaughter animal and the reported price received by farmers for milk cows. Net additions to inventory from these categories are taken from Table 1 and similarly valued. Depreciation is based on a six-year herd life for both milk cows and beef cows. Finally, the sale of capital items is the difference between the net physical stock change from the gross physical additions, valued at the same prices.

Implications for the Farm Income Estimates

How important are the results of Table 3? One way to evaluate them might be to ask how farm income would change if the results were incorporated into present measures. Of the estimated \$2.6 billion of own-account production of fixed capital, over half, some \$1.3 billion to \$1.4 billion, will never appear in market transactions.⁶ The stock of "natural capital" is increased, but only the indirect consequences such as increased feed purchased are reflected in the market transactions.

An independent source indicates that 46% of feed crop production went unrecorded as either farm output or farm expenses (3). If so, the argument that own-account production will be identified in market transactions under current concepts is unwarranted. The value of that part of the feed crop used to produce the \$1.3-1.4 billion of other own-account production will remain unrecorded, compounding our underestimation of total output. Properly recording the remaining \$1.3 billion would reduce current account receipts from cattle by 6% for the period studied and would reduce expenses for purchased livestock by nearly 15% in

⁶ Nonpurchased additions to beef cows is estimated at .62 for July 1, 1973 to July 1, 1974 and .47 for 1974. Nonpurchased additions to dairy cows is estimated at .67 for the first period and .54 for 1974.

Table 2. Inventory change compared to flows

July 1 Inventory	Beef Cows		Milk Cows	
	Number	Value	Number	Value
	(1000 Head)	(\$ Million)	(1000 Head)	(\$ Million)
1973	42,556	14,214	11,387	5,693
1974	45,572	10,484	11,191	5,270
Change	+3,016	-3,730	-196	-423
Change due to price ¹	-----	4,738	-----	-325
Gross flow estimate ²	5,941	1,885	1,411	750

¹ Value of July 1, 1974 inventory at July 1, 1973 prices

² Average prices during period are used to value the gross additions we obtain by applying the gross replacement rate estimators (from the survey) to the beginning stocks.

Table 3. A capital flow account (million dollars) for cattle

A. Fixed capital formation	-2,428
(1) Own-account production	2,635
a. Beef cows	1,885
b. Milk cows	750
(2) Valuation adjustment	-5,063
B. Net additions to inventory	853
(1) Beef cows	957
(2) Milk cows	-104
C. Net capital disappearance ¹	6,696
GROSS CAPITAL FORMATION	5,121
D. Fixed capital consumption	3,315
E. Sales of capital items	1,806
GROSS CAPITAL DISAPPEARANCE	5,121

¹ If the sum of items D + E exceeds the sum of items A + B, then there is a negative capital formation (net). Accordingly, disappearance carries a positive sign. For comparison, if items A + B totaled 7,068 while items D + E totaled 5,121, net capital formation would be 1,947 and would be entered in item C as minus 1,947

1973. Correspondingly, gross farm capital expenditures would increase by the amount of recorded and unrecorded formation, increasing from \$10.4 billion to \$13 billion for 1973. Including beef and dairy cows in current estimates of depreciable farm capital would cause the total depreciation estimate to soar from \$8.9 billion (1973) to \$12.2 billion, a 37% increase. If all transactions portrayed in the capital flows account had taken place during calendar 1973, then farm operators' total net income would be different by some \$7.5 billion, as shown in Table 4. We emphasize that this does not imply an overestimation or omission on the part of USDA. The difference is a matter of classification.

Adjustments to cash receipts include the \$1.8 billion from sales of capital items (Table 3) and \$1.3 billion of own-account capital production. The latter figure is the maximum amount the present accounting system could be measuring, but is now attributed to current account receipts. If, as some authorities suggest (1), economic well-being is affected by wealth as well as income, the creation or loss of wealth is a contribution or deduction from current income. Accordingly, the realized nonmoney "income" would be adjusted by fixed capital formation of minus \$2.5 billion. A simpler reason for including this item is to balance the accounts. If we account for the service of capital by its depreciation, we must also account for its acquisition. This adjustment partly amends the present procedure which accounts for inputs to the farming establishment but mainly records commodity output. (Nonmoney income does not currently include such capital transactions; if it did the

Table 4. Income from farming, 1973 under different concepts¹

Item	Current Concepts	Adjustment	Alternative Concept
Cash receipts from farm marketings	88.6	-3.1	85.5
Government payments to farmers	2.6	----	2.6
Realized nonmoney and other farm income	5.8	-2.4	3.3
Realized gross farm income	97.0	-5.5	91.4
Farm production expenses	(-) 64.7	2.0	66.7
Farm operators' net income	32.2	-7.5	24.7
Net change in farm inventories	4.0	----	4.0
Farm operators' total net income	36.2	-7.5	28.7

¹ Details may not add to totals because of rounding

Balance Sheet of the Farming Sector would be conceptually linked more closely to the Farm Income Situation). Farm production expenses are adjusted to reflect increased depreciation of \$3.3 billion. And they are reduced by \$1.3 billion of livestock purchases presently recorded as current account expenditures which are, in fact, capital purchases. The livestock purchases figure offsets the reduction in cash receipts.

Summary

This study represents the first attempt to separate cattle production between production for consumption and for capital formation. We showed how "natural" capital and own-account formation of that capital can be incorporated in one part of such accounts. Substantial economic activity is identified which affects agriculture's ability to deliver cattle products to the consumer. But, such activity is never reflected, or it is reported only in total and too late for any discretionary policy to have effect. Simply put, paying attention exclusively to inventory change ignores the substantial gross flows in and out from dissimilar inventory categories. It is these movements that represent the more telling activity. Examining total production and its uses could help identify total costs and benefits of alternative, perhaps mutually exclusive, courses of action for public decision making, such as more food now or more food later. Quantifying the total capital flows account and particularly monitoring own-account capital formation would help in such identification.

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