DISAGGREGATION OF NATIONAL DATA ON CATTLE AND CALVES FOR REGIONAL ANALYSIS

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CHAPTER I

INTRODUCTION

This study was initiated as a part of a more comprehensive program of research to determine interregional competitive relationships in the cattle sector of the nation's agricultural economy. The principal issues in this, as in any other sector of the agricultural community, are those related to present and future demand, supply, and price conditions. Considerable study has been made of the demand characteristics for beef and livestock products.[1] Relatively few research findings are available, however, on characteristics of supplies.

The nation's cattle industry consists of many interdependent segments and components. Although the dairy and beef components are widely recognized as separate industries, it must be recognized that most dairy cattle eventually become part of the beef cattle supply. The beef cattle sector may be classified: (1) according to use as breeding stock, feeders, and slaughter cattle; (2) by class as cows, bulls, calves, steers, and heifers; (3) by grade and weight; and (4) geographically by region, state, or county. Further classification by subsectors, such as the commercial feedlot component, may be possible. While occasionally some research attention is given to one or more of these sectors, intelligent entrepreneurial and public policy decisions with reference to the industry

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[1] See the Bibliography.

requires much more. For instance, policy decisions with respect to beef imports and exports can be made more intelligently if prospective consumption requirements and supplies of beef by class or type can be estimated with some degree of confidence.

Among the larger questions currently confronting the beef industry are those concerning interregional competition. Cattle are produced in all areas of the nation, and in each area interest and concern regarding potentials for growth and development of the industry may be identified. Shifts in the location of cattle production by class and type are of interest to livestock marketing agencies, meat packers, wholesale distributors, retailers, and others as well as producers themselves. Such shifts are determined basically by the nature of interarea competitive relationships. Research interest in interregional competition, therefore, tends to settle upon these relationships. One methodological approach is the spatial equilibrium matrix. This approach, however, requires regional estimates of production for past, present, or future periods. The answers to many other related questions require meaningful estimates by classes and types of beef. Studies dealing with location of feeder cattle production, cattle feeding, and meat packing and processing also require estimates that are less aggregative than are presently available.

National and regional estimates of production and supplies for historical and future periods by classes and types of beef are essential to the solution of a wide variety of industry problems. But even here the basic data necessary for construction of highly reliable estimates are, in many instances, missing. Despite the volume and variety of data on the cattle industry provided by the U. S. Department of Agriculture, and

Census Bureau, and other agencies, data gaps and inadequacies are critical limitations in any approach to the study of economic trends and interregional competition. For instance, no published data are available on regional or national supplies of feeder cattle, and commercial slaughter data are available only for all mature beef and for calves.

Inadequacies in regional data on cattle supplies, production, marketings, and slaughter are much more apparent and limiting than is true of national data. It was partly for this reason that emphasis of this report was shifted to the national data. More important, in any regional analysis involving the generation of input variables, as in this study, reliable national data are a prerequisite. Nevertheless, regional work was carried out and methods were presented in the study. Illustrations and analysis of regional data and estimations, however, were limited to one region only (region 9, Oklahoma) because of the enormous volume of data, time, and expenses involved in reporting all regions.

Objectives of the Study

The primary objectives of this study were: (1) to develop methods of disaggregating national data and data on total cattle and calves into component parts for analysis of the livestock industry; (2) to determine national and regional trends and cyclical patterns in various aspects of cattle supplies and production by classes; and (3) to analyze the adequacies and inadequacies of existing data on the livestock industry for comprehensive and qualitative study.

More specifically, the objectives of the study were to:

1. develop methods and procedures for estimating principal national data and components of the cattle supplies and

dispositions by class, i.e., cows, bulls, steers, and heifers;

2. develop methods and procedures for estimating principal regional data and components of the regional supplies and dispositions by class;
3. analyze and draw implications of the trends of the principal national data by class;
4. analyze and draw implications of the trends of the principal regional data by class; and
5. to arrive at recommendations for improvements in published state and national data on cattle supplies and dispositions to facilitate more meaningful researches and to aid decision makings of private as well as public sector of the cattle industry.

As indicated, the objectives place emphasis upon the development of methods of estimation and disaggregation and on subsectors of the beef industry. Successful efforts to develop reliable estimates in the various components under study would open new vistas for meaningful problem oriented research. For instance, estimates would offer new possibilities for analyses of demand and prices of feeder cattle. In addition to unknown supply characteristics, feeder cattle prices are affected by demand in the replacement and slaughter markets as well as the feeder markets. Detailed data on demand and supply characteristics of these markets, however, are not found in published form.

CHAPTER II

THE NATURE OF STATISTICAL DATA SERIES ON THE BEEF CATTLE INDUSTRY

The volume and variety of data developed by public agencies on cattle, calves and dressed beef is impressive. Few industries in the United States are so well supplied with facts and figures as the cattle industry. Despite these circumstances, economic research programs on critically important entrepreneurial and policy problems in the beef industry have been severely limited by inadequacies and shortages in the data. Few of the series on cattle or beef are entirely satisfactory for research dealing with economic problems.

The data shortages and inadequacies, although serious and frustrating, are not especially surprising for two principal reasons. First, the data generally were not developed primarily for research purposes and their development did not follow any well-organized plan. Some were collected because they could be obtained easily or as a result of local or sectoral pressures. Second, the beef industry is an unusually large, complex, and heterogeneous collection of enterprises, functions, and institutions. Since livestock add weight and shift from one type, class, or grade to another with changes in age or weight, data on production and disposition are collected only at considerable expense and with much difficulty. Partly for these reasons, organized research studies on characteristics of supplies of the beef industry are limited in number and sharply restricted in depth.

Bureau of Census data on cattle inventories have been available throughout the history of the agricultural census. These are used as benchmarks for a more detailed annual series on inventories compiled and published by the U. S. Department of Agriculture. In addition to inventories, census data include the number of farms reporting sales of cattle and the number sold alive by subclasses of farms.[1]

Information published by the U. S. Department of Agriculture includes the following types of data:[2]

1. The numbers and value of cattle on farms January 1, by type and class by state are provided annually. State statisticians also determine and publish data on inventories by counties in cooperating states. In the national and state data, inventories of dairy cows, dairy heifers, and dairy calves are reported separately but inventories of dairy steers and bulls are included with the data on beef types.
2. The January 1, numbers of cattle on feed for market by states are issued annually. While these data are available for a long series of years, alterations have been made in the definition of "cattle on feed."
3. Quarterly estimates of cattle on feed for market, numbers placed on feed, numbers marketed from feedlots, weight and sex distributions of feedlot inventories, and length of time on feed for 30 states are issued regularly. These data are of recent origin as they were available for only 3 states in 1953. The service

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[1] Willard F. Williams and Thomas T. Stout, Economics of the Livestock Meat Industry, the MacMillan Co., (New York, 1964) Chapter 2.

[2] Ibid., pp. 456-57.

still is in the process of expansion. Monthly data on inventories, placements, and marketings of cattle on feed have been developed in recent years for a few states including Colorado, Arizona, California, and Texas.

4. Annual data are provided on numbers of cattle marketings, inshipments, deaths, farm slaughter, and calf birtns.

   (a) Together with total cattle inventories, these data provide essential elements of what is referred to in this report as the U.S.D.A. "balance sheet data."[3] These data are developed annually for the nation and each state.

   (b) Complete balance sheet data are provided, however, only for the total of all cattle and calves. State and national data are reported separately for cattle and calves for inventories, commercial slaughter, marketings, farm slaughter, and deaths only.

   (c) The data on inshipments represent "inshipments to farms and ranches." While these "inshipments" sometimes consist primarily of inshipments from other states, the definition allows inclusion of marketings within the state that are returned to the farms within the same state. Inshipment data for individual states refer to the combined total of all cattle and calves.

   (d) The total of cattle and calf marketings is reported nationally and by states in terms of liveweight as well as in

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[3] U. S. Dept. of Agriculture. Livestock and Meat Statistics, AMS, U. S. Dept. of Agriculture Statistical Bul. No. 230, July, 1958, and Supplements for 1958, 1959, and 1960, Washington, D. C.

numbers. But this is the only element of the U. S. Department of Agriculture balance sheet on livestock that is reported in terms other than numbers.

5. In addition to the balance sheet data, the U. S. Department of Agriculture maintains a series on cattle referred to as "production" which is defined as total liveweight added during the year with adjustments made for inshipments and changes in inventory.[4] Liveweight production is reported nationally and by states for the total of all cattle and calves. It purportedly includes commercial slaughter and reflects adjustments for farm slaughter, other non-commercial slaughter, deaths, and changes in farm inventories.

6. Monthly and annual data on commercial slaughter have been published separately for cattle and calves for the U. S. and individual states only since 1946.

   (a) Prior to this time, published slaughter data consisted primarily of numbers and liveweight of slaughter in federally inspected establishments. These data are available by classes of cattle. In recent years they have been reported monthly by classes on a regional basis.

   (b) The commercial slaughter data are reported in terms of both numbers and liveweight.

7. Data on shipments and movements of cattle are relatively scarce and specialized.

   (a) Data on receipts of cattle and calves at terminal markets

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[4] U. S. Department of Agriculture. The Agricultural Estimating and Reporting Services of the U. S. Department of Agriculture, U.S.D.A. Miscellaneous Publication No. 703, Dec. 1949, Washington, D. C. pp. 81-82.

have been reported for many years. These are classified as "salable receipts," "directs," and "throughs." Feeder cattle receipts also are reported separately. Auction markets and country sales of cattle have become so large, however, that terminal market data alone are not particularly useful.

(b) U. S. Department of Agriculture data also include monthly estimates of both direct and terminal market shipments of feeder cattle to the Corn Belt. However, these are incomplete and shipments to other markets are excluded. No other feeder shipments data are available.

(c) No data are published on interstate or intermarket shipments of finished cattle, beef carcasses, or beef products.

8. Information is published monthly for 12 livestock markets on numbers, total weight, total packer cost, and average packer cost of slaughter steers and heifers by grades.

(a) With the principal exceptions of Oklahoma City and Fort Worth these markets are primarily Corn Belt "River Markets."

(b) These data on 12 markets have been published only since 1959.[5] During 1955-58, detailed information was published on seven markets,[6] and prior to this period such information was available only for three.[7] In addition, no data of this

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[5]The 12 markets are made of Chicago, Omaha, Sioux City, St. Louis, St. Joseph, Kansas City, Denver, Cincinnati, Fort Worth, Indianapolis, Oklahoma City, and Sioux Falls.

[6]The seven markets included Chicago, Omaha, Sioux City, St. Louis, St. Joseph, Kansas City, and Denver.

[7]The three markets included Chicago, Omaha, and Sioux City.

type were available, prior to 1955, on slaughter heifers.

9. Data are developed for 10 markets on number, weight, and cost of stocker-feeder cattle and calves since 1922. These markets also include Oklahoma City and Fort Worth.

While some additional data are published by the U. S. Department of Agriculture and various other sources, they are not particularly relevant to this study. Included are a variety of data on prices and cash receipts from farm marketings.

The U. S. Department of Agriculture balance sheet data are of particular interest in this study. These data are employed in the following formulation for the nation and each state:

$$BI + NBC + IS = M + D + FS + EI$$

where:

BI = Beginning inventories of all cattle and calves

NBC = New born calves

IS = Inshipments of cattle and calves

M = Marketings of cattle and calves

D = Deaths of cattle and calves

FS = Farm slaughter of cattle and calves

EI = Ending inventories of all cattle and calves

The left side of the equation represents the components of supplies whereas the right side represents components of disposition. A characteristic of this equation, as with all such equations, is that accuracy in the estimates is not a necessary requirement for the equation to balance. Equal and offsetting errors on each side of the equality sign leave supplies in balance with disposition and provide an illusion of accuracy. Thus, during 1955-60 when cattle inventories were in error by several

million head, as revealed by subsequent events, the equation for the nation and for each state was in balance because equal and offsetting errors were made in beginning inventories and ending inventories. Similarly, if equal and offsetting errors were made in marketings and inshipments, the equation would balance. A priori observations and rather large unexpected inconsistencies between these data and the data on commercial slaughter suggest that both marketings and inshipments are biased downward. This hypothesis is supported by the popularity of direct marketings, the paucity of data on marketings through auctions, and the serious inadequacies of data on interstate shipments of cattle. The data suggest, however, that the discrepancy has become smaller in recent years.

The U. S. Department of Agriculture balance sheet data and the data on commercial slaughter are developed independently. This results in problems that are encountered in any attempt to integrate the two sets of data and to delineate the integrated data by classes of cattle. For instance, the definition employed in collecting data on inventories of calves apparently includes bovine animals under about one year of age but weight and maturity are the criteria used in determining calf slaughter. The result seems to be a larger calf slaughter than justified by the inventory definition. The task of integration, therefore, requires adjustments in one or both series.

Analyses of the available data reveal a number of other equally serious inadequacies and shortcomings. "Inshipments" may be cited as an example. While inventories, deaths, marketings, and slaughter of calves are reported separately by type, inshipments are available only for the total of all cattle and calves. In addition, the data indicate that among the various states inshipments to feedlots are not uniformly

included or excluded from the data on "inshipments to farms and ranches." That they do not include all feedlot placements is clear since inshipments by definition are marketings that are returned to the cattle inventory. Precisely which items have been included in inshipments usually is unclear. The weight of evidence suggests that "inshipments" simply is a residual figure introduced to provide a balanced equation.

Even the data on cattle inventories leave much to be desired. Since census data are used as benchmarks for interpolation by the U. S. Department of Agriculture between census years, the inventory data presumably are reasonably accurate. These data, nevertheless, leave highly distorted impressions. For instance, large numbers of both feeder and slaughter cattle are shipped from Oklahoma and Texas as well as other areas to the Corn Belt in the fall of the year and prior to the collection of inventory data. January 1 inventory figures, therefore, show a small number of heifers and steers in Oklahoma and Texas relative to numbers of cows and bulls. In contrast, inventories for Iowa consistently show an unusually high percentage of heifers and steers. Inventories, therefore, are not a reliable guide to the regional distribution of cattle production.

CHAPTER III

METHOD OF DISAGGREGATION AND GENERATION OF THE UNITED STATES DATA

The development of satisfactory data generation techniques and methods of disaggregating data on total cattle and calves for the United States was one of the main objectives of the study. Procedures adopted tended to insure reasonably accurate and reliable estimates in view of a prior knowledge. However, bases for rigorous statistical significance tests and an evaluation of techniques used were lacking because no previous attempts were made and no published data are in existence.

Methodology for the U. S. Balance Sheet Estimates

A theoretical scheme was developed by using the balance sheet equation employed by the Statistical Reporting Service of the U. S. Department of Agriculture.[1] The equation was expanded to include additional variables and made applicable to individual classes of cattle as shown in Table I.

The data published by the U. S. Department of Agriculture are indicated by the shaded squares in Table I. These consist of inventory data by classes, inshipments of total cattle and calves (T) and marketings and commercial slaughter data for all cattle (ac) and calves (cv) separately.

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[1] U. S. Dept. of Agriculture, Livestock and Meat Statistics, AMS, U.S.D.A., Statistical Bulletin No. 230, pp. 35.

TABLE I

CLASSIFICATION OF VARIABLES FOR BALANCE SHEET ANALYSIS, YEAR t

Variables \ Class (i)	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bulls (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All cattle (ac)	Calves (cv) (i=5)	Total cattle and calves (T)	Newborn calves (NBC)
BI	BI_c	BI_b	BI_{cb}	BI_s	BI_h	BI_{sh}	BI_{ac}	BI_{cv}	BI_T	BI_{NBC}
R	R_c	R_b	R_{cb}	R_s	R_h	R_{sh}	R_{ac}	R_{cv}	R_T	--
R'	--	--	--	--	R'_h	R'_{sh}	--	R'_{cv}	R'_T	--
D	D_c	D_b	D_{cb}	D_s	D_h	D_{sh}	D_{ac}	D_{cv}	D_T	D_{NBC}
FS	--	--	--	FS_s	FS_h	FS_{sh}	FS_{ac}	FS_{cv}	FS_T	FS_{NBC}
CSP	CSP_c	CSP_b	CSP_{cb}	CSP_s	CSP_h	CSP_{sh}	CSP_{ac}	CSP_{cv}	CSP_T	CSP_{NBC}
M	M_c	M_b	M_{cb}	M_s	M_h	M_{sh}	M_{ac}	M_{cv}	M_T	--
AM	AM_c	AM_b	AM_{cb}	AM_s	AM_h	AM_{sh}	AM_{ac}	AM_{cv}	AM_T	--
OS	OS_c	OS_b	OS_{cb}	OS_s	OS_h	OS_{sh}	OS_{ac}	OS_{cv}	OS_T	--
IS	IS_c	IS_b	IS_{cb}	IS_s	IS_h	IS_{sh}	IS_{ac}	IS_{cv}	IS_T	--
CS	CS_c	CS_b	CS_{cb}	CS_s	CS_h	CS_{sh}	CS_{ac}	CS_{cv}	CS_T	--
ACS	ACS_c	ACS_b	ACS_{cb}	ACS_s	ACS_h	ACS_{sh}	ACS_{ac}	ACS_{cv}	ACS_T	--
dI	dI_c	dI_b	dI_{cb}	dI_s	dI_h	dI_{sh}	dI_{ac}	dI_{cv}	dI_T	--
EI	EI_c	EI_b	EI_{cb}	EI_s	EI_h	EI_{sh}	EI_{ac}	EI_{cv}	EI_T	--
ΔI	ΔI_c	ΔI_b	ΔI_{cb}	ΔI_s	ΔI_h	ΔI_{sh}	ΔI_{ac}	ΔI_{cv}	ΔI_T	--
P	P_c	P_b	P_{cb}	P_s	P_h	P_{sh}	P_{ac}	P_{cv}	P_T	--

See the following pages for the explanation of variables

TABLE I. (Continued).

BI = Inventories on farms, January 1, year t

$$BI_T = \sum_{i=1}^{5} BI_i \qquad \text{and} \qquad BI_{ac} = \sum_{i=1}^{4} BI_i$$

The above two relationships hold true for all variables unless specified otherwise.

EI = Inventories on farms, January 1, year t + 1

R = "Replacements" or numbers added to farm inventories during year t

R_T = The total calf crop adjusted for discrepancy, year t

R_{cv} = The total calf crop, year t, less deaths and farm slaughter of new crop calves

$$R_{ac} = \sum_{i=2}^{4} R_i$$

R' = "Outplacements" or numbers removed from farm inventories through shift in class, i.e., heifers to cows and calves to steers, heifers and bulls.

$$R'_h = R_c$$

$$R'_{cv} = \sum_{i=2}^{4} R_i = R_{ac}$$

$R'_T = R_T - R_{cv}$ = deaths and farm slaughter of new crop calves

D = Deaths of cattle and of calves other than new crop calves

FS = Farm slaughter of cattle and of calves other than new crop calves

CSP = Commercial supplies or the total available supplies

$$CSP_T = BI_i + R_i - R'_i - D_i - FS_i$$

M = Marketings or the gross movements of cattle or calves off farms and ranches

AM = Adjusted marketings

IS = Inshipments or the gross movement of cattle and calves to farms and ranches

CS = Commercial slaughter

ACS = Adjusted commercial slaughter

OS = "Outshipments" initially defined as

$$OS_i = M_i - CS_i$$

dI = Discrepancy due to errors in published figures and estimates

$$dI_i = OS_i - IS_i$$

For regional analysis discrepancy is defined as "Net-outshipments (NOS)." See chapter VI for further discussion.

$\triangle I$ = The change in inventories

$$\triangle I_i = EI_i - BI_i$$

P = Production

$$P_i = ACS_i + I_i = R_i - R'_i - D_i - FS_i$$

The following relationships also are implied:

$CSP_i - M_i + IS_i = EI_i$ or $CSP_i = EI_i + M_i - IS_i$ and

$CSP_i - CS_i + dI_i = EI_i$ or $CSP_i = EI_i + CS_i - dI_i$

The immediate problem, therefore, was to derive estimates of the remaining variables. The estimates of these variables for the United States for each year of the period 1947-62 are shown in Appendix A, Tables I - XVI.

In deriving estimates, several procedural rules were adopted and observed. The approach was disaggregative rather than aggregative. Estimates for the United States preceded work on regional estimates. Published data or estimates for total cattle and calves were divided first into separate estimates for (1) all cattle and (2) calves. The all cattle estimates were then allocated to (1) cow-bull and (2) steer-heifer totals. These, finally, were separated into components, cow-bull into cow and bull and steer-heifer into steer and heifer. Separate estimates for each component were made and these were adjusted proportionally to totals so that the sum of individual estimates were equal to the total. In many instances, it was necessary to adjust component estimates to both horizontal and vertical totals. This generally was accomplished through successive approximations which involved alternating horizontal and vertical proportional approximations.

As can be seen in Table I, the published data on total cattle and calves consists of both beginning and ending inventories (BI & EI), marketings (M), inshipments (IS), and commercial slaughter (CS). The data for the year 1960 for the variables with other published data are shown in Table IIa.

Table IIa suggests that the first task is to obtain estimates of total cattle and calves for the remaining variables. The balance sheet variables can be classified into those belonging to supplies and those belonging to disposition.

TABLE IIa

PUBLISHED DATA FOR THE U. S. BALANCE SHEET VARIABLE, 1960

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,871	1,676	47,547	10,574	12,115	22,689	70,236	26,000	96,236	39,353
R										
R'										
D										
FS										
GSP										
M							34,378	12,054	46,432	
AM										
OS										
IS									13,448	
GS							25,224	8,225	33,449	
ACS										
dI										
EI	46,370	1,702	48,072	10,942	12,107	23,049	71,121	26,198	97,319	
ΔI										
P										

[a] T.C.C = Total Cattle and Calves

[b] BI of newborn calves actually is the calves born during the year

All animals supplied in the U. S. during a year must be disposed in one of two ways, either be left on farms and ranches as ending inventory or be slaughtered. Thus, commercial disposition of total cattle and calves is estimated by taking the sum of ending inventory and commercial slaughter. Animals disposed must be supplied making commercial supplies equal to commercial disposition.

$$CDP_T = EI_T + CS_T \qquad (3, 1)$$

$$CSP_T = CDP_T \qquad (3, 2)$$

where:

CDP_T = commercial disposition of total cattle and calves.

Other variables defined in the pages following Table I.

It is only logical to assume that all animals marketed (M) in the U. S. must either be commercially slaughtered (CS) or shipped out of farms as outshipments (OS) to be returned to farms and ranches as inshipments (IS). That is

$$M_T = CS_T + OS_T \qquad (3.3)$$ and

$$IS_T = OS_T \qquad (3.4)$$

Since data on marketings (M) and commercial slaughter are published it is possible to obtain estimate of outshipments for total cattle and calves by using equation (3.3).

It was found, however, that the equation (3.4) does not hold. Except for the years 1952 and 1959 inshipments exceeded outshipments estimates during the period under study, 1947 - 62. Upon further examination of the data, it was decided that the difference was due to the discrepancy or

$$dI_T = OS_T - IS_T \qquad (3.5)$$

---

[2]Variables defined following Table I will not be defined again after each use.

At first it seemed logical for inshipments to exceed outshipments, that is $IS_T > OS_T$ or $IS_T > M_T - CS_T$, because live cattle imports normally exceed exports and net imports, consisting primarily of feeder cattle, would tend to affect inshipments more than marketings or slaughter if imports were included in these data. On this basis net imports of live cattle and dI_T were expected to be highly related. Detailed study revealed, however, that little, if any, such relation existed and that the discrepancy usually exceeded net imports by a substantial quantity. For instance, during 1947 - 50 dI_T ranged between -1.4 and -2.0 million head whereas net imports did not exceed 460 thousand head.[3] In several subsequent years, on the other hand, net imports exceeded discrepancy. It was, thus, decided that any attempt to separate net inshipments and other components of dI_T was inadvisable and was concluded that the published data on marketings generally were biased downward. Therefore, an adjustment was needed to account for the bias and a new series was designated as adjusted marketings (AM).

$$AM_T = M_T - dI_T \qquad \text{or} \qquad (3.6)$$

$$AM_T = CS_T + IS_T \qquad (3.7)$$

Estimates of change in inventory of total cattle and calves was obtained as the difference between ending and beginning inventories.

$$\triangle I_T = EI_T - BI_T \qquad (3.8)$$

On the number of head basis there should be as many animals produced as the number slaughtered plus any increase or minus any decrease

---

[3] Little evidence of cyclic or counter cyclical variation in the discrepancy was found. EI_T on the other hand shows a definite cyclical variation. The simple correlation coefficient for total cattle and calves between EI_T and dI_T was $r = .32$. Also see appendix Table C-X.

in inventory. Thus, estimate of production of total cattle and calves was derived as:

$$P_T = CS_T + \Delta I_T \qquad (3.9)$$

Adjusted commercial slaughter for total cattle and calves is equal to commercial slaughter and is estimated as following:

$$ACS_T = CS_T \qquad (3.10)$$

The above identity, however, is not necessarily true for various classes of cattle and will be discussed in more detail in subsequent pages.

With estimation of component variables of commercial disposition and other balance sheet variables below commercial supplies completed, attention was given to components variables of commercial supplies which is defined as:

$$CSP_T = BI_T + R_T - R'_T - D_T - FS_T \qquad (3.10)$$

U. S. Department of Agriculture publishes inventory data by classes and data on death and farm slaughter for both cattle and calves. However, it was assumed that the published data on death and farm slaughter of calves included death and farm slaughter of new-born calves only and death and farm slaughter of calves other than newly born are included in death and farm slaughter of cattle data. Thus, death and farm slaughter data of total cattle and calves used in the balance sheet are published as death and farm slaughter of cattle. Data on death and farm slaughter of new born calves as used in the balance sheet are published as death and farm slaughter of calves.

Unlike individual classes of cattle, outplacements of total cattle and calves is not intended to replace other classes of cattle. Instead, it is the sum of death and farm slaughter of new born calves.

With estimates of commercial supplies (CSP), death (D), farm slaughter (FS), beginning inventory (BI), and outplacements (R') available it is now possible to estimate replacements (R) of total cattle and calves.

$$R_T = CSP_T + D_T + FS_T + R'_T - BI_T \qquad (3.11)$$

Logic suggests that replacements of total cattle and calves should be equal to the number of new born calves (NBC) for any given year. However due to the discrepancy encountered earlier, replacements of total cattle and calves in fact is equal to new born calves plus discrepancy of total cattle and calves.

$$R_T = NBC + dI_T \qquad (3.12)$$

Having obtained estimates of all variables for total cattle and calves along with published data, as shown in Table IIb, the next task was to disaggregate these estimates into estimates for all cattle and calves. Table IIb shows that both marketings and commercial slaughter data are published for all cattle and calves separately as well as inventory data. Of the published data, inshipments of total cattle and calves is not disaggregated.

Allocation of inshipments of total cattle and calves into inshipments of all cattle and inshipments of calves was achieved by use of unpublished liveweight data.[4] These were data representing average liveweight per head of calf inshipments, all cattle inshipments, and inshipments of total cattle and calves. The data were employed as follows:

$$IS_T \cdot AIW_T = IS_{ac} \cdot AIW_{ac} + IS_{cv} \cdot AIW_{cv} \qquad (3.13)$$

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[4] These liveweight data were provided for the U. S. and each of 48 states by the Statistical Reporting Service, U. S. Dept. of Agric., Washington, D. C.

TABLE IIb

PUBLISHED AND ESTIMATED DATA, TOTAL CATTLE AND CALVES, U. S., 1960

	Cows (C) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,871	1,676	47,547	10,574	12,115	22,089	70,236	26,000	96,236	39,353
R									39,818	39,818
R'									2,917	
D									1,567	2,531
FS									802	386
CSP									130,768	36,901
M							34,378	12,054	46,432	
AM									46,897	
OS									12,983	
IS									13,448	
CS							25,224	8,225	33,449	
ACS									33,449	
dI									-465	
EI	46,370	1,702	48,072	10,942	12,107	23,049	71,121	26,198	97,319	
ΔI									1,083	
P									34,532	

[a] T.C.C. = Total Cattle and Calves

[b] BI of newborn calves actually is the calves born during the year

$$IS_T = IS_{ac} + IS_{cv}^{5} \qquad (3.14)$$

where:

ALW_T = Average liveweight per head of total cattle and calf inshipments.

ALW_{ac} = Average liveweight per head of all cattle inshipments.

ALW_{cv} = Average liveweight per head of calf inshipments.

Other variables defined following Table I.

In turning to estimation of outshipments (OS) and discrepancy (dI) of all cattle and calves, outshipments were defined as marketing minus commercial slaughter and discrepancy was defined as outshipments minus inshipments, i.e.,

$$OS_i = M_i - CS_i \quad (i = ac, cv) \qquad (3.15)$$

$$dI_i = OS_i - IS_i \quad (i = ac, cv) \qquad (3.16)$$

The inevitable result, however, was a large dI_{ac} and dI_{cv}, with one being positive and the other negative, greatly exceeding the magnitude of dI_T.[6] This result was considered unacceptable and the difficulty was found to be in the differing slaughter and inventory definitions of "calves".

Logic suggested that if $OS_T \leq IS_T$, then $OS_{ac} \leq IS_{ac}$ and $OS_{cv} \leq IS_{cv}$. Outshipments of all cattle and calves were estimated by distributing outshipments of total cattle and calves based on the ratio of inshipments.

$$OS_i = \frac{IS_i}{IS_T} \cdot OS_T \quad (i = ac, cv) \qquad (3.17)$$

---

[5] Solving equation (3.14) for IS_{cv} then substituting the solution into (3.13) yields equation $IS_T \cdot ALW_T^{cv} = IS_{ac} \cdot ALW_{ac} + (IS_T - IS_{ac}) \cdot ALW_{cv}$ and finally $IS_{ac} = IS_T (ALW_T - ALW_{cv}) / (ALW_{ac} - ALW_{cv})$.

[6] For the year 1960 dI_T, dI_{ac}, and dI_{cv} were -465,000 head, 1,700,000 head, and -2,165,000 head respectively.

With the distribution of outshipments between all cattle and calves on the basis of inshipments rather than in accordance with the equation $OS_i = M_i - CS_i$ (3.15), adjustments in either marketings (M_i) or commercial slaughter (CS_i) became necessary. A variety of estimating procedures and considerations led to the conclusion that the adjustment should be confined to commercial slaughter (CS_i). This would effectively adjust the slaughter data to reflect the inventory distinction between "cattle" and "calves". "Adjusted commercial slaughter" (ACS) was defined as:

$$ACS_i = M_i - OS_i \quad (i = ac, cv) \qquad (3.18)$$

The result was a substantial increase in estimated all cattle slaughter at the expense of calf slaughter which could now be defined as the commercial slaughter of animals one year of age and younger.[7]

Estimates of adjusted commercial slaughter (ACS), outshipments (OS), and inshipments (IS) with published data on both beginning and ending inventory (BI and EI), and marketings (M) for both all cattle and calves were employed as follows to give estimates of commercial supplies (CSP), change in inventory (ΔI), discrepancy (dI), and production (P) for both all cattle and calves.[8]

$$CSP_i = ACS_i + EI_i \quad (i = ac, cv) \qquad (3.19)$$

---

[7] For the year 1960, adjustment in commercial slaughter resulted in an increase of 1,958 thousand head in cattle slaughter with same amount of decrease in calf slaughter.

[8] Production of calves represent only that portion of calves that were either slaughtered or resulted in addition (or decrease) to inventory of calves. Of course, those that were used to replace mature cattle are of part of calf production but were excluded from production figure to avoid double counting and be consistent with concept of production used for mature cattle. It could be argued that total calf production is equal to calf slaughter plus change in inventory of calves plus outplacements of calves. This, however, would result in double counting of total cattle and calves production.

$$\Delta I_i = EI_i - BI_i \quad (i = ac, cv) \qquad (3.20)$$

$$dI_i = OS_i - IS_i \quad (i = ac, cv) \qquad (3.21)$$

$$P_i = ACS_i + I_i \quad (i = ac, cv) \qquad (3.22)$$

Allocation of death and farm slaughter of total cattle and calves into death and farm slaughter of the separate groups of all cattle and of calves was based on the ratio of commercial supplies as follows:

$$D_i = \frac{CSP_i}{CSP_T} \cdot D_T \quad (i = ac, cv) \qquad (3.23)$$

$$FS_i = \frac{CSP_i}{CSP_T} \cdot FS_T \quad (i = ac, cv) \qquad (3.24)$$

It was assumed that the use of mature cattle to replace another class of cattle is not physiologically possible implying zero outplacements (R') of all cattle. The above assumption and estimates of death (D), farm slaughter (FS), commercial supplies (CSP), and beginning inventory (BI) were employed with the following equation to obtain an estimate of replacements (R) for all cattle.

$$R_{ac} = CSP_{ac} + D_{ac} + FS_{ac} - BI_{ac}^{9} \qquad (3.25)$$

Replacements of mature cattle must come from younger animal, calves. This makes the following identity.

$$R_{ac} = R'_{cv} \qquad (3.26)$$

The above identity and estimates of death (D), farm slaughter (FS), commercial supplies (CSP), and beginning inventory of calves were employed as follows to obtain estimate of calf replacements.

$$R_{cv} = CSP_{cv} + D_{cv} + FS_{cv} + R'_{cv} - BI_{cv} \qquad (3.27)$$

The summary of estimates of all variables for all cattle and calves with published data for classes of all cattle are shown in Table IIc.

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[9]Since CSP = BI + R - R' - D - FS and $R'_{ac} = 0$ the equation (3.25) can be derived readily by solving the equation for R.

TABLE IIc

PUBLISHED AND ESTIMATED DATA FOR TOTAL CATTLE AND CALVES, ALL CATTLE, AND CALVES, U. S., 1960

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,871	1,676	47,547	10,574	12,115	22,689	70,236	26,000	96,236	39,353
R							29,848	36,901	39,818	
R'							--	29,848	2,917	
D							1,178	389	1,567	2,531
FS							603	199	802	386
CSP							98,303	32,465	130,768	36,901
M							34,378	12,054	46,432	
AM							34,636	12,261	46,897	
OS							7,196	5,787	12,983	
IS							7,454	5,994	13,448	
CS							25,224	8,225	33,449	
ACS							27,182	6,267	33,449	
dI							-258	-207	-465	
EI	46,370	1,702	48,072	10,942	12,107	23,049	71,121	26,198	97,319	
ΔI							885	198	1,083	
P							28,007	6,465	34,532	

[a] T.C.C. = Total Cattle and Calves

[b] BI of newborn calves actually is the calves born during the year

As Table IIc shows, published data on classes of cattle consist of inventory data only both beginning and ending. All other variables for classes of all cattle must be estimated or estimates for all cattle be allocated into classes.

Allocation of all cattle data into classes began with commercial slaughter. Published data on federally inspected slaughter (FIS) for classes of all cattle are available. Since federally inspected slaughter of all cattle in the United States represents a high percentage of all cattle commercial slaughter (80 percent in 1963), commercial slaughter of all cattle was distributed among the various classes according to the following ratio:

$$CS_i = \frac{FIS_i}{FIS_{ac}} \cdot CS_{ac} \qquad (i = c,b,s,h) \qquad (3.28)$$

where:

CS_i = Commercial slaughter of i-th class cattle

FIS_i = Federally inspected slaughter, i-th class

Other variables defined previously.

In estimating adjusted commercial slaughter, it was assumed that any adjustment in commercial slaughter would not affect commercial slaughter (CS) of cows or bulls. The adjustment, therefore, was confined to steers and heifers and was based on commercial slaughter of steers and heifers.

$$ACS_i = CS_i \qquad (i = c, b) \qquad (3.29)$$

$$ACS_{sh} = ACS_{ac} - CS_{cb} \qquad (3.30)$$

$$ACS_i = \frac{CS_i}{CS_{sh}} \cdot ACS_{sh} \qquad (3.31)$$

where:

All variables defined previously except for the subscripts. See footnotes following Table I.

The problem now was to estimate marketings (M_i) and commercial supplies (CSP_i) by classes. This, however, required the estimation of inshipments, outshipments, discrepancy and production for each class.

The production of various classes, which was defined for the U. S. as the sum of adjusted commercial slaughter and changes in inventory (ΔI) figures, was used to allocate marketings of all cattle into its components.

$$P_i = ACS_i + \Delta I_i \qquad (i = c,b,s,h) \qquad (3.32)$$

$$M_i = \frac{P_i}{P_{ac}} \cdot M_{ac} \qquad (i = c,b,s,h) \qquad (3.33)$$

It was assumed that the distributional pattern of discrepancy is parallel to the distributional pattern of the adjusted commercial slaughter.

$$dI_i = \frac{ACS_i}{ACS_{ac}} \cdot dI_{ac} \qquad (i = c,b,s,h) \qquad (3.34)$$

Once the data for marketings, discrepancy, and both adjusted and unadjusted commercial slaughter by classes were obtained, it was possible to derive the data for "adjusted marketings", "inshipments", and "outshipments" for various classes using the following relationships:

$$AM_i = M_i - dI_i \qquad (i = c,b,s,h) \qquad (3.35)$$

$$IS_i = AM_i - ACS_i \qquad (i = c,b,s,h) \qquad (3.36)$$

$$OS_i = M_i - ACS_i \qquad (i = c,b,s,h) \qquad (3.37)$$

By definition, commercial supplies must equal commercial disposition and commercial disposition is equal to cattle slaughtered and cattle kept on farms and ranches at end of year. Thus, commercial supplies is defined as:

$$CSP_i = ACS_i + EI_i \qquad (i = c,b,s,h) \qquad (3.38)$$

Death of all cattle were allocated to various classes on the basis of commercial supplies.

$$D_i = \frac{CSP_i}{CSP_{ac}} \cdot D_{ac} \qquad (i = c,b,s,h) \qquad (3.39)$$

Most of the slaughtering on farms for home consumption and local sales consist of steers, heifers, and calves. Farm slaughter of cows or bulls was considered negligible. That is:

$$FS_i = 0 \qquad (i = c,b)$$

Farm slaughter of all cattle was allocated to farm slaughter of steers and heifers only on the basis of commercial supplies.

$$FS_{sh} = FS_{ac} \qquad (3.40)$$

$$FS_i = \frac{CSP_i}{CSP_{sh}} \cdot FS_{ac} \qquad (i = s,h) \qquad (3.41)$$

Since outplacements of cows, bulls, and steers as defined were physically impossible, and BI, CSP, FS, and D had been determined, replacements for these classes were determined as follows:

$$R_i = CSP_i + D_i + FS_i + R'_i - BI_i \quad (i = c,b,s,h) \quad (3.42)$$

Since all replacements for cows must come from heifers, heifer outplacements were determined ($R'_h = R_c$). Estimates of all variables for cow-bull and steer-heifer were obtained as simple sums of sub-classes, that is, cow-bull as the sum of cows and bulls and steer-heifer as the sum of steers and bulls. Table IId shows complete estimates of all variables of the balance sheet for all classes for 1960.

TABLE IId

PUBLISHED AND ESTIMATED DATA FOR ALL VARIABLES OF ALL CLASSES, U. S., 1960

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,871	1,676	47,547	10,574	12,115	22,689	70,236	26,000	96,236	39,353
R	6,900	404	7,304	16,165	13,279	29,444	29,848	36,801	39,818	39,818
R'					6,900	6,900		29,848	2,917	
D	625	25	650	312	216	528	1,178	389	1,567	2,531
FS				356	247	603	603	199	802	386
CSP	52,146	2,055	54,201	26,071	18,031	44,102	98,303	32,465	130,768	36,901
M	7,305	447	7,752	19,134	7,492	26,626	34,378	12,054	46,432	
AM	7,360	450	7,810	19,278	7,548	26,826	34,636	12,261	46,897	
OS	1,529	94	1,623	4,005	1,568	5,573	7,196	5,787	12,983	
IS	1,584	97	1,681	4,149	1,624	5,773	7,454	5,994	13,448	
CS	5,776	353	6,129	13,722	5,878	19,095	25,224	8,225	33,449	
ACS	5,776	353	6,129	15,129	5,924	21,053	27,182	6,267	33,449	
dI	-55	-3	-58	-144	-56	-200	-258	-207	-465	
EI	46,370	1,702	48,072	10,942	12,107	23,049	71,121	26,198	97,319	
ΔI	499	26	525	368	-8	360	885	198	1,083	
P	6,275	379	6,654	15,497	5,916	21,413	28,067	6,465	34,532	

[a] T.C.C. = Total Cattle and Calves

[b] BI of newborn calves actually is the calves born during the year

CHAPTER IV

ESTIMATION AND DISAGGREGATION METHODS FOR THE REGIONAL BALANCE SHEET

The development of estimation and disaggregation methods for the 20 regions as shown in Figure 1 was one of the five main objectives of the study. Even though the procedure employed to estimate and disaggregate the data for the regional balance sheet variables generally followed the procedure used for the United States balance sheet variables, the procedure of estimating and disaggregating the regional data varied from that used for the United States in many instances due to lack of available data. However, all estimates of the regional balance sheet variables were subject to two restrictions. These were (1) the sum of estimates of all regions of any class of cattle or calves must be equal to the U. S. estimate; and (2) the sum of estimates of all classes of cattle of a region must be equal to the regions estimate of total cattle and calves.

Because of the procedure adopted in estimation of the regional data it is not possible to present the procedure in the same manner as in Chapter III. The presentation of the procedure used in estimating U. S. balance sheet variables were composed of three parts. These parts were (1) estimation of data for all variables for total cattle and calves; (2) estimation of data for all variables for both all cattle and calves; and (3) estimation of data for all variables for various classes of all cattle.

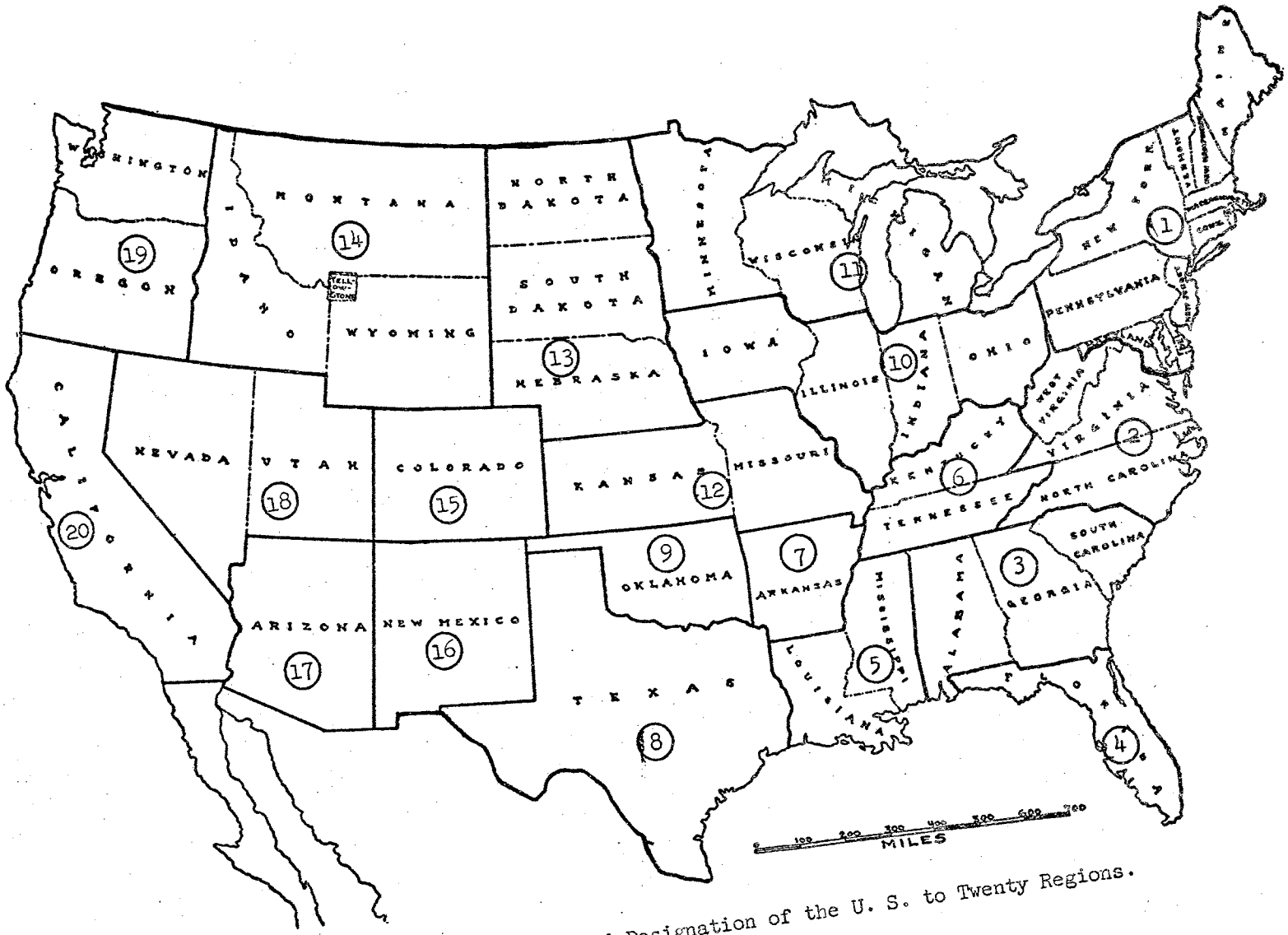

Figure 1. Location and Designation of the U. S. to Twenty Regions.

In estimating the regional balance sheet variables data for total cattle and calves, all cattle, calves, and classes of all cattle were often developed simultaneously making the division of steps involved into three distinctive parts, as was done for the U. S., impractical.

Estimation of the Regional Balance Sheet Variables

The regional estimation of balance sheet variables began, unlike the procedure for the United States, with the estimation of regional commercial slaughter by classes. Estimation of regional commercial slaughter by classes required an approach different from the one used for the U. S. due to lack of published data.

Data on federally inspected slaughter for the 20 regions are not available. The U. S. Department of Agriculture, however, publishes data on federally inspected slaughter for eight major regions subsequently referred to as "areas" in this study (Figure 2 and Table III).

Area commercial slaughter of all cattle was first subdivided into estimates by classes using the percentage distribution of the federally inspected slaughter among classes published for major areas.[1] The result was initial estimates of federally inspected slaughter by classes. These estimates were adjusted into final estimates such that they would add up to the United States figures by classes (See Tables, IVa, IVb, Va and Vb).

$$CS_{ir} = \frac{FIS_{ir}}{FIS_{or}} \cdot CS_{or} \qquad \begin{matrix}(i = c,b,s,h) \\ (r = 1,2,\ldots 8)\end{matrix} \qquad (4.1)$$

subject to restrictions

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[1] FIS in North Atlantic shows unrealistically low heifer slaughter (1.7 of total FIS for year 1960) compared to steer slaughter (73.6 of total FIS for year 1960).. To make heifer slaughter a little more reasonable the ratio of South Atlantic region was applied to North Atlantic region also.

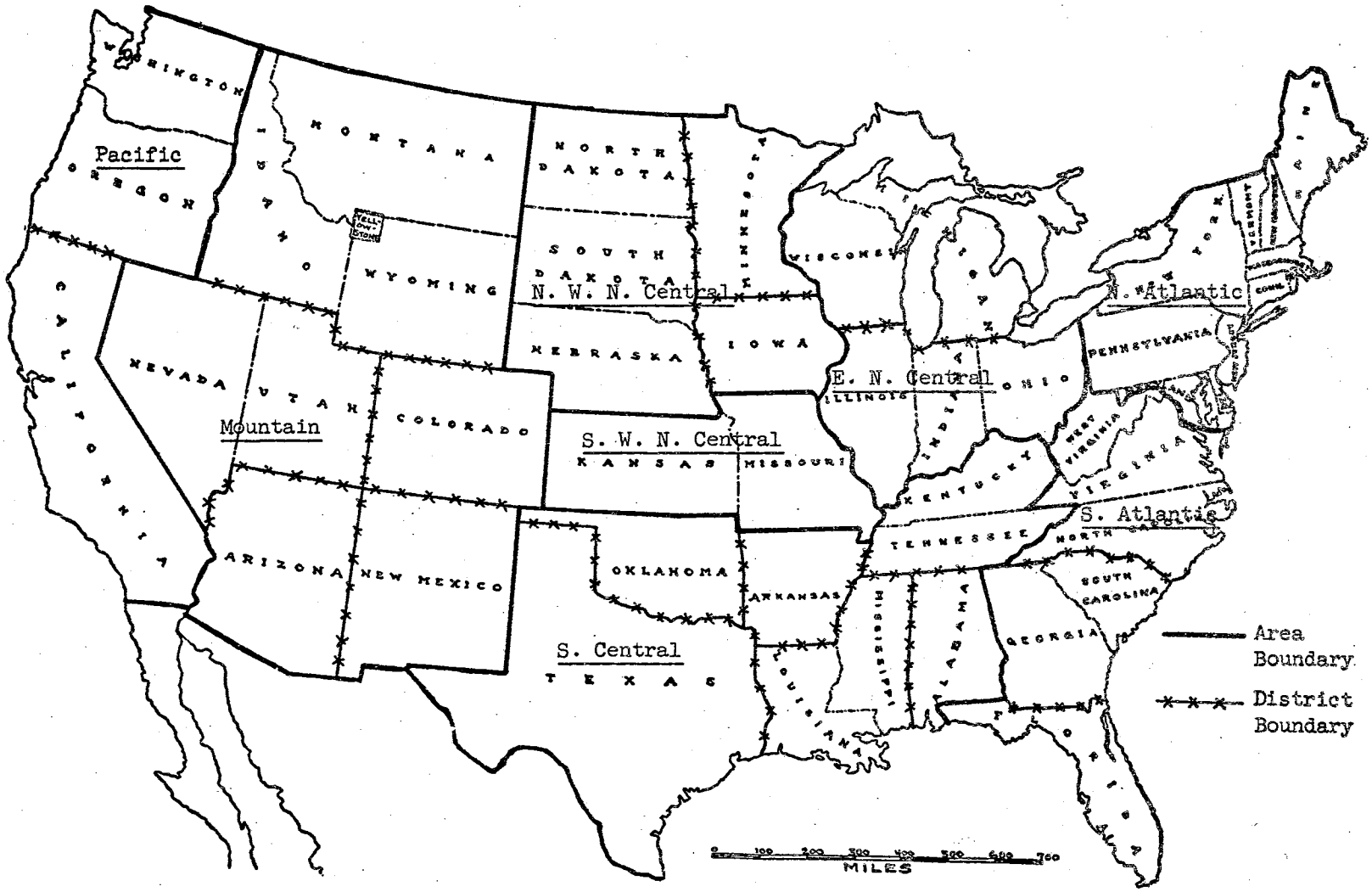

Figure 2. Location and Designation of Areas and Districts.

TABLE III

REGIONAL, AREA, AND DISTRICT DESIGNATION OF 48 STATES

STATE	REGION (j)	AREA (r)	DISTRICT (k)
Maine	1	N. Atlantic	1
New Hampshire	1	N. Atlantic	1
Vermont	1	N. Atlantic	1
Massachusetts	1	N. Atlantic	1
Rhode Island	1	N. Atlantic	1
Connecticut	1	N. Atlantic (r = 1)	1
New York	1	N. Atlantic	1
New Jersey	1	N. Atlantic	1
Pennsylvania	1	N. Atlantic	1
Maryland	1	N. Atlantic	1
Delaware	1	N. Atlantic	1
West Virginia	2	S. Atlantic	1
Virginia	2	S. Atlantic	1
North Carolina	2	S. Atlantic	1
South Carolina	3	S. Atlantic (r = 5)	3
Georgia	3	S. Atlantic	3
Florida	4	S. Atlantic	2
Alabama	3	S. Central	1
Mississippi	5	S. Central	2
Louisiana	5	S. Central	2
Tennessee	6	S. Central	3
Kentucky	6	S. Central (r = 6)	3
Arkansas	7	S. Central	4
Texas	8	S. Central	5
Oklahoma	9	S. Central	6
Kansas	12	S. W. N. Central	1
Missouri	12	S. W. N. Central (r = 4)	1
Ohio	10	E. N. Central	1
Indiana	10	E. N. Central	1
Illinois	10	E. N. Central (r = 2)	1
Michigan	11	E. N. Central	2
Wisconsin	11	E. N. Central	2
Iowa	10	N. W. N. Central	1
Minnesota	11	N. W. N. Central	2
Nebraska	13	N. W. N. Central (r = 3)	3
South Dakota	13	N. W. N. Central	3
North Dakota	13	N. W. N. Central	3
Montana	14	Mountain	1
Idaho	14	Mountain	1
Wyoming	14	Mountain	1
Colorado	15	Mountain	2
New Mexico	16	Mountain (r = 7)	3
Arizona	17	Mountain	4
Utah	18	Mountain	5
Nevada	18	Mountain	5
Washington	19	Pacific	1
Oregon	19	Pacific (r = 8)	1
California	20	Pacific	2

$$\sum_{r=1}^{8} CS_{ir} = CS_{io} \qquad (i = c,b,s,h) \qquad (4.2)$$

where:

CS_{ir} = r-th area commercial slaughter of i-th class

FIS_{ir} = r-th area federally inspected slaughter of i-th class

CS_{or} = r-th area commercial slaughter of all cattle

FIS_{or} = r-th area federally inspected slaughter of all cattle

CS_{io} = U. S. commercial slaughter of i-th class

Commercial slaughter and beginning inventories of each area with beginning inventories of districts within each area were used as following to divide district commercial slaughter of all cattle into its component classes.

$$CS_{ik}{}^{2} = CS_{ok} \frac{BI_{ik}}{BI_{ok}} \cdot \frac{BI_{ok}}{BI_{ik}} \cdot \frac{CS_{ik}}{CS_{ok}} \quad (i = c,b,s,h) \quad (k = 1,2,\ldots n)^{3} \qquad (4.3)$$

where:

CS_{ik} = i-th class commercial slaughter of k-th district of r-th area

CS_{or} = r-th area commercial slaughter of all cattle

CS_{ok} = k-th district of r-th area commercial slaughter of all cattle

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[2] 1960 data for region 9, Oklahoma, will be used to illustrate regional estimating procedure, whenever possible. For example, cow commercial slaughter in Oklahoma, district 6 in area 6 (South Central), for 1960 was obtained as following:

$$144 = 334 \cdot \frac{1,679}{2,403} \cdot \frac{17,235}{16,282} \cdot \frac{1,468}{3,248} .$$

[3] Value of n which k subscript may take on varies from area to area depending on the number of districts within each area. Districts are part of a region or whole of twenty regions. For example, districts of South Central are regions 5,6,7,8,9, and part of region 3 (Alabama). Also see Figure 2 and Table VIII.

TABLE IVa

INITIAL ESTIMATES OF AREA FEDERALLY INSPECTED SLAUGHTER BY CLASS, 1960

Area[a]	Cows	Bulls	Steers	Heifers	All Cattle
			(1000 Head)		
1	332	17	962	102	1,413
2	934	72	1,860	449	3,315
3	1,153	73	3,423	1,600	6,249
4	417	11	1,181	357	1,966
5	228	14	248	41	531
6	993	50	701	266	2,010
7	253	15	478	719	1,465
8	414	42	1,600	389	2,445
Total	4,724	294	10,453	3,923	19,394
U. S.	4,440	273	10,557	4,124	19,394

[a]See Figure 2 and Table III for area designation.

TABLE IVb

FINAL ESTIMATES OF AREA FEDERALLY INSPECTED SLAUGHTER BY CLASS, 1960

Area[a]	Cows	Bulls	Steers	Heifers	All Cattle
			(1000 Head)		
1	312	16	976	109	1,413
2	879	68	1,890	947	3,315
3	1,071	67	3,435	1,138	6,249
4	389	10	1,191	399	1,966
5	219	13	255	232	531
6	951	47	724	998	2,010
7	234	13	474	247	3,910
8	385	39	1,612	424	1,465
Total	4,440	273	10,557	4,713	19,394
U. S.	4,440	273	10,557	4,713	19,394

[a]See Figure 2 and Table III for area designation.

TABLE Va

INITIAL ESTIMATES OF AREA COMMERCIAL SLAUGHTER BY CLASS, 1960

Area[a]	Cows	Bulls	Steers	Heifers	All Cattle
			(1000 Head)		
1	458	23	1,431	160	2,072
2	1,319	103	2,837	718	4,977
3	1,111	72	3,570	1,742	6,495
4	448	13	1,376	434	2,271
5	468	28	545	94	1,135
6	1,535	78	1,170	465	3,248
7	294	17	598	939	1,848
8	501	50	2,095	532	3,178
Total	6,134	384	13,622	5,084	25,224
U. S.	5,776	353	13,722	5,373	25,224

[a]See Figure 2 and Table for area designation.

TABLE Vb

FINAL ESTIMATES OF AREA COMMERCIAL SLAUGHTER BY CLASS, 1960

Area[a]	Cows	Bulls	Steers	Heifers	All Cattle
			(1000 Head)		
1	431	21	1,448	172	2,072
2	1,243	94	2,872	768	4,977
3	1,031	65	3,567	1,832	6,495
4	419	12	1,381	459	2,271
5	448	26	559	102	1,135
6	1,468	74	1,202	504	3,248
7	269	15	590	974	1,848
8	467	46	2,103	562	3,178
Total	5,776	353	13,722	5,373	25,224
U. S.	5,776	353	13,722	5,373	25,224

[a]See Figure 2 and Table III for area designation.

BI_{ok} = k-th district of r-th area beginning inventory of all cattle

BI_{ik} = k-th district for r-th area beginning inventory of i-th class

Other variables defined previously.

Commercial slaughter of steers and heifers for regions 10, 12, and 14 through 18 required special adjustment to ensure inclusion of feedlot marketings. It was assumed that all cattle marketed out of feedlot were commercially slaughtered and this assumption necessitated special adjustments for regions where initial estimates of commercial slaughter were not sufficiently large to include all feedlot marketings.

$$CS_{ij} > FLM_{ij} \qquad \begin{matrix}(i = s,h)\\(j = 1,2,\ldots 20)\end{matrix}^{4}$$

where:

FLM_{ij} = feedlot marketings of i-th class of j-th region

Regional commercial slaughter of all cattle and calves were adjusted by the use of the ratio of U. S. adjusted commercial slaughter to commercial slaughter for these classes to yield regional adjusted commercial slaughter of all cattle, then, was divided into classes using regional commercial slaughter.

$$ACS_{ij} = \frac{ACS_i}{CS_i} \cdot CS_{ij}^{5} \quad (i = ac,cv) \qquad (4.4)$$

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[4] Regional subscript j takes on values 1 through 20 unless stated differently.

[5] For 1960, use of equation (4.3) yielded 334,000 and 71,000 as commercial slaughter of all cattle and calves respectively for Oklahoma. The U. S. ratio of ACS_{ac} to CS_{ac} 1.0776 then was applied to 334,000 to give 360,000 as Oklahoma's adjusted commercial slaughter of all cattle. Initial estimates of regional data were adjusted so that the following be true.

$ACS_{ac,j} + ACS_{cv,j} = ACS_{Tj} = CS_{Tj}$ and $\sum_{j=1}^{20} ACS_{ij} = ACS_i$.

$$ACS_{sh} = ACS_{ac} - CS_{cb} \qquad (4.5)$$

$$(204 = 354 - 150)^{6}$$

$$ACS_{ij} = \frac{CS_{ij}}{CS_{sh,j}} \cdot ACS_{sh,j} \quad (i = s,h) \qquad (4.6)$$

$$(165 = \frac{149}{184} \times 204)$$

where:

All variables have been defined in Table I except for the addition of regional subscript, j.

Regional estimates of adjusted marketings of total cattle and calves, all cattle, and calves were obtained by using the U. S. ratio of AM to M for these. Regional estimates of all cattle and calves were then adjusted by using successive approximation technique.

$$AM_{Tj} = \frac{AM_T}{M_T} \cdot M_{Tj} \qquad (4.7)$$

$$(1592 = \frac{46,897}{46,432} \times 1,576)$$

$$AM_{ij} = \frac{AM_i}{M_i} \cdot M_{ij} \quad (i = ac, cv) \qquad (4.8)$$

where:

All variables defined previously except for regional subscript j.

The distribution of regional adjusted marketings of all cattle to various classes were based on regional marketing base, K_{ij}, under two restrictions that the sum of estimates of various classes and the sum of regional estimates each be equal to the respective estimates of the total. The regional marketing base was to reflect the logic that marketings would generally tend to be lower in the areas where there is an

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[6] All regional estimating equations will be illustrated for region 9, Oklahoma, following each equations for the year 1960 wherever possible. The illustration, furthermore, is for the 1st subscripted class only.

increase in inventory and vice versa. To reflect this logic the marketing base is composed of regional inventory and change in inventory.

$$K_{ij} = BI_{ij} - \Delta I_{ij} \qquad (i = c,b,s,h) \qquad (4.9)$$

$$(1{,}593 = 1{,}679\text{-}86)$$

$$AM_{ij} = \frac{K_{ij}}{K_i} \cdot AM_i \qquad (i = c,b,s,h) \qquad (4.10)$$

$$(258 = \frac{1{,}593}{45{,}372} \times 7{,}360)$$

Subject to

$$\sum_{i=1}^{4} AM_{ij} = AM_{ac,j} \qquad \text{and} \qquad \sum_{j=1}^{20} AM_{ij} = AM_i$$

However, the estimates of regional adjusted marketings of heifers for regions 15 and 17 were not satisfactory for these estimates failed to cover feedlot marketings of these regions.[7] To avoid this inconsistency it was decided not to separate adjusted marketings of steer-heifer into that of steers and heifers. Instead, regional adjusted marketings were estimated for cows, bulls, and steer-heifers by modifying equation (4.10) as follows:

$$AM_{ij} = \frac{K_{ij}}{K_i} \cdot AM_i \qquad (i = c,b) \qquad (4.11)$$

$$AM_{sh,j} = AM_{ac,j} - (AM_{cj} + AM_{bj}) \qquad (4.12)$$

$$(972 = 1246 - (258 + 10)$$

The breakdown of total regional inshipments into inshipments of all cattle and calves was obtained next on the basis of average liveweights of animals being marketed provided by the U. S. Department of Agriculture.[8] The following relationships, which are basically the same as

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[7] Estimated heifer adjusted marketings for regions 15 and 17 were 205,000 and 75,000 heads respectively compared to heifer feedlot marketings of 376,000 and 105,000.

[8] See footnote on p. 22.

those for the U. S., were employed as follows:

$$IS_{Tj} \cdot ALW_{Tj} = IS_{ac,j} \cdot ALW_{ac,j} + IS_{cv,j} \cdot ALW_{cv,j} \quad (4.13)$$

$$(400 \cdot 620 = IS_{ac,9} \cdot 890 + IS_{cv,9} \cdot 460)$$

$$IS_{ac,j} + IS_{cv,j} = IS_{Tj}^{9} \quad (4.14)$$

where:

IS_{ij} = inshipment of i-th class of j-th region (i = ac,cv,T)

The distribution of regional all cattle inshipments to classes were based on regional adjusted marketings and adjusted commercial slaughter.

$$IS_{ij} = \frac{AM_{ij} + ACS_{ij}}{AM_{ac,j} + ACS_{ac,j}} \cdot IS_{ac,j} \quad (i = c,b,s,h) \quad (4.15)$$

$$(46 = \frac{258 + 144}{1,256 + 354} \times 184)^{10}$$

It was assumed that all animals marketed were either slaughtered or shipped to other regions. This assumption, together with regional data on adjusted marketings and adjusted commercial slaughter, were used to derive regional outshipments for various classes of cattle.

$$OS_{ij} = AM_{ij} - ACS_{ij} \quad (i = c,b,sh) \quad (4.16)$$

$$(114 = 258 - 144)$$

In contrast with the United States data, regional outshipments, as defined, were not necessarily equal to regional inshipments for individual regions. The excess of outshipment over inshipment for individual regions was designated "net outshipments." The summation of the regional

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[9] Equations (4.13) and (4.14) give 149,000 and 251,000 as inshipments of all cattle and calves. The two equations were also applied to other districts of South Central area, yielding 758,000 and 923,000 as compared to 938,000 and 742,000 as area inshipments of all cattle and calves respectively. After adjustments were made to district estimates to equal area total 184,000 and 216,000 were obtained as Oklahoma inshipments of all cattle and calves respectively.

[10] The initial estimate of 46,000 was adjusted by successive approximation method to give 52,000 as the final estimate of Oklahoma cow inshipments.

"net outshipments" is equivalent to statistical discrepancy (dI) of the United States.[11]

$$NOS_{ij} = OS_{ij} - IS_{ij} \qquad (i = c,b,sh) \qquad (4.17)$$

$$(62 = 114 - 52)$$

$$\sum_{j=1}^{20} NOS_{ij} = dI_i \qquad (i = c,b,sh) \qquad (4.18)$$

where:

NOS_{ij} = i-th class "net outshipments" of j-th region.

Having obtained the regional data for adjusted commercial slaughter, ending inventory and net outshipments, it was now possible to derive regional commercial supplies for each class.

$$CSP_{ij} = EI_{ij} + ACS_{ij} + NOS_{ij} \quad (i = c,b,sh) \qquad (4.19)$$

$$(1,971 = 1,765 + 144 + 62)$$

The distribution of regional death (D) and farm slaughter (FS) of total cattle and calves into classes were carried out based on regional commercial supplies.

$$D_{ij} = \frac{CSP_{ij}}{CSP_{T,j}} \cdot D_{T,j} \qquad (i = c,b,sh,ac,cv) \quad (4.20)$$

$$(19 = \frac{1,971}{4,705} \times 47)$$

$$FS_{ij} = \frac{CSP_{ij}}{CSP_{T,j}} \cdot FS_{T,j} \qquad (i = ac,cv) \qquad (4.21)$$

$$(14 = \frac{3,538}{4,705} \times 18)$$

where:

All variables defined in Table I except for the regional subscript, j.

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[11] Net outshipments of a class of cattle for a given region could either be positive or negative depending on class and region. Also see p. 24 for the discussion of the statistical discrepancy (dI) of the United States.

Estimated next were regional replacements (R) and outplacements (R') for all classes except steers and heifers by the following equations.

$$R_{ij} = CSP_{ij} + D_{ij} + FS_{ij} + R'_{ij} - BI_{ij} \quad (i = c,b,sh,ac) \tag{4.22}$$

$$(311 = 1971 + 19 + 0 - 0 - 1679)$$

$$R'_{sh,j} = R'_{h,j} = R_{c,j} \tag{4.23}$$

The initial estimation of regional replacements of steers and heifers were based on regional beginning inventories (BI) and changes in inventories (ΔI) of these classes and then were adjusted to the U. S. data.

$$R''_{ij} = \frac{BI_{ij} + \Delta I_{ij}}{BI_i + \Delta I_i} \cdot R_i \qquad (i = s,h) \tag{4.24}$$

$$(443 = \frac{320 + (-20)}{10,574 + 368} \times 16,165)^{12}$$

where:

R''_{ij} = Initial estimate of i-th class replacements in the j-th region.

Other variables defined previously.

The initial estimates of regional replacement of steers and heifers with estimates of outshipments and beginning inventories were employed to obtain initial estimates of death and farm slaughter combined (D + FS) for each region.

$$(D + FS)_{ij} = \frac{BI_{ij} + R_{ij} - R'_{ij}}{BI_{sh,j} + R_{sh,j} - R'_{sh,j}} \cdot (D_{sh,j} + FS_{sh,j})$$

$$(i = s,h) \tag{4.25}$$

$$(18 = \frac{320 + 640 - 0}{664 + 1,167 - 311} \times (15 + 14))$$

---

[12] 443,000 were adjusted to be 640,000.

where:

$(D + FS)_{ij}$ = Initial estimates of death and farm slaughter combined of i-th class of j-th region. Other variables defined previously.

The regional initial estimates of replacements, death and farm slaughter combined, outplacements, and beginning inventories of steers and heifers were employed as follows to give preliminary estimates of commercial supplies of these cattle.

$$CSP_{ij} = BI_{ij} + R_{ij} - (D + FS)_{ij} \quad (i = s,h) \qquad (4.26)$$

$$(942 = 320 + 640 - 0 - 18)$$

where:

CSP_{ij} = preliminary estimate of i-th class commercial supply of j-th region.

Marketings of cattle consist of marketings from feedlots (FLM) and other sources (OM). To insure that regional adjusted marketings of heifers are large enough to cover regional marketings from feedlot of heifers, the breakdown of regional adjusted marketings of steer-heifer to that of steers and heifers were carried out by first estimating other marketings (OM), marketings from sources other than feedlot, based on regional feedlot marketings (FLM) and preliminary estimates of commercial supplies of steers and heifers with regional adjusted marketings of steer-heifer as follows:

$$OM'_{ij} = CSP_{ij} - FLM_{ij} \quad (i = sh) \qquad (4.27)$$

$$(855 = 942 - 87)$$

$$OM''_{ij} = \frac{AM_i - FLM_i}{\sum_{j=1}^{20} OM'_{ij}} \cdot OM'_{ij} \quad (i = s,h) \qquad (4.28)$$

$$(503 = \frac{19,278 - 9,589}{16,482} \times 942)$$

$$OM_{ij} = \frac{OM''_{ij}}{OM''_{s,j} + OM''_{h,j}} \cdot (AM_{sh,j} - FLM_{sh,j}) \quad (i = s,h) \quad (4.29)$$

$$(661 = \frac{503}{503 + 128} \times (972 - 143))^{13}$$

where:

OM'_{ij} = estimating factor of other marketings of i-th class of j-th region.

FLM_{ij} = marketings from feedlot, feedlot marketings, of i-th class of j-th region.

OM''_{ij} = initial estimates of other marketings of i-th class of j-th region.

OM_{ij} = other marketings of i-th class of j-th region.

Other variables defined previously.

Regional feedlot marketings and other marketings were brought together to yield regional adjusted marketings of steers and heifers.

$$AM_{ij} = FLM_{ij} + OM_{ij} \quad (i = s,h) \quad (4.30)$$

$$(744 = 87 + 657)$$

The procedure adopted for estimating inshipments of steers and heifers separately required construction of a factor to be used as follows and is intended to reflect influence of commercial supplies on inshipments.

$$IS'_{ij} = AM_{ij} + EI_{ij} - IS_{sh,j} \quad (i = s,h) \quad (4.31)$$

$$(915 = 744 + 300 - 129)$$

$$IS_{ij} = \frac{IS'_{ij}}{IS'_{sh,j}} \cdot IS_{sh,j} \quad (i = s,h) \quad (4.32)$$

---

[13] Successive further adjustment of 661,000 gave 657,000 as the final estimate of other marketings of steers in Oklahoma for 1960.

$$(87 = \frac{915}{1,362} \times 129)^{14}$$

where:

IS'_{ij} = Estimation factor of inshipments of i-th class of j-th region.

Others defined previously.

Once regional inshipments and adjusted marketings of steer-heifer were separated into regional inshipments and adjusted marketings of steers and heifers, application of equations (4.16) through (4.22) to these estimates and estimates of regional adjusted commercial slaughter and ending inventories data yielded regional estimates of outshipments (OS), net outshipments (NOS), commercial supplies (CSP), death (D), farm slaughter (FS), and replacements (R) for steers and heifers.

Estimation of Fed and Non-Fed Slaughter, and Feeder Supplies for the United States and Regions

Having developed procedures for estimating principal regional balance sheet variables, attention was devoted to the subsectors of steer and heifer slaughter and marketings with major emphasis placed on feeder cattle supplies and fed cattle slaughter. As the first step in this direction, other marketings of steers and heifers for the United States were then partitioned into "other marketings for slaughter" (OMFS) and "other marketings for feeding" (OMFF).[15]

$$OMFS_i = ACS_i - FLM_i \qquad (i = s,h,sh) \qquad (4.33)$$

$$(5,540 = 15,129 - 9,589)$$

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[14] Adjusted figure of 87,000 is 86,000.

[15] See p. 46 for the derivation and definitation of other marketings.

$$OMFF_i = OM_i - OMFS_i \qquad (i = s,h,sh) \qquad (4.34)$$

$$(4,149 = 9,689 - 5,540)$$

The United States other marketings for slaughter (OMFS) and other marketings for feeding (OMFF) of steer-heifers were distributed by using two estimating factors as follows and are shown in Table VI.

$$F'_j = CSP_{sh,j} + IS_{sh,j} \qquad \text{if } NOS_{sh,j} \geq 0 \qquad (4.35)$$

$$F'_j = CSP_{sh,j} - NOS_{sh,j} \qquad \text{if } NOS_{sh,j} < 0 \qquad (4.36)$$

$$FFS_j = \frac{ACS_{sh,j}}{F'_j} \cdot OM_{sh,j} \qquad (4.37)$$

$$FFF_j = OM_{sh,j} - FFS_j \qquad (4.38)$$

$$OMFS_{sh,j} = \frac{OMFS_{sh}}{\sum_{j=1}^{20} FFS_j} \cdot FFS_j \qquad (4.39)$$

$$OMFF_{sh,j} = \frac{OMFF_{sh}}{\sum_{j=1}^{20} FFF_j} \qquad (4.40)$$

where:

F'_j = Distributional base for j-th regions steer-heifer other marketings either for slaughter or for feeding.

FFS_j = Factor for initial estimation of j-th regions other marketings for slaughter

FFF_j = Factor for initial estimation of j-th regions other marketings for feeding.

$OMFS_{sh,j}$ = j-th regions steer-heifer other marketings for slaughter.

$OMFF_{sh,j}$ = j-th regions steer-heifer other marketings for feeding.

Other variables defined previously.

TABLE VI

ESTIMATION OF REGIONAL STEER-HEIFER AREA MARKETINGS FOR SLAUGHTER AND OTHER MARKETINGS FOR FEEDING, 1960

Region	Commercial Supplies	Inshipment or Net-Outshipment[a]	F',[b]	Adjusted Commercial Slaughter	Other Marketings	Factors		Initial Estimates			Final Estimates	
						Slaughter	Feeding	OMFS[c]	OMFF[d]	Sum	OMFS[c]	OMFF[d]
1	1,526	-1,618	3,223	2,050	236	150	86	249	56	305	196	40
2	895	4	899	279	255	79	176	131	116	247	142	113
3	1,173	5	1,178	409	342	119	223	198	146	344	205	137
4	511	-53	586	234	115	46	69	77	45	122	75	40
5	1,032	4	1,036	332	319	102	217	170	142	312	182	137
6	1,360	82	1,442	380	447	118	329	196	216	412	223	224
7	407	6	413	74	147	26	121	43	79	122	59	92
8	3,527	377	3,904	973	1,926	480	1,446	798	949	1,747	925	1,001
9	1,491	129	1,620	204	829	104	725	173	476	649	236	593
10	9,501	2,078	11,599	4,998	2,213	954	1,259	1,586	826	2,412	1,500	713
11	4,066	-799	5,246	2,741	998	521	477	866	313	1,179	250	248
12	4,480	625	5,105	1,895	1,986	737	1,249	1,226	819	2,045	1,234	752
13	5,125	493	5,618	2,082	1,191	441	750	733	492	1,225	739	452
14	1,999	89	2,088	271	840	109	731	181	480	661	247	593
15	1,558	345	1,903	903	480	228	252	379	165	544	344	136
16	544	109	653	61	361	34	327	57	215	272	81	280
17	762	217	979	142	139	20	119	33	78	111	44	95
18	495	23	518	204	106	42	64	70	42	112	68	38
19	968	30	1,147	584	98	50	48	83	32	115	73	25
20	2,682	675	3,662	2,237	337	206	131	343	86	429	273	64
Total	44,102		52,799	21,053	13,365	4,566	8,799	7,592	5,773	13,365	7,592	5,773
U. S.	44,102			21,053	13,365			7,592	5,773	13,365	7,592	5,773

[a] Negative numbers represent net-outshipments.

[b] F' is distributional base for regions and is obtained by adding inshipments or subtracting net-outshipments to commercial supplies.

[c] Other marketings for slaughter.

[d] Other marketings for feeding.

Regional steer-heifer marketings for slaughter were then subdivided by classes on the following basis:

$$OMFS_{ij} = \frac{OMFS_{sh,j} \cdot OM_{ij}}{OM_{sh,j}} \qquad (i = s,h,sh) \qquad (4.41)$$

"Other marketings for slaughter" of steers and heifers together with "feedlot marketings" yields "marketings for slaughter."

$$MFS_{ij} = OMFS_{ij} + FLM_{ij} \qquad (i = s,h,sh) \qquad (4.42)$$

where:

MFS_{ij} = marketings for slaughter of i-th class of j-th region.

Regional marketings for slaughter included slaughter marketings within the region and "net outshipments for slaughter." These were obtained as follows:

$$NOFS_{ij} = MFS_{ij} - ACS_{ij} \qquad (i = s,h,sh) \qquad (4.43)$$

where:

$NOFS_{ij}$ = "net outshipments for slaughter" of i-th class of j-th region.

For the regions with positive net outshipments, net outshipments for slaughter of i-th class cattle were partitioned into fed and non-fed cattle estimates on the basis of the ratios of regional feedlot marketings to regional marketings for slaughter.

$$FNOFS_{ij} = NOFS_{ij} \cdot \frac{FLM_{ij}}{MFS_{ij}} \qquad (i = s,h,sh) \qquad (4.44)$$

$$NFNOFS_{ij} = NOFS_{ij} - FNOFS_{ij} \qquad (4.45)$$

where:

$FNOFS_{ij}$ = "Net outshipments for slaughter" of fed animals of i-th class of j-th region.

$NFOFS_{ij}$ = "non-fed cattle net outshipments for slaughter" of i-th class of j-th region.

A different procedure was necessary for those regions where regional slaughter exceeded regional marketings for slaughter, that is, where

$$MFS_{ij} < ACS_{ij} \qquad (i = s,h,sh).$$

For such regions, the partitioning of regional inshipments for slaughter into fed and non-fed cattle was carried out on the basis of the ration of aggregated net outshipments of fed cattle to non-fed cattle outshipments:

$$FNOFS_{ij} = NOFS_{ij} \cdot \frac{\sum_v FNOFS_{iv}}{\sum_v NOFS_{iv}} \quad (i = s,h,sh) \quad (v = \text{surplus regions}) \qquad (4.46)$$

$$NFOFS_{ij} = NOFS_{ij} \cdot \frac{\sum_v NFOFS_{iv}}{\sum_v NOFS_{iv}} \quad (i = s,h,sh) \quad (v = \text{surplus regions}) \qquad (4.47)$$

"Regional slaughter" of fed cattle was estimated by beginning with feedlot marketings and adding or subtracting net outshipments of fed cattle for slaughter as required.

$$FSL_{ij} = FLM_{ij} \pm FNOFS_{ij} \qquad (i = s,h,sh) \qquad (4.48)$$

where:

FSL_{ij} = regional slaughter of fed cattle of i-th class.

The initial step involved in estimating the "regional supplies of feeder cattle" was to estimate the "regional supplies of cattle for slaughter and feeding" as follows:

$$RS_{ij} = BI_{ij} - EI_{ij} + R_{ij} - R'_{ij} - D_{ij} - FS_{ij} \quad (i = s,h,sh) \qquad (4.49)$$

where:

RS_{ij} = "regional supplies for cattle for slaughter and feeding" of i-th class.

$BI_{ij} + R_{ij}$ represents the regional "total supplies of i-th class which can be disposed of as R', D, FS, and EI, or for immediate slaughter or feeding and slaughter. Replacing $BI_{ij} - EI_{ij}$ by ΔI_{ij} in the above equation yields the following equation which is the estimate of regional supplies of cattle for feeding and/or slaughter.

$$RS_{ij} = R_{ij} - R'ij - D_{ij} - FS_{ij} - \Delta I_{ij} \quad (i = s,h,sh) \quad (4.50)$$

Where regional "other marketings for slaughter" is deducted from "regional supplies of cattle for slaughter and feeding" the residual is the regional supplies of feeder cattle being designated as "feeder supplies."

$$FDS_{ij} = RS_{ij} - OMFS_{ij} \qquad (i = s,h,sh) \qquad (4.51)$$

where:

FDS_{ij} = j-th regions "feeder supplies" of i-th class.

By comparing the size of regional feedlot marketings to the feeder supplies of the region, it was possible to decide whether a particular region was a deficit or a surplus region of feeder cattle, i.e.,

if $FDS_{ij} - FLM_{ij} > 0$ surplus feeder cattle supplying area

if $FDS_{ij} - FLM_{ij} < 0$ deficit feeder cattle supplying area.[16]

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[16]Deficit steer feeder cattle supplying areas in 1960 were regions 1, 10, 11, 15, 17, 19, and 20. Deficit heifer cattle supplying areas in 1960 were regions 1, 4, 10, 11, 12, 13, 15, 19, and 20.

CHAPTER V

UNITED STATES CATTLE SUPPLIES AND DISPOSITION TRENDS

The cattle industry of the United States is a vast, complex, and heterogeneous assemblage of many varied and changing components which defy accurate description. The components vary from cow-calf operations to commercial feedlots and from dairy heifers to feeder cattle and fed beef cattle. The industry also consists of many area and regional components which include every state and every county in the nation. While interrelated, each component possesses its own individual and characteristic patterns of development or evolution and change.

Findings regarding national trends in various measures of the national (1) production and supplies and (2) distribution or disposition of supplies will be presented first. Employing components developed in the preceding chapter, a "statistically aggregated supplies" (SAS) is defined by:

$$SAS = BI + R + IS = EI + R' + ACS + D + FS + OS \pm dI \quad (5.1)$$

where:

SAS = Statistically aggregated supplies

Other variables defined previously.

For the United States, SAS is an inflated figure since $IS = OS \pm dI$ and IS is included in replacements (R) and OS + dI is included in ending inventories (EI). Therefore:

$$TS = BI + R = EI + ACS + R' + D + FS \quad (5.2)$$

where:

TS = Total supplies

Other variables defined previously.

Other concepts and definitions of supplies, however, are derived readily and were found useful. These include:

(1) Net supplies (NS)

$$NS = BI + R - R' = EI + ACS + D + FS \quad (5.3)$$

(2) Commercial supplies (CSP)

$$CSP = BI + R - R' - D - FS = EI + ACS \text{ or} \quad (5.4)$$

$$CSP = NS - D - FS$$

(3) Production (P)

$$P = ACS + I = CSP - BI = R - R' - D - FS^{1} \quad (5.6)$$

Many measures of disposition such as ACS also can be considered measures of supplies of production. This is true also of marketings. Various components of marketings such as "marketings for slaughter" and "feeder cattle marketings" represent commercial supplies available for specified purposes.

Inventories

Total inventories of cattle and calves in the United States rose from about 80.5 million in 1947 to 99.8 million in 1962, Figure 3. Inventories trended upward at the average rate of about 1.5 million head or 1.6 percent per year, Table VII.[2] Since 1947 dairy cattle and calf

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[1] $\because P = ACS + I$, $I = EI - BI$, $CSP = ACS + EI$, and $ACS = CSP - EI$
$\therefore P = ACS + EI - BI = CSP - EI + EI - BI = CSP - BI$
$\because CSP = BI + R - R' - D - FS$
$\therefore P = BI + R - R' - D - FS - BI = R - R' - D - FS$

[2] Percentage based on the average of 1947-62 period.

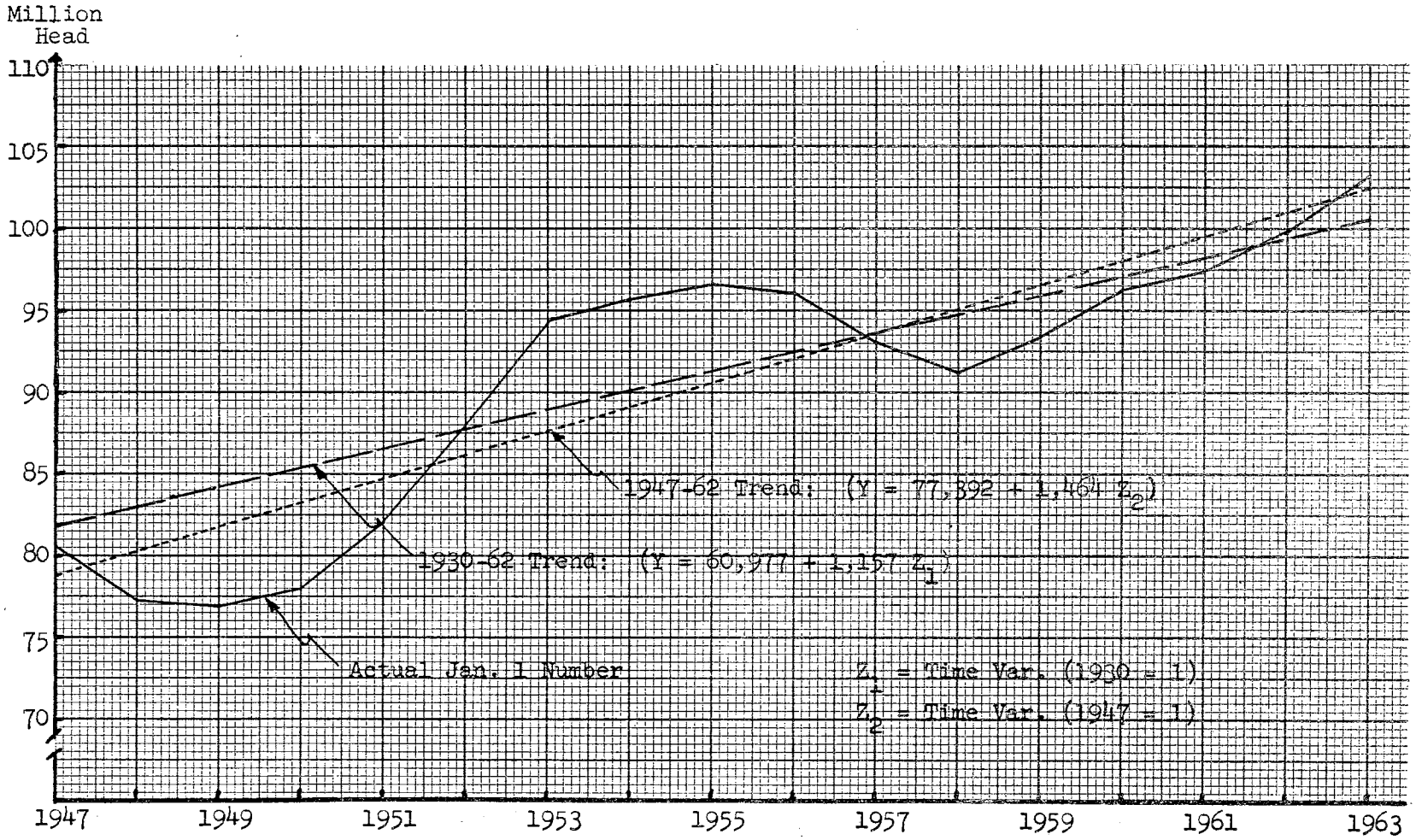

Figure 3. Estimates and Trends of Total Cattle and Calves on Farms, January 1, United States, 1947-63.

TABLE VII

CATTLE INVENTORIES BY TYPE AND CLASS: TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES, UNITED STATES, 1947-62

Type and Class of Cattle and Calves	Trend Coefficient[a]	Average Annual Percentage change[b]
	(1000 head)	(percent)
Dairy		
Cows	-400.40	-1.8
Heifers	-39.56	-0.7
Calves	-62.56	-1.0
Total cattle	-439.97	-1.6
Total Dairy Cattle and Calves	-502.52	-1.5
Other		
Cows	844.19	3.8
Heifers	176.14	3.0
Steers	291.89	3.4
Bulls	-7.10	-0.4
Calves	661.41	3.9
Total Cattle	1,305.12	3.4
Total Other Cattle and Calves	1,966.53	3.5
All Cattle	865.15	1.3
All Calves	598.85	2.6
Total Cattle and Calves	1,464.00	1.6

[a]"Trend coefficients" are the regression coefficients with time as the independent variable (1947 = 1).

[b]Computed by dividing the regression coefficients by the mean.

numbers have decreased about one-half million head per year, from 37.7 million to 28.8 million head in 1962. The annual percentage decline in dairy cattle numbers was 1.5 percent. "Other" cattle and calf numbers, in contrast, rose by nearly 2 million head per year, from 42.9 in 1947 to 74.7 million head in 1962, or about 3.5 percent, Table VII. Inventories of each major class of dairy cattle, as indicated in Table VII and Figure 4 trended downward with dairy cow numbers dropping most sharply. Among other cattle, largest average annual absolute gains were made in cow numbers but the average annual percentage rise was slightly larger for calves than for cows (Table VII).

Since cycles are a prominent feature of cattle inventories, trend values are greatly affected by the time period under consideration. For instance, a trend equation on total cattle and calves for the period 1947-62 would have yielded a substantially larger trend coefficient than the one based on 1930-62. The 1930-62 trend equation, Y = 60,556.66 + 1,175.4125 T, implies an average increase in total cattle and calf inventories of 1.175 million head compared with an average annual rise of 1.464 million head for 1947-62 (Figure 3).

Linear Trends in Supplies, Marketings, and Dispositions, 1947-62

While a January 1 inventory figure can be considered as one measure of supplies, this measure is subject to many limitations. Replacements, the gross supplies added to inventories during the year, is another component of the total supplies. For certain classes of cattle, such as cows and bulls, replacements are small relative to inventories (Table VIII). But for steers, heifers, and calves replacements are relatively large. Total and net supplies (TS & NS) of cows, bulls, steers, all

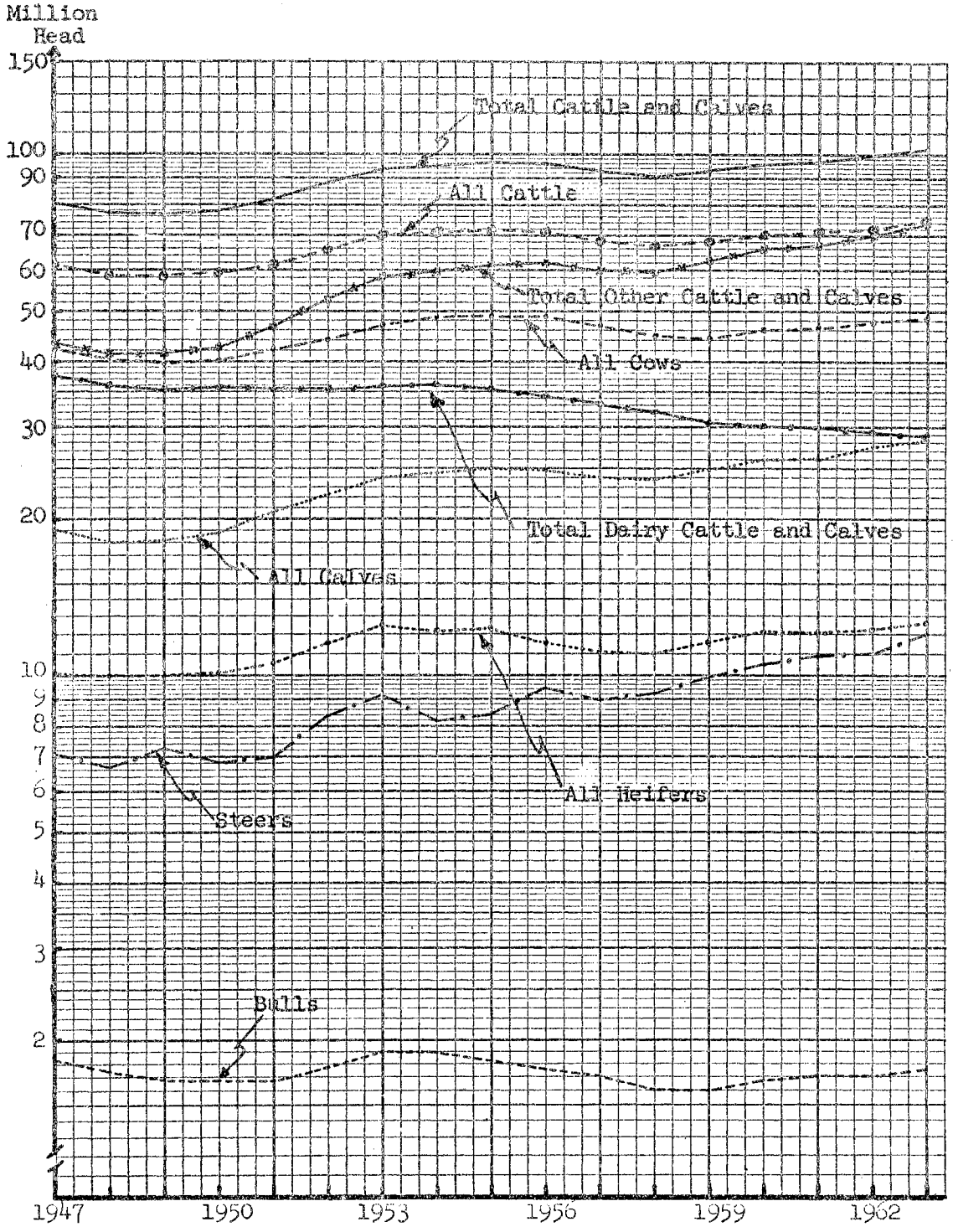

Figure 4. Cattle and Calves on Farms, January 1, by Classes and Types, U. S., 1947-63.

TABLE VIII

ESTIMATED TOTAL AND NET SUPPLIES OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

	Cow			Bulls			Steers			Heifers		
	BI[a]	R[a]	TS&NS[b]	BI[a]	R[a]	TS&NS[b]	BI[a]	R[a]	TS&NS[b]	BI[a]	R[a]	TS[b]
	(1000 Head)											
1947	42,330	7,292	49,622	1,834	752	2,586	7,109	10,933	18,042	10,160	10,670	20,830
1948	40,625	7,234	47,859	1,759	635	2.391	6,672	9,957	16,629	10,068	10,670	20,830
1949	39,781	7,160	46,941	1,681	673	2,354	7,270	10,088	17,358	9,984	9,829	19,820
1950	40,596	7,963	48,559	1,690	710	2,400	6,805	10,568	17,373	10,148	9,836	20,031
1951	42,094	8,020	50,114	1,689	806	2,495	7,029	10,880	17,909	10,615	10,783	21,838
1952	43,923	9,164	53,087	1,774	827	2,601	8,400	11,383	19,783	11,665	11,223	24,000
1953	46,840	10,267	57,107	1,907	752	2,659	9,147	12,640	21,787	12,428	12,335	25,746
1954	48,946	9,305	58,251	1,896	587	2,483	8,229	13,889	22,118	12,238	13,318	25,535
1955	49,121	8,819	57,940	1,829	553	2,382	8,444	14,915	23,359	12,300	13,297	24,664
1956	48,283	8,013	56,296	1,762	514	2,276	9,483	15,052	24,535	11,613	12,364	23,740
1957	46,859	7,329	54,188	1,713	481	2,194	8,991	15,562	24,553	11,193	12,127	23,125
1958	45,430	6,506	51,936	1,619	412	2,031	9,252	15,376	24,628	11,029	11,932	22,746
1959	45,244	6,275	51,519	1,607	413	2,020	9,931	15,337	25,268	11,607	11,717	24,222
1960	45,871	6,900	52,771	1,676	404	2,080	10,574	16,165	26,739	12,115	12,615	25,394
1961	46,370	6,791	53,161	1,702	353	2,055	10,042	16,561	27,503	12,107	13,279	25,919
1962	47,379	7,287	54,666	1,699	350	2,049	11,026	17,886	28,912	12,269	13,812	26,658

	Heifers	Calves					Total Cattle & Calves				
	NS[b]	BI[a]	R[a]	TS[b]	R'[a]	NS[b]	BI[a]	R[a]	TS[b]	NCD[c]	NS[b]
		(1000 Head)									
1947	13,538	19,121	33,498	52,619	22,355	30,624	80,554	33,498	117,231	3,179	114,052
1948	12,663	18,050	31,990	50,040	20,421	29,619	77,171	31,990	112,019	2,858	109,161
1949	12,660	18,114	32,223	50,347	20,597	29,750	76,830	32,233	111,966	2,903	109,063
1950	12,968	18,724	34,152	52,876	22,061	30,815	77,963	34,152	114,940	2,825	112,115
1951	13,818	20,656	33,028	53,684	22,909	30,775	82,083	33,028	117,921	2,610	115,111
1952	14,836	22,310	35,291	57,601	24,545	33,056	88,072	35,291	126,288	2,925	123,363
1953	15,479	39,144	63,144	63,063	26,710	36,353	94,241	39,144	136,404	3,019	133,385
1954	16,230	24,370	41,122	65,492	27,773	37,719	95,679	41,122	139,814	3,013	136,801
1955	15,845	24,898	39,862	64,760	27,832	36,928	96,592	39,862	139,403	2,949	136,454
1956	15,727	24,759	38,714	63,473	27,693	35,780	95,900	38,714	137,526	2,912	134,614
1957	15,796	24,104	38,734	62,838	27,975	34,863	92,860	38,734	134,398	2,804	131,594
1958	16,240	23,846	37,341	61,187	27,505	33,682	91,176	37,341	131,238	2,721	128,517
1959	17,947	24,933	35,820	60,753	28,365	32,388	93,322	35,820	131,906	2,764	129,142
1960	18,494	26,000	36,901	62,901	29,848	33,053	96,236	36,901	136,054	2,917	133,137
1961	19,128	26,198	38,161	64,359	30,726	33,633	97,319	36,161	138,341	2,861	135,480
1962	19,372	27,409	39,718	67,127	32,625	34,502	99,782	39,718	142,395	2,895	139,500

[a]See footnote following Table I for the definition of these variables.

[b]TS = Total Supplies; NS = Net Supplies.

[c]NCD = the death of new born calves.

cattle, and total cattle and calves are the same since the class category for each of these does not change.[3] In contrast, net supplies of heifers and calves consistently are substantially smaller than total supplies. Net supplies are additive whereas total supplies are not, and represent supplies available during the year for disposal within each class. Net and commercial supplies differ only by deaths and farm slaughter. Since it was assumed that no cows or bulls were included in farm slaughter, net and commercial supplies of these classes differ only by estimated deaths.

Production estimates, shown in Table IX, represent commercial supplies less initial inventories. Production includes adjusted commercial slaughter plus any increase or minus any reduction in inventories when looked at from the disposition side.[4] As production is defined, outplacements of calves are allocated as production to steers, heifers and bulls. On a liveweight basis, it would be necessary to allocate outplacements to production according to classes responsible for weight gains. While the definition in terms of numbers tends to under represent calf and heifer production, it was found useful.

Linear Trends in Supplies and Production

Linear trends in balance sheet variables for 1947-62 necessarily are affected by the period selected for study. The emphasis, therefore, must be placed on comparisons among the variables rather than on the

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[3] Outplacements for these classes are equal to zero.

[4] It could be argued, of course, that production should include farm slaughter. Exclusion of farm slaughter, however, is consistent with emphasis throughout the report on commercial or salable supplies.

TABLE IX

PRODUCTION OF CATTLE AND CALVES BY CLASSES
UNITED STATES, 1947-62[a]

	Cows	Bulls	Steers	Heifers	All Cattle	Calves[b]	Total Cattle & Calves
				(1000 Head)			
1947	6,650	719	10,338	2,932	20,639	10,524	31,163
1948	6,621	605	9,421	2,187	18,834	10,977	29,811
1949	6,507	640	9,535	2,272	18,954	11,020	29,974
1950	7,333	679	10,051	2,433	20,496	11,498	31,994
1951	7,347	773	10,350	2,794	21,264	9,519	30,783
1952	8,470	793	10,807	2,739	22,809	10,110	32,919
1953	9,589	721	12,020	2,610	24,940	11,771	36,711
1954	8,631	558	13,272	3,540	26,001	12,675	38,676
1955	8,139	525	14,269	3,108	26,041	11,366	37,407
1956	7,387	488	14,384	3,868	25,945	10,389	36,334
1957	6,730	457	14,920	4,190	26,297	10,155	36,452
1958	5,891	388	14,727	4,783	25,789	9,227	35,016
1959	5,672	390	14,698	5,887	26,647	6,880	33,527
1960	6,275	379	15,497	5,916	28,067	6,465	34,532
1961	6,187	330	15,884	6,550	28,951	6,848	35,799
1962	6,668	327	17,192	6,637	30,824	6,501	37,325

[a]Production represents (1) replacements minus outplacements, deaths and farm slaughter which is equivalent to (2) adjusted commercial slaughter plus or minus discrepancy (3) commercial supply minus beginning inventories or (4) ending inventories plus adjusted commercial slaughter minus beginning inventories.

[b]Production of calves represent only that portion of calves that were either slaughtered or resulted in a net addition to the inventory of calves. Of course, those calves that were used to replace mature cattle, outplacements of calves, are part of calf production but were excluded from the production of calves to avoid double counting and be consistent with concept of production used for mature cattle, that is, production is equal to the sum of slaughter and change in inventory.

magnitudes of specified variables. Average annual percentage changes were computed by dividing trend coefficients representing annual average absolute changes by the appropriate means for the period.

Despite a downtrend in cow-bull replacements of about 105 thousand head per year, total, net, and commercial supplies of cows and bulls increased by an annual average of more than 330 thousand head. This, as seen later, was made possible by sharp average annual reductions for the period in cow-bull slaughter. This is reflected in cow-bull production. (Table IX).

Sharp upward trends and average annual percentage increases in steer inventories, replacements, and supplies relative to those for heifers or cows are evident. Commercial supplies of steer-heifer cattle rose at the average annual rate of about 1.25 million head for average annual percentage increases of 3.7 percent for steers and 2.9 percent for heifers. In contrast, the average annual percentage rise in production of heifers, due to a larger percentage increase in slaughter, was nearly double that for steers (Table X).

Although the total supplies of calves rose by an average annual of more than 1.0 million head, commercial supplies rose by less than 286 thousand head and calf production[5] trended downward at the rate of about 313 thousand head annually. The principal reasons for these differences can be traced to a strong upward trend in outplacements of calves and to a sharp downtrend in calf slaughter. It seems apparent that with some shift in consumer preferences from calf and veal to more mature beef, feedlot operators were increasingly successful during the period in bidding calves away from meat packers.

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[5]See the footnote at the end of Table IX for the discussion of calf production.

TABLE X

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN SELECTED MEASURES OF CATTLE SUPPLIES AND PRODUCTION, UNITED STATES, 1947-62

Class	Beginning Inventories	Replacements	Supplies			Production[d]
			Total[a]	Net[b]	Commercial[c]	
	Average Annual Changes (1947-62) Trend Coefficients (1000 Head)					
Cows (All)	443.79	-74.86	368.93	368.93	371.93	-71.86
Bulls	-7.10	-30.24	-37.34	-37.34	-36.56	-29.46
Cows & Bulls	463.69	-105.10	331.59	331.59	335.37	-101.32
Steers	291.89	530.21	822.10	822.10	811.78	519.89
Heifers (All)	139.57	233.62	370.19	455.05	441.63	305.06
Steer-Heifer	428.46	763.83	1192.20	1267.15	1253.41	824.95
All Cattle	865.15	733.59[e]	1598.74[e]	1598.74	1588.78	723.63
All Calves	598.85	418.73	1017.58	283.99	285.67	-310.18
Total Cattle & Calves	1464.00	409.57[e]	1873.57[e]	1882.73	1874.75	410.45
	Average Annual Percentage Changes (1947-62) (Percent)					
Cows (All)	1.0	-1.0	0.7	0.7	0.7	0.7
Bulls	-0.4	-5.2	-1.6	-1.6	-1.6	-5.4
Cows & Bulls	0.9	-1.3	0.6	0.6	0.6	-1.3
Steers	3.4	3.9	3.7	3.7	3.7	4.0
Heifers (All)	1.2	1.9	1.7	2.8	2.9	7.8
Steer-Heifer	2.1	3.0	2.6	3.3	3.4	4.9
All Cattle	1.3	2.8[e]	1.7[e]	1.7	1.7	2.9
All Calves	2.6	1.1	1.7	0.9	0.9	-3.2
Total Cattle & Calves	1.6	1.0[e]	1.4[e]	1.5	1.5	1.2

[a]Total Supplies = Beginning inventories plus replacements (TS=BI+R).

[b]Net Supplies excludes numbers shifted during the year to another class or NS=TS-R'=BI+R-R'.

[c]Commercial Supplies are equivalent to net supplies less death and farm slaughter. CSP=NS-D-FS=BI+R-R'-D-FS.

[d]Production is commercial supplies minus beginning inventories or P=CSP-BI=ACS+ ΔI.

[e]These are not additive for the reasons explained earlier. See pp. 56 and 59.

With inventories of all cattle and calves rising at an average annual rate of nearly 1.5 million head and replacement trending upward at more than 409 thousand head annually, commercial supplies of total cattle and calves rose by an average annual rate of nearly 2 million head, or 1.5 percent of 1947-62 mean. Of the 2 million total, the percentage contributions by classes were: cow-bull 17.9; steers 43.3; heifers 23.6; and calves 16.2 percent.

In contrast to the trend in commercial supplies, production of total cattle and calves rose by an average of about 410 thousand head annually. While the trend in production is governed largely by the associated trend in slaughter, it also is a function of the difference between commercial supplies and beginning inventories. Thus,

$$CSP\ (1874.45) - BI\ (1464.00) = P\ (410.45). \qquad (5.7)$$

Linear Trends in Marketings, Feeder Supplies and Components

Marketings, as indicated earlier were adjusted for discrepancy in published data between marketings and the sum of commercial slaughter and inshipments. It seemed logical to assume that cattle marketings were either slaughtered or returned to farms and ranches for breeding or further feeding. In general, the adjustment resulted in upward revision in marketings.[6]

On a national basis, commercial slaughter can be considered a measure of the supplies available for slaughter. Adjustments in commercial slaughter for steers, heifers, and calves, however, also were found necessary. This adjustment provided improved comparability between

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[6] See Appendix Tables C-IV and C-V.

inventory and slaughter definition of calves. It reduced calf slaughter for the period 1947-62 by an average annual volume of about 1.1 million head and distributed this volume to steers and heifers according to the ratios of steer and heifer commercial slaughter to the combined total.[7]

Relative contributions of the various classes to adjusted marketings changed materially over the period under study (Table XI). In 1947, steers and heifers accounted for nearly 40 percent of total marketings with steers responsible for 31 percent. By 1962, steer-heifer marketings represented nearly 60 percent of the total marketings with steers alone accounting for 43 percent.

Inshipments consist primarily of stock that are returned to farms, ranches, or feedlots, frequently in another state, for feeding rather than breedings. The popular shift to calves rather than steers or heifers for feeding is clearly indicated by the inshipment data for 1947-62 (Table XI). The relative contribution of calves to inshipments rose during the period from about one-third to about 44 percent. Inshipments of steers and heifers, however, also increased relatively as well as absolutely from about 30 percent to 32 percent for steers and 8.4 percent to 12.3 percent for heifers.

Downtrends in marketings and slaughter of cows, bulls, and calves are quantified for the period in Table XII. Average annual reductions in calf slaughter, whether adjusted or unadjusted, of 3.7 percent and 2.3 percent, respectively, were substantial. Increases in marketings, inshipments, and slaughter of steers and heifers, heifers particularly, also were substantial.

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[7] See chapter on procedures, pp. 13-31.

TABLE XI

ADJUSTED MARKETINGS AND PRINCIPAL COMPONENTS
UNITED STATES, 1947-62

Year	Cows			Bulls			Steers		
	AM[a]	IS[b]	ACS[c]	AM[a]	IS[b]	ACS[c]	AM[a]	IS[b]	ACS[c]
	(1000 Head)								
1947	10,279	1,924	8,355	981	184	797	13,257	2,482	10,775
1948	9,562	2,097	7,465	871	191	680	11,301	2,478	8,823
1949	7,361	1,669	5,692	816	185	631	12,930	2,930	10,000
1950	7,646	1,811	5,835	891	211	680	12,878	3,051	9,827
1951	7,382	1,864	5,518	920	232	688	12,011	3,032	8,979
1952	7,187	1,634	5,553	854	194	660	13,020	2,960	10,060
1953	9,007	1,524	7,483	881	149	732	15,574	2,636	12,938
1954	10,411	1,955	8,456	769	144	625	16,076	3,019	13,057
1955	10,940	1,963	8,977	721	129	592	16,123	2,893	13,230
1956	10,667	1,856	8,811	650	113	537	18,009	3,133	14,876
1957	10,051	1,892	8,159	678	127	551	18,057	3,398	14,659
1958	7,827	1,750	6,077	515	115	400	18,095	4,047	14,048
1959	6,497	1,452	5,045	413	92	321	18,100	4,045	14,055
1960	7,360	1,584	5,776	450	97	353	19,278	4,149	15,129
1961	6,684	1,506	5,178	430	97	333	20,397	4,597	15,800
1962	7,236	1,783	5,453	378	93	285	21,397	5,271	16,126

Year	Heifers			Calves			Total Cattle & Calves		
	AM[a]	IS[b]	ACS[c]	AM[a]	IS[b]	ACS[c]	AM[a]	IS[b]	ACS[c]
	(1000 Head)								
1947	3,721	697	3,024	14,610	3,015	11,595	42,848	8,302	34,546
1948	2,909	638	2,271	13,104	2,191	10,913	37,747	7,595	30,152
1949	2,726	618	2,108	13,087	2,677	10,410	36,920	8,079	28,841
1950	2,577	611	1,966	12,778	3,212	9,566	36,770	8,896	27,874
1951	2,333	589	1,744	11,333	3,468	7,865	33,979	9,185	24,794
1952	2,557	581	1,976	12,223	3,722	8,501	35,841	9,091	26,750
1953	3,371	571	2,800	14,807	3,487	11,320	43,640	8,367	35,273
1954	4,283	805	3,478	16,131	3,984	12,147	47,670	9,907	37,763
1955	4,625	830	3,795	15,585	4,080	11,505	47,994	9,895	38,099
1956	4,970	864	4,106	15,687	4,643	11,044	49,983	10,609	39,374
1957	5,363	1,009	4,354	15,079	4,666	10,413	49,228	11,092	38,136
1958	5,416	1,211	4,205	13,633	5,493	8,140	45,486	12,616	32,870
1959	6,928	1,549	5,379	11,815	6,002	5,813	43,753	13,140	30,613
1960	7,548	1,624	5,924	12,261	5,994	6,267	46,897	13,448	33,449
1961	8,247	1,859	6,388	12,339	6,702	5,637	48,097	14,761	33,336
1962	8,248	2,032	6,216	12,814	7,317	5,497	50,073	16,496	33,577

[a]AM = Adjusted marketings.

[b]IS = Inshipments (to farms and ranches).

[c]ACS = Adjusted commercial slaughter.

TABLE XII

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN MARKETINGS ADJUSTED MARKETINGS AND PRINCIPAL COMPONENTS, UNITED STATES, 1947-62

	Adjusted Marketings	Inshipments	Adjusted Commercial Slaughter	Marketings	Commercial Slaughter
			Average Annual Changes (1000 Head)		
Cows	-103.63	-18.34	-85.29	-84.13	-85.29
Bulls	-40.53	-8.68	-31.85	-38.13	-31.85
Cows & Bulls	-144.56	-27.02	-117.14	-122.26	-117.14
Steers	635.73	150.58	485.15	650.84	417.36
Heifers	397.43	92.36	305.07	397.95	272.84
Steers & Heifers	1033.16	242.94	790.22	1048.62	690.20
All Cattle	889.00	215.93	673.07	926.07	573.06
All Calves	-32.59	304.75	-337.34	-24.77	-237.33
Total Cattle & Calves	856.41	520.67	335.73	902.57	335.73
			Average Annual Percentage Changes (percent)		
Cows	-1.2	-1.0	-1.3	-1.0	-1.3
Bulls	-5.8	-5.9	-5.7	-5.6	-5.7
Cows & Bulls	-1.6	-1.4	-1.6	-1.4	-1.6
Steers	4.0	4.5	3.8	4.1	3.5
Heifers	8.4	9.2	8.2	8.6	7.9
Steers & Heifers	5.0	5.5	4.8	5.2	4.5
All Cattle	3.0	3.4	2.8	3.2	2.5
All Calves	-0.2	6.9	-3.7	-0.2	-2.3
Total Cattle & Calves	2.0	4.9	1.0	2.1	1.0

The data and estimates reported in these and following tables reflect basic changes in the organization of the cattle industry and in production and marketing patterns and practices. Growth in feedlot marketings and in feeder supplies, reductions in other marketings of steers for slaughter, the changing role of heifers, and the rising relative importance of direct movements of feeders to feedlots are reflected and quantified in Tables XIII and XIV. It appeared reasonable to assume for the nation as a whole, that (1) "inshipments" represent "marketings for feeding" and (2) "feedlot marketings" in terms of numbers represent the "total feeder supplies." Since marketings were not sufficiently large to include both adjusted slaughter and total feeders supplies,[8] the difference, it was assumed, consists of feeders that move directly to feedlots without entering the marketing system. In general, the data appear reasonably consistent internally in view of a priori expectations.

Outstanding features of Table XIV are (1) the increases in feedlot marketings relative to other marketings for feeding, (2) the substantially larger percentage increases in all components of marketings and slaughter for heifers, and (3) the larger average annual direct placements of cattle on feed relative to marketings for feeding.

In 1947, adjusted commercial slaughter of steers and heifers represented less than 40 percent of total adjusted commercial slaughter and the slaughter of fed cattle accounted for about 46 percent of the steer-heifer slaughter. By 1962, two-thirds of the total adjusted commercial slaughter was steer-heifer beef and two-thirds of steer-heifer commercial slaughter consisted of fed cattle. Assuming an unaltered progression of

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[8] Feeder supplies for the U. S. is equal to feedlot marketings. See pp. 51 and 52 for more detailed discussion.

TABLE XIII

ADJUSTED MARKETINGS AND COMPONENTS REPRESENTING MARKETINGS FOR SLAUGHTER, FEEDER MARKETINGS, OTHER FEEDLOT PLACEMENTS, AND FEEDER SUPPLIES FOR STEERS, HEIFERS, AND STEERS AND HEIFERS, UNITED STATES 1947-62

	Steers						
	Marketings for Slaughter						
Year	FLM[a]	Other	Total	MFF[b]	Total Mktgs.[d]	OPFF[c]	Feeder Supplies
	(1000 Head)						
1947	4,548	6,227	10,775	2,482	13,257	2,066	4,548
1948	4,200	4,623	8,823	2,478	11,301	1,722	4,200
1949	6,404	3,596	10,000	2,930	12,930	3,474	6,404
1950	6,090	3,737	9,827	3,051	12,878	3,039	6,090
1951	6,079	2,900	8,979	3,032	12,011	3,047	6,079
1952	6,697	3,363	10,060	2,960	13,020	3,737	6,697
1953	6,551	6,387	12,938	2,636	15,574	3,915	6,551
1954	6,457	6,600	13,057	3,019	16,076	3,438	6,457
1955	7,344	5,886	13,230	2,893	16,123	4,451	7,344
1956	7,744	7,132	14,876	3,133	18,009	4,611	7,744
1957	7,660	6,999	14,659	3,398	18,057	4,262	7,660
1958	8,229	5,819	14,048	4,047	18,095	4,182	8,229
1959	9,138	4,917	14,055	4,045	18,100	5,093	9,138
1960	9,589	5,540	15,129	4,149	19,278	5,440	9,589
1961	10,235	5,565	15,800	4,597	20,397	5,638	10,235
1962	10,745	5,381	16,126	5,271	21,397	5,474	10,745
	Heifers						
	Marketings for Slaughter						
	FLM[a]	Other	Total	MFF[b]	Total Mktgs.[d]	OPFF[c]	Feeder Supplies
	(1000 Head)						
1947	1,812	1,212	3,024	697	3,721	1,115	1,812
1948	1,655	616	2,271	638	2,909	1,017	1,655
1949	1,463	645	2,108	618	2,726	845	1,463
1950	1,386	580	1,966	611	2,577	775	1,386
1951	1,139	605	1,744	589	2,333	550	1,139
1952	1,343	633	1,976	581	2,557	762	1,343
1953	2,172	628	2,800	571	3,371	1,601	2,172
1954	2,513	965	3,478	805	4,283	1,708	2,513
1955	2,578	1,217	3,795	830	4,625	1,748	2,578
1956	2,953	1,153	4,106	864	4,970	2,089	2,953
1957	3,074	1,280	4,354	1,009	5,363	2,065	3,074
1958	3,062	1,143	4,205	1,211	5,416	1,851	3,062
1959	3,489	1,890	5,379	1,549	6,928	1,940	3,489
1960	3,872	2,052	5,924	1,624	7,548	2,248	3,872
1961	4,098	2,290	6,388	1,859	8,247	2,239	4,098
1962	4,078	2,138	6,216	2,032	8,248	2,046	4,078

[a]FLM = Feedlot marketings.

[b]MFF = Marketings for feeding.

[c]OPFF = Other placements for feeding.

[d]Total marketings is equal to adjusted marketings (AM).

TABLE XIII (Continued)

Year	Steers and Heifers						
	Marketings for Slaughter						
	FLM[a]	Other	Total	MFF[b]	Total Mktgs[d]	OPFF[c]	Feeder Supplies
	(1000 Head)						
1947	6,360	7,439	13,779	3,179	16,978	3,181	6,360
1948	5,855	5,239	11,094	3,116	14,210	2,739	5,855
1949	7,876	4,241	12,108	3,548	15,656	4,319	7,867
1950	7,476	4,317	11,793	3,662	15,455	3,814	7,476
1951	7,218	3,505	10,723	3,621	14,344	3,597	7,218
1952	8,040	3,996	12,030	3,541	15,557	4,499	8,040
1953	8,723	7,015	15,738	3,207	18,945	5,516	8,723
1954	8,970	7,565	16,535	3,824	20,359	5,146	8,970
1955	9,922	7,103	17,025	3,723	20,748	6,199	9,922
1956	10,697	8,285	18,982	3,997	22,979	6,700	10,697
1957	10,734	8,279	19,013	4,407	23,420	6,327	10,734
1958	11,291	6,902	18,253	5,258	23,511	6,033	11,291
1959	12,627	6,807	19,434	5,594	25,028	7,033	12,627
1960	13,461	7,592	21,052	5,773	26,826	7,688	13,461
1961	14,333	7,855	22,188	6,456	28,644	7,877	14,333
1962	14,823	7,519	22,342	7,303	29,645	7,520	14,823

[a]FLM = Feedlot marketings.

[b]MFF = Marketings for feeding.

[c]OPFF = Other placements for feeding.

[d]Total marketings is equal to adjusted marketings (AM).

TABLE XIV

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN MARKETINGS AND FEEDER SUPPLIES AND COMPONENTS FOR STEERS AND HEIFERS, UNITED STATES, 1947-62

Item	Steers	Heifers	Steers and Heifers
	Average Annual Changes (1000 Head)		
Marketings:			
Adjusted Marketings	635.73	397.43	1,033.16
Inshipments	150.58	92.36	242.94
Marketings for Slaughter	485.15	305.07	790.22
Feedlot Marketings	379.72	199.56	579.28
Other Marketings for Slaughter	105.43	105.51	210.04
Marketings for Feeding	150.58	92.36	242.94
Other Placements on Feed[a]	229.14	107.20	336.34
Total Feeder Supplies	379.72	199.56	579.28
	Average Annual Percentage Changes (percent)		
Marketings:			
Adjusted Marketings	4.0	8.4	5.0
Inshipments	4.5	9.2	5.5
Marketings for Slaughter	3.8	8.2	4.8
Feedlot Marketings	5.2	7.8	5.6
Other Marketings for Slaughter	2.0	8.9	3.3
Marketings for Feeding	4.5	9.2	5.5
Other Placements on Feed[a]	5.8	7.0	6.1
Feeder Supplies	5.2	7.8	5.6

[a]This refers to cattle placed on feed directly, i.e., without going through the marketings.

these trends into the future, steer-heifer slaughter would represent nearly 82 percent of the total by 1972 and fed cattle marketings would rise to 78 percent of the total steer-heifer slaughter.

Relative increases in the direct movement of feeder cattle to feedlots may reflect increased feeding of cattle by the rancher-owners either at the ranch or through custom feedlots. The rising prevalence of custom feeding facilities would seem to be the more logical explanation. Direct purchases by feedlot operators or order buyers at the ranch or farm, which were not recorded as marketings, also may be responsible.

Despite the larger percentage increase in marketings of fed heifers, heifers did not represent a larger percentage of total fed cattle marketings at the end of the period than they did at the beginning of the period. Much larger percentage increases in production of fed heifers were required to maintain the percentage of total slaughter for heifers at 27 to 28 percent. Effects of the cattle cycle are apparent, however, in the placements of heifers on feed and in fed heifer marketings.

Sharp increases in supplies, production and marketings of steers and heifers were made possible by two primary factors. These were, (1) continued large annual increases in the calf crop and in total supplies of calves, and (2) sharp reductions in production of calves, as such, i.e., in the marketings of calves for slaughter (Table X).

Linear Trends in Disposition and Components

In the preceding section, origins or sources of total supplies were considered along with a number of more detailed measures of supplies. Here, total supplies, now labeled "total dispositions," are considered as the aggregate quantity available for disposal or disappearance.

The principal components of total dispositions are ending inventory, adjusted commercial slaughter and outplacements. Death and farm slaughter are the remaining components, but they are relatively unimportant. Trends in ending inventories differ from those for beginning inventories only to the extent that the data were affected by the addition of beginning inventories for 1963 and the deletion of these inventories for 1947. Since cattle inventories rose during 1962-63 and fell during 1947-48, ending inventories for 1947-62 trended upward more sharply or downward more gently than did beginning inventories, (1,539,000 vs. 1,464,000). For heifers and calves, outplacements are the difference between total and net supplies. Adjusted commercial slaughter received some attention as a component of marketings. Organization of the data in the form shown in Table XIV, however, more clearly demonstrates some tendancies and relationships mentioned earlier and reveals new ones.

Interactions between inventories and slaughter are clearly illustrated in the trend coefficients reported in Tables X and XV. The strong uptrend in inventories of cows in the face of a downtrend in replacements was made primarily by a downtrend in cow slaughter. Another explanation is provided by reordering the terms in the basic total supplies equation as follows:

$$TS = TD = BI + R = EI + ACS - R' + D + FS \quad \text{or} \quad (5.8)$$

$$BI - EI = ACS - R + R' + D + FS \quad (5.9)$$

Thus, in considering trend coefficients for cows:

$$\underset{(TS)}{-13.44} = \underset{(BI)}{443.79} - \underset{(EI)}{457.23} = \underset{(ACS)}{-85.29} - \underset{(R)}{(-74.86)} + \underset{(R')}{0} + \underset{(D)}{(-3.01)} + \underset{(FS)}{0}$$

$$= -85.29 + 74.86 - 3.01$$

The larger positive uptrend in ending inventories of cows (457.23),

TABLE XV

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN TOTAL DISPOSITIONS AND COMPONENTS, UNITED STATES, 1947-62

Class	Ending Inventory	Farm Slaughter	Deaths	A.C.S.[a]	Out-placements	Total Dispositions[b]
			Average Annual Changes (1000 Head)			
Cows	457.23	---	-3.01	-85.29	---	368.93
Bulls	-4.71	---	-.78	-31.85	---	-37.34
Cows & Bulls	452.52	---	-3.97	-117.14	---	331.59
Steers	326.63	3.51	6.81	485.15	---	822.10
Heifers	136.56	.22	3.20	305.07	-74.86	370.19
Steers & Heifers	463.19	3.73	10.01	790.22	-74.86	1192.29
All Cattle	915.71	3.73	6.23	673.07	---	1598.74
All Calves	623.01	-.47	1.21	-337.34	-733.59	1017.58
Total Cattle & Calves	1538.72	3.27	5.02	335.73	-9.16	1873.57
			Average Annual Percentage Changes (percent)			
Cows	1.0	---	-0.5	-1.3	---	0.7
Bulls	-0.3	---	-2.8	-5.7	---	-1.6
Cows & Bulls	1.0	---	-0.6	-1.6	---	0.6
Steers	3.6	1.0	2.6	33.8	---	3.7
Heifers	1.2	0.1	1.7	8.2	-1.0	1.7
Steers & Heifers	2.3	0.6	2.2	4.8	-1.0	2.6
All Cattle	1.4	0.6	0.6	2.8	---	1.7
All Calves	2.6	-0.2	-0.3	-3.7	2.8	1.7
Total Cattle & Calves	1.7	0.4	0.3	1.0	-0.3	1.4

[a] Adjusted Commercial Slaughter.

[b] Components do not always add precisely to these totals due to rounding.

relative to beginning inventories (443.79), reflects a relatively larger downtrend in slaughter relative to replacements.

Reordering the terms for steers and inserting the appropriate trend values gives the following results for steers:

$$R = EI - BI + ACS + R' + D + FS \qquad (5.10)$$

$$530.21 = 326.63 - 291.89 + 485.15 + 0 - 6.81 - 3.51$$

$$530.31 = 34.74 + 485.15 + 6.81 + 3.51$$

An average annual increase in steer replacements of more than one-half million head was sufficient to (1) account for uptrends in deaths and farm slaughter of steers, (2) sustain an average annual increase of 485 thousand head in slaughter of steers, and, at the same time, (3) add 35 thousand head more each year to inventories than during the previous year. More simply, total supplies of steers (BI + R) rose sufficiently each year to add nearly one-half million head to slaughter and contribute 327 thousand head to inventories.

For heifers:

$$R = EI - BI + ACS + R' + D + FS \qquad (5.11)$$

$$233.62 = 136.56 - 136.57 + 305.07 + (-74.86) + 3.20 + .22$$

$$233.62 = -.01 + 305.07 - 74.86 + 3.42 \qquad \text{or}$$

$$R - R' = (EI - BI) + ACS + (D + FS) \qquad (5.12)$$

$$233.62 + 74.86 = -.01 + 305.07 + 3.42$$

An upward trend in replacements together with a downtrend in outplacements (transfer to cows) contributed to a substantial average annual increase in slaughter. Replacements, however, were not sufficient to sustain the level of slaughter indicated and, at the same time, add more to inventories each succeeding year, as indicated by a negative trend coefficient for changes in inventories ($EI - BI = \Delta I$).

The trends and relationships for claves are explained as follows:

$$R = EI - BI + ACS + R' + D + FS \qquad (5.13)$$

$$418.73 = 623.01 - 598.85 + (-337.34) + 733.59 + (-1.21) + (-.47)$$

$$\text{or } R - ACS = EI - BI + R' + (D + FS) \qquad (5.14)$$

$$418.73 - (-337.34) = 623.01 - 598.85 + 733.59 - 1.68$$

$$756.07 = 24.16 + 733.59 - 1.68$$

For calves, a rising trend in the calf crop in addition to a sharp downward trend in calf slaughter made possible a substantial average annual increase in the transfer of calves to steers, heifers, and bulls. This was accomplished while adding an average of 24 thousand more calves to inventories each succeeding year.

Considering all of these changes, the following represents a logical composite for total cattle and calves:

$$R - R' = EI - BI + ACS + D + FS^{9} \qquad (5.15)$$

$$409.57 - (-9.16) = 1538.72 - 1464.00 + 335.73 + 5.02 + 3.27$$

$$418.72 = 74.72 + 335.73 + 8.39$$

A rising trend in the calf crop (R) plus a downtrend in new calf deaths (D_{nbc}) were associated with (1) a net uptrend in slaughter of 336 thousand head annually, and (2) an average annual addition to inventories of nearly 75 thousand head after accounting for deaths and farm slaughter of yearling calves and mature cattle. More than 82 percent of the average annual increase in the total supplies of total cattle and calves was absorbed by the uptrend in ending inventories. Cows contributed most to this high percentage. The comparable percentages for cows and bulls was

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[9] Outplacements (R') of total cattle and calves are equal to death (D_{nbc}) and farm slaughter (FS_{nbc}) of new crop calves.

136.5 percent; a reduction in slaughter, as indicated, accounted for the difference. Only about 39 percent of the average annual increase in steer-heifer supplies and 61 percent of the annual rise total calf supplies were allocated to inventories.

Trends in Composite Balance Sheet Variables

Balance sheet variables are brought together in Table XVI for simultaneous consideration. The only variable not given detailed consideration in the preceding analysis is outshipments. On the national basis, however, outshipments are equivalent to inshipments except for the discrepancy. Within specified assumptions, inshipments can be viewed as the sum of the interregional shipment, included in adjusted marketings, to farms, ranches, and feedlots. Within this context, outshipments are the inverse of inshipments and represent the sum of the shipments from the various regions for purposes other than slaughter.

TABLE XVI

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN BALANCE SHEET VARIABLES, UNITED STATES, 1947-62

Variable	Cows	Bulls	Cows & Bulls	Steers	Heifers	Steers & Heifers	All Cattle	Calves	T.C.C.[a]
				Average Annual Changes (1000 Head)					
Beg. Inventories	443.79	-7.10	436.69	291.89	136.57	428.46	865.15	598.85	1464.00
Replacements	-74.86	-30.24	-105.10	530.21	233.62	763.83	733.59	418.73	409.57[b]
Outplacements	-	-	-	-	-74.86	-74.86	-	733.59	-9.16[b]
Farm Slaughter	-	-	-	3.51	.22	3.73	3.73	-.47	3.27
Deaths	-3.01	-.78	-3.79	6.81	3.20	10.01	6.23	-1.21	5.02
Com. Supplies	371.93	-36.56	335.37	811.78	441.63	1253.41	1588.78	285.67	1874.45
Marketings							926.34	-23.77	902.57
Adj. Marketings	-103.63	-40.53	-144.56	635.73	397.43	1033.16	889.00	-32.59	856.41
Outshipments	-18.34	-8.69	-27.02	150.58	92.36	242.94	215.92	304.75	520.67
Inshipments	-18.34	-8.68	-27.02	150.58	92.36	242.94	215.92	304.75	520.67
Com. Slaughter	-85.29	-31.85	-117.14	417.36	272.84	690.20	573.06	-237.33	335.73
Adj. Com. Slaughter	-85.29	-31.85	-117.14	485.15	305.07	790.22	673.09	-337.34	335.73
End. Inventories	457.23	-4.71	452.52	326.63	136.56	463.19	915.71	623.01	1538.72
Production	-71.86	-29.46	-101.32	519.89	305.06	824.95	723.63	-313.18	410.45
				Average Annual Percentage Changes					
Beg. Inventories	1.0	-0.4	0.9	3.4	1.2	2.1	1.3	2.6	1.6
Replacements	-1.0	-5.2	-1.3	3.9	1.9	3.0	2.8	1.1	1.0[b]
Outplacements	-	-	-	-	-1.0	-1.0	-	2.8	-0.3[b]
Farm Slaughter	-	-	-	1.0	0.1	0.6	0.6	-0.2	0.4
Deaths	-0.5	-2.8	-0.6	2.6	1.7	2.2	0.6	-0.3	0.3
Com. Supplies	0.7	-1.6	0.6	3.7	2.9	3.4	1.7	0.9	1.5
Marketings							3.2	-0.2	2.1
Adj. Marketings	-1.2	-5.8	-1.6	4.0	8.4	5.0	3.0	-0.2	2.0
Outshipments	-1.0	-5.9	-1.4	4.5	9.2	5.5	3.4	6.9	4.9
Inshipments	-1.0	-5.9	-1.4	4.5	9.2	5.5	3.4	6.9	4.9
Com. Slaughter	-1.3	-5.7	-1.6	3.5	7.9	4.5	2.5	-2.3	1.0
Adj. Com. Slaughter	-1.3	-5.7	-1.6	3.8	8.2	4.8	2.8	-3.7	1.0
End. Inventories	1.0	-0.3	1.0	3.6	1.2	2.3	1.4	2.6	1.7
Production	-1.0	-5.4	-1.3	4.0	7.8	4.9	2.9	-3.2	1.2

[a] Total Cattle and Calves.

[b] These represent new calf deaths, and slaughter of newborn calves.

CHAPTER VI

TRENDS OF OKLAHOMA CATTLE INDUSTRY

Analysis of trends of the cattle industry for all of the twenty regions would require a vast amount of work, time, expense, and space making the task a prohibitive one for a single study. Region 9, Oklahoma, was selected as the region for which a complete analysis is made to provide some insights to the trend of cattle industry at regional level. The selection of Oklahoma, region 9, for an analysis is well justified in view of the fact that the study is conducted in Oklahoma.

Inventories

Oklahoma has been one of the leading cattle producing states in the U. S. During the period of 1947-62, Oklahoma ranked around tenth in the nation on the number of cattle and calves on farms and ranches, January 1. Oklahoma also ranked around tenth, during the same period, in the nation of liveweight cattle production of cattle and calves.

Total inventories of cattle and calves in Oklahoma rose from about 2.7 million head in 1947 to about 3.7 million head in 1962, a rise of one million head, compared to a rise of 19.3 million head for the U. S. during the same period. From 1947 to 1962, inventory of total cattle and calves in Oklahoma trended upward at a rate of 62,320 head, or 2.0 percent,[1]

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[1]The percentage figure is obtained by taking trend coefficients as percent of 1947-62 mean.

per year compared to about 1.5 million head or 1.6 percent per year increase for the U. S.

Average annual percentage changes of inventories for all classes of cattle and calves, except heifers, in Oklahoma were greater than the changes for the U. S. during the period of 1947-62. (Table XVII).

Cow inventory in Oklahoma saw an increase of 1.7 percent per year, compared to 1.0 percent for the U. S., and inventory of bulls increased at a rate of 1.3 percent per year in Oklahoma compared with -0.4 percent for the U. S. Heifer inventory, on the other hand, in Oklahoma saw a down-trend of -0.1 percent per year compared with an increase of 1.2 percent for the U. S.

Contrary to the U. S. cows, replacements of cows in Oklahoma trended upward at an average of 4,870 head per year or 1.7 percent of 1947-62 mean, Table XVIII. Although bull replacements trended downward in Oklahoma, rate of down-trend is less than the rate for the U. S. (Table XVIII). Average annual percentage increases of replacements of heifers, steer-heifer, all cattle, calves and total cattle and calves were also higher in Oklahoma than were for the U. S. Only steer replacements in Oklahoma increased at a rate less than the U. S. rate.

Higher average annual percentage changes in both beginning inventories and replacements are responsible for higher annual percentage increases in total, net, and commercial supplies in Oklahoma compared to the U. S.

An average annual increase of over 62 thousand in January 1 inventory of total cattle and calves and nearly 21 thousand head in replacements added close to 81.5 thousand head annually to commercial supplies of total cattle and calves in Oklahoma.

TABLE XVII

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN INVENTORIES, OKLAHOMA AND U. S., 1947-62

Class	Average annual change		Average annual percentage change[a]	
	Oklahoma	U. S.	Oklahoma	U. S.
	(1000 head)		(percent)	
Cows	26.94	443.79	1.7	1.0
Bulls	.72	-7.10	1.3	-0.4
Cow-Bull	27.66	463.69	1.7	0.9
Steers	10.00	291.89	4.6	3.4
Heifers (all)	-.20	139.57	-0.1	1.2
Steer-Heifer	9.80	428.46	1.8	2.1
All Cattle	37.46	865.15	1.7	1.3
All Calves	24.86	598.85	3.0	2.6
Total Cattle and Calves	62.32	1,464.00	2.0	1.6

[a]Average annual percentage change is the average annual change expressed as percentage of the means for 1947-62.

TABLE XVIII

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN SELECTED MEASURES OF CATTLE SUPPLIES AND PRODUCTION, UNITED STATES AND OKLAHOMA, 1947-62

Class	Begin. Inventory		Replacements		Supplies						Production	
					Total[a]		Net[a]		Commercial[a]			
	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.
	Average Annual Changes (1947-62) or Trend Coefficients (1000 Head)											
Cows	443.79	26.94	-74.86	4.87	368.93	31.81	368.93	31.81	371.93	31.82	-71.86	4.88
Bulls	-7.10	0.72	-30.24	-0.37	-37.34	0.35	-37.43	0.35	-36.56	0.35	-29.46	-0.36
Cow-Bull	463.69	27.66	-105.10	4.50	331.59	32.16	331.59	32.16	335.37	32.17	-101.32	4.52
Steers	291.89	10.00	530.21	19.25	822.10	29.25	822.10	29.25	811.78	28.97	519.89	18.96
Heifers	139.57	-0.20	233.62	11.10	370.19	10.90	455.05	6.03	441.63	6.04	305.06	6.24
Steer-Heifer	428.46	9.80	763.83	30.35	1192.20	40.15	1267.15	32.28	1253.41	35.00	824.95	25.20
All Cattle	865.15	37.46	733.59[b]	29.98[b]	1598.74[b]	67.44[b]	1598.74	67.44	1588.78	67.18	723.63	21.68
Calves	598.85	24.86	418.73	19.42	1017.58	44.28	283.99	14.30	285.67	14.29	-313.18	-10.56
Total Cattle and Calves	1464.00	62.32	409.57[b]	20.80[b]	1873.57[b]	83.12[b]	1882.73	81.74	1874.75	81.47	410.45	19.15

[a] See footnote at the end of Table X for the definitions

[b] These are not additive for the reasons explained earlier. See pp. 56 and 59.

TABLE XVIII (Continued)

Class	Begin. Inventory		Replacements		Supplies: Total[a]		Supplies: Net[a]		Supplies: Commercial[a]		Production	
	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.	U. S.	Okla.
	Average Annual Percentage Changes (1947-62) (Percent)											
Cows	1.0	1.7	-1.0	1.7	0.7	1.7	0.7	1.7	0.7	1.7	0.7	1.9
Bulls	-0.4	1.3	-5.2	-2.0	-1.6	0.5	-1.6	0.5	-1.6	0.5	-5.4	-2.1
Cow-Bull	0.9	1.7	-1.3	1.5	0.6	1.6	0.6	1.6	0.6	1.7	-1.3	1.6
Steers	3.4	4.6	3.9	3.5	3.7	3.8	3.7	3.8	3.7	3.9	4.0	3.6
Heifers	1.2	-0.1	1.9	2.6	1.7	1.4	2.8	1.2	2.9	1.2	7.8	4.4
Steer-Heifer	2.1	1.8	3.0	3.1	2.6	2.6	3.3	2.8	3.4	2.8	4.9	3.7
All Cattle	1.3	1.7	2.8[b]	3.0[b]	1.7[b]	2.1[b]	1.7	2.1	1.7	2.1	2.9	3.1
Calves	2.6	3.0	1.1	1.4	1.7	2.0	0.9	1.2	0.9	1.2	-3.2	-3.1
Total Cattle and Calves	1.6	2.0	1.0[b]	1.5[b]	1.4[b]	1.8[b]	1.5	1.8	1.5	1.9	1.2	1.5

[a] See footnote at the end of Table X for the definitions

[b] These are not additive for the reasons explained earlier. See pp. 56 and 59.

An average annual increase of 4,870 replacements of cows is partially responsible for a down-trend in heifer inventory and a small average annual increase (6,030 head) in heifer commercial slaughter in spite of large average annual increase (11,100 head) in heifer replacements. Of 81,470 head average annual increase in commercial supplies of total cattle and calves, cows and steers accounted for nearly three-fourths. Percentage distribution of 81,470 head by classes were: cow-bull 39.5 percent; steers 35.6 percent; heifers 7.4 percent; and calves 17.5 percent.

Production, which is governed largely by slaughter, also is a function of difference between commercial supplies and beginning inventory. Regional production, unlike the U. S. production, is influenced considerably by regional net outshipments.

$$P_{ij} = CSP_{ij} - BI_{ij} \qquad (6.1)$$

$$P_{ij} = ACS_{ij} + OI_{ij} + NOS_{ij} \qquad (6.2)$$

Difference between regional outshipment and regional inshipment is different from the statistical discrepancy for the U.S. It is the net-outshipments of animals to another region and should be considered as a part of regional production.

While commercial supplies of total cattle and calves rose at an average animal rate of nearly 81.5 thousand head production of total cattle and calves rose at a rate of only slightly over 19 thousand head per year due to large average annual increade in beginning inventory (over 62 thousand head per year). Increase in steer production accounted for most of the 19,150 head increase per year, 18,960 head. Contrary to other classes, calf production trended downward at an average annual rate of over 10.5 thousand head.

Linear Trends in Marketings, Feeder Supplies, and Components

Adjusted marketings of cows and calves in Oklahoma trended downward while adjusted marketings of steers and heifers trended upward, Table XIX.

High rates of down-trend in adjusted commercial slaughter are responsible for down-trends in adjusted marketings of cows and calves. Adjusted slaughter of cows trended downward at an average annual rate of 5,920 head. Cow adjusted marketings trended down at an average annual rate of 2,750 head. Contrary to down-trends in adjusted marketings and adjusted slaughter net-outshipments of cows trended up at an annual rate of 3,180. This increase in net-outshipments explains the difference in trend coefficients between adjusted marketings and adjusted commercial slaughter.

$$NOS_{c,9}\ (3180) = AM_{c,9}\ (-2750) - ACS_{c,9}\ (-5920) \qquad (6.3)$$

Adjusted marketings of steers increased 17,910 head per year and adjusted marketings of heifers increased 7,500 per year in Oklahoma. Much of the increase in adjusted marketings of steers (and heifers) is due to high increasing rates of net-outshipments. An average annual increase of 12,790 head in net-outshipments accounted for 71.4 percent of increase in adjusted marketings of steers. While slaughter of total cattle and calves trended down at an average annual rate of 10,510 head net-outshipments of total cattle and calves trended up at an average annual rate of 25,750 head showing the change in the role Oklahoma has had in the nation's cattle industry. Oklahoma has shifted emphasis from slaughtering of cattle to producing cattle for shipment to other regions.

Feeder cattle supplies in Oklahoma increased at an average annual rate of 25,520 head, an average annual percentage increase of 6.0 percent compared to 5.6 percent for the U. S. (Table XX). Outstanding

TABLE XIX

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN MARKETINGS AND PRINCIPAL COMPONENTS, OKLAHOMA, 1947-62

Class	Adjusted Marketings	Out-Shipments	Inshipments	Net Out-Shipments	Adjusted Commercial Slaughter
	Average Annual Changes (1947-62) (1000 Head)				
Cows	-2.75	3.18	-3.23	6.41	-5.92
Bulls	-.99	0.11	-0.52	0.63	-1.09
Cow-Bull	-3.73	3.29	-3.75	7.04	-7.02
Steers	17.91	12.79	-0.67	13.46	5.12
Heifers	7.50	6.68	1.29	5.39	0.82
Steer-Heifer	25.41	19.47	0.62	18.85	5.94
All Cattle	21.68	22.76	-3.13	25.89	-1.08
All Calves	-6.44	2.99	6.82	-3.83	-9.43
Total Cattle and Calves	15.24	25.75	3.70	22.06	-10.51
	Average Annual Percentage Changes (1947-62) (Percent)				
Cows	-0.9	3.3	-4.4	26.1	-2.9
Bulls	-4.4	1.4	-9.3	28.0	-7.5
Cow-Bull	-1.1	3.1	-4.8	26.7	-3.2
Steers	3.0	2.7	-0.8	3.5	3.8
Heifers	4.3	4.8	3.9	5.1	2.4
Steer-Heifer	3.3	3.2	0.5	3.8	3.6
All Cattle	2.0	1.2	-1.6	5.0	-0.3
All Calves	-1.4	0.8	4.4	-2.1	-7.0
Total Cattle and Calves	1.0	1.1	1.1	3.1	-2.0

TABLE XX

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN MARKETINGS AND FEEDER CATTLE SUPPLIES AND COMPONENTS FOR STEERS AND HEIFERS OKLAHOMA, 1947-62

Item	Steers	Heifers	Steer-Heifer
Average Annual Changes (1947-62) (1000 Head)			
Adj. Marketings	17.91	7.50	25.41
Marketings for Feeding	16.84	4.30	21.14
Marketings for Slaughter	1.07	3.20	4.27
Feedlot Marketings	1.72	3.27	4.99
Other Marketings for Slaughter	-0.65	-0.07	-0.72
Feeder Cattle Supplies	19.23	6.29	25.52
Feedlot Marketings	1.72	3.72	4.99
Net-Outshipments for Feeding	17.51	3.02	20.53
Average Annual Percentag Changes (1947-62) (percent)			
Adj. Marketings	3.0	4.3	3.3
Marketings for Feeding	5.1	5.0	5.1
Marketings for Slaughter	0.4	3.6	1.2
Feedlot Marketings	2.2	7.0	4.0
Other Marketings for Slaughter	-0.3	-0.2	-0.3
Feeder Cattle Supplies	5.9	6.4	6.0
Feedlot Marketings	2.2	7.0	4.0
Net-Outshipments for Feeding	7.0	5.8	6.8

features of Table XX are (1) higher average annual percentage increases of heifers than of steers, (2) importance of marketings for feeding in the adjusted marketings, (3) relatively small role of marketings for slaughter played in adjusted marketings, (4) down-trend of feedlot marketings, and (5) importance of net-outshipments of feeder cattle supplies in the total supplies of feeder cattle.

Linear Trends in Disposition and Components

The principal components of total dispositions, which is the same as total supplies, are adjusted commercial slaughter, ending inventory, net-outshipments, and outplacements. Death and farm slaughter make up the remainder but are relatively unimportant. Large average annual increases in ending inventory (31,340) and net-outshipments (6,410) in cows were made possible at the expense of down-trend (-5,920) in adjusted commercial slaughter in spite of up-trend (4,870) in cow replacements (Table XXI). Unlike cows, net-outshipments contributed most to up-trends in total disposition of steers and heifers. Large up-trends in beginning inventory and outplacements of calves resulted in down-trends in adjusted commercial slaughter and net-outshipments of calves (Table XXI).

To have a substantially large average annual increase in ending inventory (42,370) and net-outshipments (25,890) of all cattle, outplacements of calves had to increase at a substantially high average annual rate (29,980). Coupled with this was a necessity of maintaining high rate of increase (27,550) in calf ending inventory which attributed heavily, if not forced, to the down-trends in calf slaughter (-9,430) and net-outshipments of calves (-3,830).

TABLE XXI

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN DISPOSITION AND COMPONENTS, OKLAHOMA, 1947-62

Class	Ending Inventory	Adjusted Commercial Slaughter	Net Out-Shipments	Commercial Disposition	Death	Farm Slaughter	Net Disposition	Out-Placements	Total Disposition
				Average Annual Changes (1947-62) (1000 Head)					
Cows	31.34	-5.92	6.41	31.82	-0.01	--	31.81	--	31.81
Bulls	0.82	-1.09	0.63	0.35	[a]	--	0.35	--	0.35
Cow-Bull	32.16	-7.02	7.04	32.17	-0.01	--	32.16	--	32.16
Steers	10.39	5.12	13.46	28.97	0.16	0.13	29.26	--	29.26
Heifers	-0.18	0.82	5.39	6.03	-0.03	0.03	6.03	4.87	10.90
Steer-Heifer	10.21	5.94	18.85	35.00	0.13	0.15	35.29	4.87	40.15
All Cattle	42.37	-1.08	25.89	67.17	0.12	0.15	67.44	--	67.44[c]
All Calves	27.55	-9.43	-3.83	14.30	-0.05	0.05	14.30	29.98	44.28
Total Cattle and Calves	69.92	-10.51	22.06	81.47	0.07	0.20	81.74	1.38[b]	83.12[c]

[a] Less than 0.01

[b] Outplacements of total cattle and calves in actual is death and farm slaughter of new born calves

[c] These are not additive because outplacements are not additive

TABLE XXI (Continued)

Class	Ending Inventory	Adjusted Commercial Slaughter	Net Out-Shipments	Commercial Disposition	Death	Farm Slaughter	Net Disposition	Out-Placements	Total Disposition
	Average Annual Percentage Changes (1947-62) (percent)								
Cows	1.9	-2.9	26.1	1.7	-0.1	--	1.7	--	1.7
Bulls	1.4	-7.5	28.0	0.5	d	--	0.5	--	0.5
Cow-Bull	1.9	-3.2	26.7	1.7	-0.1	--	1.6	--	1.6
Steers	4.6	3.8	3.5	3.9	2.0	1.8	3.8	--	3.8
Heifers	-0.1	2.4	5.1	1.2	-0.6	0.6	1.2	--	1.4
Steer-Heifer	1.8	3.6	3.8	2.8	1.0	1.3	2.8	--	2.6
All Cattle	1.9	-0.3	5.0	2.1	0.3	1.3	2.1	--	2.1
All Calves	3.2	-7.0	-2.1	1.2	-0.4	1.2	1.2	--	2.0
Total Cattle and Calves	2.2	-2.0	3.1	1.9	0.2	1.3	1.8	--	1.8

[d] Less than 0.01 percent

Down-trend in total cattle and calf slaughter (-10,510) and an up-trend in newborn calves (20,800) made it possible to add 7,600 cattle and calves annually to inventory of total cattle and calves and increase net-outshipments of total cattle and calves by 22,060 annually on the average.

$$CSP = BI + R - R' - D - FS \qquad (6.4)$$

$$(81.47 = 62.32 + 20.80 - 1.38 - 0.07 - 0.20)$$

or $$CSP = ACS + EI + NOS \qquad (6.5)$$

$$(81.47 = -10.51 + 69.92 + 22.06)$$

Therefore $$BI + R - R' - D - FS = ACS + EI + NOS \qquad (6.6)$$

$$(62.32 + 20.80 - 1.38 - 0.07 - 0.20 = -10.51 + 69.92 + 22.06)$$

or $$R - ACS = EI - BI + NOS + R' + D + FS \qquad (6.7)$$

$$(20.80 - (-10.51) = 69.92 - 62.32 + 22.06 + 1.38 + 0.07 + 0.20)$$

or $$R - ACS = \Delta I + NOS + R' + D + FS \qquad (6.8)$$

$$(31.31 = 7.60 + 22.06 + 1.38 + 0.07 + 0.20)$$

The trends of all the balance sheet variables for Oklahoma are put together in Table XXII, with average annual percentage changes, as final summary of linear trends of various aspects of Oklahoma cattle industry for the period of 1947-62.

TABLE XXII

TREND COEFFICIENTS AND AVERAGE ANNUAL PERCENTAGE CHANGES IN BALANCE SHEET VARIABLES, OKLAHOMA, 1947-62

Variable	Cows	Bulls	Cow-Bull	Steers	Heifers	Steer-Heifers	All Cattle	Calves	Total Cattle and Calves
				Average Annual Changes[a] (1000 Head)					
Beg. Inventories	26.94	0.72	27.66	10.00	-0.20	9.80	37.46	24.86	62.32
Replacements	4.87	-0.37	4.50	19.25	11.10	30.35	29.98	19.42	20.80
Outplacements	--	--	--	--	4.87	4.87	--	29.98	1.38[b]
Farm Slaughter	--	--	--	0.13	0.03	0.15	0.15	0.05	0.20
Death	-0.01	[c]	-0.01	0.16	-0.03	0.13	0.12	-0.05	0.07
Comm. Supplies	31.82	0.35	32.17	28.97	6.03	35.00	67.17	14.30	81.47
Adj. Marketings	-2.75	-0.99	-3.73	17.91	7.50	25.41	21.68	-6.44	15.24
Outshipments	3.18	0.11	3.29	12.79	6.68	19.47	22.76	2.99	25.75
Inshipments	-3.23	-0.52	-3.75	-0.67	1.29	0.62	-3.13	6.82	3.70
Net-Outshipments	6.41	0.63	7.04	13.46	5.39	18.85	25.89	-3.83	22.06
Comm. Slaughter	-5.92	-1.09	-7.02	4.62	0.77	5.39	-1.63	-8.88	-10.51
Adj. Comm. Slaughter	-5.92	-1.09	-7.02	5.12	0.82	5.94	-1.08	-9.43	-10.51
Ending Inventories	31.34	0.82	32.16	10.39	-0.18	10.21	42.37	27.55	69.92
Production	4.88	-0.36	4.51	18.96	6.24	25.20	29.71	-10.56	19.15

[a] Figures in this table may not always add up due to rounding

[b] This figure represents death and farm slaughter of new-born calves

[c] Less than 10 head

TABLE XXII (Continued)

Variable	Cows	Bulls	Cow-Bull	Steers	Heifers	Steer-Heifers	All Cattle	Calves	Total Cattle and Calves
				Average Annual Percentage Changes (percent)					
Beg. Inventories	1.7	1.3	1.7	4.6	-0.1	1.8	1.7	3.0	2.0
Replacements	1.7	-2.0	1.5	3.5	2.6	3.1	3.0	1.4	1.5
Outplacements	--	--	--	--	1.7	1.7	--	3.0	1.8
Farm Slaughter	--	--	--	1.8	0.6	1.3	1.3	1.2	1.3
Death	-0.1	0	-0.1	2.0	-0.6	1.0	0.3	-0.4	0.2
Comm. Supplies	1.7	0.5	1.7	3.9	1.2	2.8	2.1	1.2	1.9
Adj. Marketings	-0.9	-4.4	-1.1	3.0	4.3	3.3	2.0	-1.4	1.0
Outshipments	3.3	1.4	3.1	2.7	4.8	3.2	1.2	0.8	1.1
Inshipments	-4.4	-9.3	-4.8	-0.8	3.9	0.5	-1.6	4.4	1.1
Net-Outshipments	26.1	28.0	26.7	3.5	5.1	3.8	5.0	-2.1	3.1
Comm. Slaughter	-2.9	-7.5	-3.2	3.8	2.5	3.6	-0.4	-5.9	-2.0
Adj. Comm. Slaughter	-2.9	-7.5	-3.2	3.8	2.4	3.6	-0.3	-7.0	-2.0
Ending Inventories	1.9	1.4	1.9	4.6	-0.1	1.8	1.9	3.2	2.2
Production	1.9	-2.1	1.6	3.6	4.4	3.7	3.1	-3.1	1.5

CHAPTER VII

AN EVALUATION AND SUMMARY

An evaluation of methods employed in disaggregating national data for regional analysis and total cattle and calves data for analysis of component classes of cattle along with implications for changes or improvements in published sources of relevant data is in order.

Evaluation of the Methods of Disaggregation and Implications

The most important contribution of the study is the development of methods which allowed the disaggregation of the national data for regional analysis and the data on total cattle and calves by its component classes through the balance sheet approach. Inadequacies and the aggregated nature of the published data have been among the most critical problems confronting researchers. Often failure of research in providing real insight of the cattle industry is due to the inadequate and overly aggregated data. In view of this, the rationale of the study that developed, though may not be fully satisfactory, methods of generating more detailed and less aggregated data is obvious. Application of statistical tests were not carried out and an evaluation of methods used to disaggregate national data as well as data on total cattle and calves are not possible in view of the fact that there are no other data, either published or generated, available.

The necessity for assumptions at various points in the balance sheet analysis for 1947-62 may be a shortcoming and could be improved upon as more data become available. However, with available data, it was not found possible to derive certain variables directly. Marketings and inshipments, for instance, are jointly determined and within broad limits are independent of most other variables. It also was necessary to allocate the discrepancy between marketings minus inshipments and slaughter on a reasonable but more or less arbitrary basis. Regional estimates of slaughter are affected by any distortions introduced by use of federally inspected slaughter data. In some regions, such as the Northeast, federally inspected slaughter appears to be a biased indicator of commercial slaughter.

Adoption of the balance sheet approach in the study was quite important for this made it possible to obtain methods for an estimate of herd replacements, marketings, and slaughter of cattle by individual classes for the first time. Other achievements were the integration of inventory, marketings and slaughter data, and development of national and regional feeder cattle supplies estimates.

Needs for Improvements in Published Data

The estimates and findings of the study provide bases for determining and evaluating needs for improvements in published data on cattle production and marketing. The discrepancy in the national data on net marketings and slaughter deserves careful study. During certain years of the 1947-62 period, the discrepancy was sufficiently large that the effects on many other variables probably was serious. While the published data on marketings and inshipments are open to serious question

and deserve detailed attention, the study suggests that the possibility of serious errors in the published data on commercial slaughter should not be entirely discounted. In addition, the distribution of commercial slaughter to cattle and calves clearly is not consistent with the distribution of data between these classes on inventories and marketings. Greater conformity in these data is required if they are to be used jointly.

Certain key data are essential if balance sheet procedures as employed in this study are to be improved. These include (1) improved and more accurate data on total cattle and calf inshipments, (2) separate data on inshipments for cattle and calves, and (3) periodic data on the volume of calf outplacements to steers and heifers and volume of heifer outplacements to cows. Of these, data on herd replacements, the volume of outplacements to steers and heifers, and volume of heifer outplacements to cows are most critical and important. The study indicated that these might be used effectively to predict peaks in cattle cycle.

Census type data on commercial cattle slaughter by classes, i.e., for cows, steers, heifers, heifer calves, and steer calves, has been needed badly for many years. Production patterns through time and by region and comsumption requirements of the various classes are so different that in the modern economy detailed data on slaughter by classes has become almost essential. Data by classes on marketings and inshipments also are needed.

Published data on interstate shipments of cattle and dressed beef are, for practical purposes, non-existent. It is here that the regional estimates developed during the course of this study are weakest. Interregional competition and interregional shipments of cattle have become

so important that in the absence of improvements in the data on cattle and calf shipments many ill-advised investment decisions are being made. Improvements in these data also are required for substantial developments in research on interregional competition in the cattle industry.

The Nature of Changes in the U. S. Cattle Industry During 1947-62

It seems apparent that fundamental changes in the nature and composition of the cattle industry appeared during 1947-62. Primary changes have occurred in the composition of cattle slaughter, inventory, marketings, production, and commercial supplies during the 1947-62 period. Over twenty-four percent of total cattle slaughtered in 1947 were cows, second only to steers with 28 percent, and calf slaughter accounted for nearly 38 percent of total slaughter (Table XXIII). However, by 1962, considerable change in the make-up of total cattle slaughter took place. Steer slaughter had increased from 28 percent in 1947 to 43.7 percent in 1962 of total slaughter. Slaughter of heifers accounted for the most substantial increase, from 7.9 percent in 1947 to 16.9 percent in 1962 of total slaughter (Table XXIII). Importance of cows as slaughter cattle in percentage-wise declined from 24.2 percent in 1947 to 16.2 percent in 1962. Calf slaughter also declined in importance, from 37.7 percent in 1947 to 22.4 percent in 1962.

Since slaughter constituted the largest portion of production, the composition of total cattle and calf production changed substantially (Table XXIII). Production of steers became more and more important to production of total cattle and calves. In 1947, steer production accounted for about one-third of total production which, by 1962, was increased to nearly one-half. Percentage contribution of heifer

TABLE XXIII

PERCENTAGE DISTRIBUTION OF CLASSES OF TOTAL CATTLE AND CALVES OF THE MAIN BALANCE SHEET VARIABLES, U. S., 1947 AND 1962

Variables	Year	Cows	Bulls	Steers	Heifers	All Cattle	Calves	Total Cattle & Calves
				(percent)				
Beginning Inventory	1947	52.5	2.3	8.8	12.6	76.3	23.7	100.0
	1962	47.5	1.7	11.1	12.3	72.6	27.4	100.0
Replacement[a]	1947	17.2	41.0	153.8	105.2	36.4	175.2	45.5
	1962	15.4	20.6	162.2	117.3	45.1	144.9	42.7
Comm. Supplies	1947	43.8	2.3	15.6	11.7	73.5	26.5	100.0
	1962	39.4	1.5	20.6	13.8	75.3	24.7	100.0
Adj. Marketings	1947	24.0	2.3	31.0	8.7	66.0	34.0	100.0
	1962	14.0	0.8	43.1	16.6	75.1	24.9	100.0
Comm. Slaughter	1947	24.2	2.3	28.0	7.9	62.3	37.7	100.0
	1962	16.2	0.8	43.7	16.9	77.6	22.4	100.0
Adj. Com. Slaughter	1947	24.2	2.3	31.2	8.8	66.4	33.6	100.0
	1962	16.2	0.8	48.0	18.5	83.5	16.5	100.0
Production	1947	21.3	2.3	33.2	9.4	66.2	33.8	100.0
	1962	17.9	0.9	46.1	17.8	82.7	17.3	100.0

[a]Replacements as percentage of beginning inventory not a percentage distribution of classes of total cattle and calves, thus, not additive

production to production of total cattle and calves nearly doubled during the 1947-62 period increasing from 9.4 percent in 1947 to 17.8 percent in 1962.

As percentage contributions of cows and calves to the total of cattle and calves declined in slaughter and production, the decline also resulted in smaller percentage contributions made by cows and calves in marketings and commercial supplies to the total as can be seen from Table XXIII.

Some of the more important changes that have occurred in the U. S. cattle industry during the 1947-62 period were (1) larger contributions made by steers and heifers to the total slaughter of cattle and calves, especially increase in heifers; (2) change in the role of calves from slaughter to replacements; (3) lower replacements rates of cows and bulls; and (4) increased production of fed cattle.

All of these changes were achieved by (1) reducing calf slaughter, and (2) reducing heifers going out as replacements of cows.

The Nature of Changes in Oklahoma Cattle Industry, 1947-62

Very little change in composition of beginning inventory of total cattle and calves took place in Oklahoma between 1947 and 1962 (Table XXIV). Replacements ratios of classes of cattle to beginning inventories also have had only a moderate change from 1947 to 1962. In fact, unlike U. S., replacement ratio of steers and calves declined a little in Oklahoma in 1962 compared to 1947 (Table XXIV). Percentage distribution of commercial supplies by classes too had only a moderate change from 1947 to 1962 in Oklahoma. However, composition of commercial and adjusted

TABLE XXIV

PERCENTAGE DISTRIBUTION OF CLASSES OF TOTAL CATTLE AND CALVES OF THE MAIN BALANCE SHEET VARIABLES, OKLAHOMA, 1947 AND 1962

Variables	Year	Cows	Bulls	Steers	Heifers	All Cattle	Calves	Total Cattle & Calves
				(percent)				
Beginning Inventory	1947	54.1	2.0	5.9	12.0	74.0	26.0	100.0
	1962	51.6	1.8	7.7	10.1	71.2	28.8	100.0
Replacements[a]	1947	12.2	33.3	296.3	108.3	42.1	164.3	45.5
	1962	16.3	21.9	266.1	148.2	50.3	150.0	45.5
Comm. Supplies	1947	42.6	1.9	16.3	12.9	73.7	26.3	100.0
	1962	42.0	1.5	19.5	11.6	74.6	25.4	100.0
Adj. Marketings	1947	22.7	1.8	34.2	13.0	71.7	28.3	100.0
	1962	15.4	0.8	43.2	16.3	75.7	24.3	100.0
Net-Outshipments	1947	[b]	[b]	57.6[c]	20.1[c]	75.7[c]	24.3[c]	100.0
	1962	9.0	0.7	54.3	19.1	83.1	16.9	100.0
Comm. Slaughter	1947	43.4	3.5	12.0	5.6	64.5	35.5	100.0
	1962	33.8	1.2	37.1	10.4	82.5	17.5	100.0
Adj. Com. Slaughter	1947	43.4	3.5	14.7	7.1	68.7	31.3	100.0
	1962	33.8	1.2	41.0	12.0	88.0	12.0	100.0
Production	1947	14.3	1.5	41.9	15.1	72.8	27.2	100.0
	1962	19.0	0.9	48.0	15.1	83.0	17.0	100.0

[a]Replacements as percentage of beginning inventories not a percentage distribution of classes of total cattle and calves, thus, not additive

[b]Percentage computation is not possible for these due to the fact that these numbers were negative numbers. See appendix Table B-I

[c]These percentage figures computed with inclusion of negative net outshipments for cows and bulls

commercial slaughter changed substantially in Oklahoma during the 1947-62 period.

Almost one-half of commercial slaughter of cattle and calves in Oklahoma was cows and bulls in 1947. By 1962, cows and bulls comprised only 35 percent of total slaughter in Oklahoma. Slaughter of calves also declined in its importance to total slaughter. Over one-third of total cattle and calves slaughtered in Oklahoma in 1947 were calves. This proportion, however, was down to only 17.5 percent in 1962.

As in the United States, there were declining percentage contributions by cows and calves to slaughter of total cattle and calves which met by increasing percentage contributions by steers and heifers. Percentage contribution of steer slaughter to the total more than tripled, from 12.0 percent to 37.1 percent, in Oklahoma during the 1947-62 period and percentage contribution of heifer slaughter was nearly doubled during the same period.

Contributions by bulls and heifers to production of total cattle and calves remained almost unchanged while production of cows and steers have become more important, at expense of calf production, percentage-wise. In 1947, percentage distribution of total cattle and calves production by classes were: cows 14.3 percent; bulls 1.5 percent; steers 41.9 percent; heifers 15.1 percent; and calves 27.2 percent. In comparison to 1947 percentage distribution of production of total cattle and calves in 1962 were 19.0 percent, 0.9 percent, 48.0 percent, 15.1 percent, and 17.0 percent for cows, bulls, steers, heifers, and calves, respectively.

Composition of changes in production by classes differ considerably from class to class. While production of cows increased 82.3 percent (or 130,000 head) during the 1947-62 period, cow slaughter was decreased by

52.4 percent (or 150,000) during the same period. Large increases in net-outshipments (918.1 percent or 101,000 head) and net addition to inventories (ΔI), 179,000 head, made a substantial increase in cow production in spite of large decreases in cow slaughter.

Unlike cow production increases in production of steers and heifers were due to primarily increases in slaughter and net-outshipments of these classes of cattle. Increase in net-outshipments was the single most important factor in the growth of cattle and calf production in Oklahoma during 1947-62 (Table XXV).

TABLE XXV

ABSOLUTE AND PERCENTAGE CHANGES IN THE MAGNITUDES OF ESTIMATES OF THE MAIN BALANCE SHEET VARIABLES BETWEEN 1947 AND 1962, OKLAHOMA

Variables	Cows	Bulls	Steers	Heifers	All Cattle	Calves	Total Cattle & Calves
		(1000 Head)					
Beginning Inventory	413	10	119	42	584	346	930
	(28.0)	(18.5)	(73.09)	(12.8)	(29.0)	(48.8)	(34.1)
Replacements	129	-4	268	193	457	417	424
	(72.1)	(-22.4)	(56.2)	(54.5)	(53.8)	(35.8)	(34.2)
Commercial Supplies	543	6	385	105	1039	305	1344
	(33.3)	(8.5)	(61.8)	(21.3)	(36.9)	(30.2)	(35.1)
Adj. Marketings	-91	-16	237	88	218	-17	201
	(-24.1)	(-53.3)	(41.8)	(40.9)	(18.3)	(3.6)	(12.1)
Comm. Slaughter	-150	-18	70	5	-93	-164	-257
	(-52.4)	(-78.3)	(88.6)	(13.5)	(-21.9)	(-70.1)	(-39.0)
Adj. Comm. Slaughter	-150	-18	68	1	-99	-158	-257
	(-52.4)	(-78.3)	(70.1)	(2.1)	(-21.9)	(-76.7)	(-39.0)
Net Outshipments	101	9	165	59	334	9	343
	(918.2)	(450.0)	(43.3)	(44.4)	(66.7)	(5.6)	(51.8)
Change in Inventories	179	5	33	3	220	108	328
	(152.3)	(125.0)	(206.3)	(21.4)	(145.7)	(161.2)	(150.5)
Production	130	-4	266	63	455	-41	414
	(82.3)	(-23.5)	(57.6)	(38.0)	(56.7)	(-13.7)	(37.5)

[a]Numbers in the parentheses represent absolute changes as percentage of 1947 data

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APPENDIX A

TABLE A-I

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1947

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	42,330	1,834	44,164	7,109	10,160	17,269	61,433	19,121	80,554	34,703
R	7,292	752	8,044	10,933	10,670	21,603	22,355	33,498	36,677	36,677
R'					7,292	7,292		22,355	3,179	
D	642	33	675	229	172	401	1,076	388	1,464	2,466
FS				366	274	640	640	231	871	713
CSP	48,980	2,553	51,533	17,447	13,092	30,539	82,072	29,645	111,717	33,498
M	9,822	937	10,759	12,667	3,555	16,222	26,981	13,893	40,874	
AM	10,279	981	11,260	13,257	3,721	16.978	28,238	14,610	42,848	
OS	1,467	140	1,607	1,892	531	2,423	4,030	2,298	6,328	
IS	1,924	184	2,108	2,482	667	3,179	5,287	3,015	8,302	
CS	8,355	797	9,152	9,668	2,713	12,381	21,533	13,013	34,546	
ACS	8,355	797	9,152	10,775	3,024	13,799	22,951	11,595	34,546	
dI	-457	-44	-501	-590	-166	-756	-1,257	-717	-1,974	
EI	40,625	1,756	42,381	6,672	10,068	16,740	59,121	18,050	77,171	
ΔI	-1,705	-78	-1,783	-437	-92	-529	-2,312	-1,071	-3,383	
P	6,650	719	7,369	10,338	2,932	13,270	20,639	10,524	31,163	

[a] T.C.C. = Total Cattle and Calves

[b] BI of newborn calves actually is the calves born during the year. These explanations apply to all other tables, Appendix A-II through B-XVI.

TABLE A-II

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1948

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	40,625	1,756	42,381	6,672	10,068	16,740	59,121	18,050	77,171	33,125
R	7,234	635	7,869	9,957	9,829	19,786	20,421	31,990	34,848	34,848
R'					7,234	7,234		20,421	2,858	
D	613	30	643	209	159	368	1,011	377	1,388	2,247
FS				327	249	576	576	215	791	
CSP	47,246	2,361	49,607	16,093	12,255	28,348	77,955	29,027	106,982	31,990
M	9,086	828	9,914	10,739	2,764	13,503	23,417	12,607	36,024	
AM	9,562	871	10,533	11,301	2,909	14,210	24,643	13,104	37,747	
OS	1,621	148	1,769	1,916	493	2,409	4,178	1,694	5,872	
IS	2,097	191	2,288	2,478	638	3,116	5,404	2,191	7,595	
CS	7,465	680	8,145	8,145	2,096	10,241	18,386	11,766	30,152	
ACS	7,465	680	8,145	8,823	2,271	11,094	19,239	10,913	30,152	
dI	1,476	143	-519	-562	-145	-707	-1,226	-497	-1,723	
EI	39,781	1,681	41,462	7,270	9,984	17,254	58,716	18,114	76,830	
ΔI	-844	-75	-919	598	-84	514	-405	64	-341	
P	6,621	605	7,226	9,421	2,187	11,608	18,834	10,977	29,811	

TABLE A-III

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1949

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	39,781	1,681	41,462	7,270	9,984	17,254	58,716	18,114	76,830	33,748
R	7,160	673	7,833	10,088	9,835	19,924	20,597	32,233	35,136	35,136
R'					7,160	7,160		20,597	2,903	
D	653	33	686	237	173	410	1,096	411	1,507	2,333
FS				316	231	547	547	205	752	570
CSP	46,288	2,321	48,609	16,805	12,256	29,061	77,670	29,134	106,804	32,233
M	7,074	784	7,858	12,427	2,620	15,047	22,905	12,627	35,532	
AM	7,361	816	8,177	12,930	2,726	15,656	23,833	13,087	36,920	
OS	1,382	153	1,535	2,427	512	2,939	4,474	2,217	6,691	
IS	1,669	185	1,854	2,930	618	3,548	5,402	2,677	8,069	
CS	5,692	631	6,323	9,655	2,035	11,690	18,013	10,828	28,841	
ACS	5,692	631	6,323	10,000	2,108	12,108	18,431	10,410	28,841	
dI	-287	-32	-319	-503	-106	-609	-928	-460	-1,388	
EI	40,596	1,690	42,286	6,805	10,148	16,953	59,239	18,724	77,963	
ΔI	815	9	824	-465	164	-301	523	610	1,133	
P	6,507	640	7,147	9,535	2,272	11,806	18,954	11,020	29,974	

TABLE A-IV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1950

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	40,596	1,690	42,286	6,805	10,148	16,953	59,239	18,724	77,963	34,899
R	7,963	710	8,674	10,568	10,783	21,351	22,061	34,152	36,977	36,977
R'					7,963	7,963		22,061	2,825	
D	630	31	661	222	165	387	1,048	397	1,445	2,297
FS				295	222	517	517	196	713	528
CSP	47,929	2,369	50,298	16,856	12,581	29,437	79,735	30,222	109,957	34,152
M	7,223	842	8,065	12,165	2,434	14,599	22,664	12,028	34,692	
AM	7,646	891	8,537	12,878	2,577	15,455	23,992	12,778	36,770	
OS	1,388	162	1,550	2,338	468	2,806	4,356	2,462	6,818	
IS	1,811	211	2,022	3,051	611	3,662	5,684	3,212	8,896	
CS	5,835	680	6,515	9,488	1,898	11,386	17,901	9,973	27,874	
ACS	5,835	680	6,505	9,827	1,966	11,793	18,308	9,566	27,874	
dI	-423	-49	-472	-713	-143	-856	-1,328	-750	-2,078	
EI	42,094	1,689	43,783	7,029	10,615	17,644	61,427	20,656	82,083	
ΔI	1,498	-1	1,497	224	467	691	2,188	1,932	4,120	
P	7,333	679	8,012	10,051	2,433	12,484	20,496	11,498	31,994	

TABLE A-V

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1951

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	42,094	1,689	43,783	7,029	10,615	17,644	61,427	20,656	82,083	35,825
R	8,020	806	8,826	10,880	11,223	22,103	22,909	33,028	35,838	35,838
R'					8,020	8,020		22,909	2,810	
D	673	33	706	237	183	420	1,126	411	1,537	2,326
FS				293	226	519	519	189	708	484
CSP	49,441	2,462	51,903	17,379	13,409	30,788	82,691	30,175	112,866	33,028
M	7,379	920	8,299	12,007	2,332	14,339	22,638	11,328	33,966	
AM	7,382	920	8,302	12,011	2,333	14,344	22,646	11,333	33,979	
OS	1,861	232	2,093	3,028	588	3,616	5,709	3,463	9,172	
IS	1,864	232	2,096	3,032	589	3,621	5,717	3,468	9,185	
CS	5,518	688	6,206	8,516	1,654	10,170	16,376	8,418	24,794	
ACS	5,518	688	6,206	8,979	1,744	10,723	16,929	7,865	24,794	
dI	-3	0	-3	-4	-1	-5	-8	-5	-13	
EI	43,923	1,774	45,697	8,400	11,665	20,065	65,762	22,310	88,072	
ΔI	1,829	85	1,914	1,371	1,050	2,421	4,335	1,654	5,989	
P	7,347	773	8,120	10,350	2,794	13,144	21,264	9,519	30,783	

TABLE A-VI

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1952

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	43,923	1,774	45,697	8,400	11,665	20,065	65,762	22,310	88,072	38,273
R	9,164	827	9,991	11,383	12,335	23,718	24,545	35,291	38,216	38,216
R'					9,164	9,164		24,545	2,925	
D	694	34	728	254	191	445	1,173	430	1,603	2,431
FS				322	241	563	563	206	769	494
CSP	52,393	2,567	54,960	19,207	14,404	33,611	88,571	32,420	120,991	35,291
M	7,197	855	8,052	13,039	2,561	15,600	23,652	12,246	35,898	
AM	7,187	854	8,041	13,020	2,557	15,577	23,618	12,228	35,841	
OS	1,644	195	1,839	2,979	585	3,564	5,403	3,745	9,148	
IS	1,534	194	1,828	2,960	581	3,541	5,369	3,722	9,091	
CS	5,553	660	6,213	9,732	1,911	11,643	17,856	8,894	26,750	
ACS	5,553	660	6,213	10,060	1,976	12,036	18,249	8,501	26,750	
dI	10	-1	11	19	4	23	34	23	57	
EI	46,840	1,907	48,747	9,147	12,428	21,575	70,322	23,919	94,241	
ΔI	2,917	133	3,050	747	763	1,510	4,560	1,609	6,169	
P	8,470	793	9,263	10,806	2,739	13,546	22,809	10,110	32,919	

TABLE A-VII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1953

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	48,840	1,907	48,747	9,147	12,428	21,575	70,322	23,919	94,241	41,261
R	10,267	752	11,019	12,640	13,318	25,958	26,710	39,144	42,163	42,163
R'					10,267	10,267		26,710	3,019	
D	678	31	709	254	181	435	1,144	429	1,573	2,487
FS				366	260	626	626	234	860	532
CSP	56,429	2,628	59,057	21,167	15,038	36,205	95,262	35,690	130,952	39,144
M	8,843	865	9,708	15,290	3,309	18,599	28,307	14,431	42,738	
AM	9,007	881	9,888	15,574	3,371	18,945	28,833	14,807	43,640	
OS	1,360	133	1,493	2,352	509	2,861	4,354	3,111	7,465	
IS	1,524	149	1,673	2,636	571	3,207	4,880	3,487	8,367	
CS	7,483	732	8,215	12,652	2,738	15,390	23,605	11,668	35,273	
ACS	7,483	732	8,215	12,938	2,800	15,738	23,953	11,320	35,273	
dI	-164	-16	-180	-284	-62	-346	-526	-376	-902	
EI	48,946	1,896	50,842	8,229	12,238	20,467	71,309	24,370	95,679	
ΔI	2,106	-11	2,095	-918	-190	-1,108	987	451	1,438	
P	9,589	721	10,310	12,020	2,610	14,630	24,940	11,771	36,711	

TABLE A-VIII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1954

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	48,946	1,896	50,842	8,229	12,238	20,467	71,309	24,370	95,679	42,601
R	9,305	587	9,892	13,889	13,297	27,186	27,773	41,122	44,135	44,135
R'					9,305	9,305		27,773	3,013	
D	674	29	703	252	185	437	1,140	434	1,574	2,489
FS				365	267	632	632	240	872	524
CSP	57,577	2,454	60,031	21,501	15,778	37,279	97,310	37,045	134,355	41,122
M	10,108	747	10,855	15,609	4,158	19,767	30,622	15,514	46,136	
AM	10,411	769	11,180	16,076	4,283	20,359	31,539	16,131	47,670	
OS	1,652	122	1,774	2,552	680	3,232	5,006	3,367	8,373	
IS	1,955	144	2,099	3,019	805	3,824	5,923	3,984	9,907	
CS	8,456	625	9,081	12,584	3,352	15,936	25,017	12,746	37,763	
ACS	8,456	625	9,081	13,057	3,478	16,535	25,616	12,147	37,763	
dI	-303	-22	-325	-467	-125	-592	-917	-617	-1,534	
EI	49,121	1,829	50,950	8,444	12,300	20,744	71,694	24,898	96,592	
ΔI	175	-67	108	215	62	277	385	528	913	
P	8,631	558	9,189	13,272	3,540	16,812	26,001	12,675	38,676	

TABLE A-IX

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1955

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	49,121	1,829	50,950	8,444	12,300	20,744	71,694	24,898	96,592	42,112
R	8,819	553	9,372	14,915	12,364	27,279	27,832	39,862	42,811	42,811
R'					8,819	8,819		27,832	2,949	
D	680	28	708	269	183	452	1,160	430	1,590	2,462
FS				377	254	631	631	234	865	487
CSP	57,260	2,354	59,614	22,713	15,408	38,121	97,735	36,264	133,999	39,862
M	10,801	712	11,513	15,919	4,566	20,485	31,998	15,297	47,295	
AM	10,940	721	11,661	16,123	4,625	20,748	32,409	15,585	47,994	
OS	1,824	120	1,944	2,689	771	3,460	5,404	3,792	9,196	
IS	1,963	129	2,092	2,893	830	3,723	5,815	4,080	9,895	
CS	8,977	572	9,569	12,552	3,601	16,153	25,722	12,377	38,099	
ACS	8,997	592	9,569	13,230	3,795	17,025	26,594	11,505	38,099	
dI	-139	-9	-148	-204	-59	-263	-411	-288	-699	
EI	48,283	1,762	50,045	9,483	11,613	21,096	71,141	24,759	95,900	
ΔI	-838	-67	-905	1,039	-687	352	-553	-139	-692	
P	8,139	525	8,664	14,269	3,108	17,377	26,041	11,366	37,407	

TABLE A-X

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1956

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	48,283	1,762	50,045	9,483	11,613	21,096	71,141	24,759	95,900	41,376
R	8,013	514	8,527	15,052	12,127	27,179	27,693	38,714	41,626	41,626
R'					8,013	8,013		27,693	2,912	
D	626	26	652	268	172	440	1,092	395	1,487	2,425
FS				400	256	656	656	237	893	487
CSP	55,670	2,250	57,920	23,867	15,299	39,166	97,086	35,148	132,234	38,714
M	10,623	647	11,270	17,935	4,950	22,885	34,155	15,578	49,733	
AM	10,667	650	11,317	18,009	4,970	22,979	34,296	15,867	49,983	
OS	1,812	110	1,922	3,059	844	3,903	5,825	4,534	10,359	
IS	1,856	113	1,969	3,133	864	3,997	5,966	4,643	10,609	
CS	8,811	537	9,348	13,726	3,788	17,514	26,862	12,512	39,374	
ACS	8,811	537	9,348	14,876	4,106	18,982	28,330	11,044	39,374	
dI	-44	-3	-47	-74	-20	-94	-141	-109	-250	
EI	46,859	1,713	48,572	8,991	11,193	20,184	68,756	24,104	92,860	
ΔI	-1,424	-49	-1,473	-492	-420	-912	-2,385	-655	-3,040	
P	7,387	488	7,875	14,384	3,686	18,070	25,945	10,389	36,334	

TABLE A-XI

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1957

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	46,859	1,713	48,572	8,991	11,193	20,184	68,756	24,104	92,860	39,905
R	7,329	481	7,810	15,562	11,932	27,494	27,975	38,734	41,538	41,538
R'					7,329	7,329		27,975	2,804	
D	599	24	623	268	172	440	1,063	383	1,446	2,355
FS				374	241	615	615	221	836	449
CSP	53,589	2,170	55,759	23,911	15,383	39,294	95,053	34,259	129,312	38,734
M	9,705	655	10,360	17,436	5,179	22,615	32,965	14,620	47,595	
AM	10,051	678	10,729	18,057	5,363	23,420	34,149	15,079	49,228	
OS	1,546	104	1,650	2,777	825	3,602	5,252	4,207	9,459	
IS	1,892	127	2,019	3,398	1,009	4,407	6,426	4,666	11,092	
CS	8,159	551	8,710	13,509	4,013	17,522	26,232	11,904	38,136	
ACS	8,159	551	8,710	14,659	4,354	19,013	27,723	10,413	38,136	
dI	-346	-23	-369	-621	-184	-805	-1,174	-459	-1,633	
EI	45,430	1,619	47,049	9,252	11,029	20,281	67,330	23,846	91,176	
ΔI	-1,429	-94	-1,523	261	-164	97	-1,426	-258	-1,684	
P	6,730	457	7,187	14,920	4,190	19,110	26,297	10,155	36,452	

TABLE A-XII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1958

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,430	1,619	47,049	9,252	11,029	20,281	67,330	23,846	91,176	40,062
R	6,506	412	6,918	15,376	11,717	27,093	27,505	37,341	40,062	
R'					6,506	6,506		27,505	2,721	
D	615	24	639	287	190	477	1,116	396	1,512	2,298
FS				362	238	600	600	213	812	423
CSP	51,321	2,007	53,328	23,979	15,812	39,791	93,119	33,073	126,192	
M	7,660	504	8,164	17,709	5,301	23,010	31,174	13,110	44,284	
AM	7,827	515	8,342	18,095	5,416	23,511	31,853	13,633	45,486	
OS	1,583	104	1,687	3,661	1,096	4,757	6,444	4,970	11,414	
IS	1,750	115	1,865	4,047	1,211	5,258	7,123	5,493	12,616	
CS	6,077	400	6,477	13,144	3,934	16,078	23,555	9,315	32,870	
ACS	6,077	400	6,477	14,048	4,205	18,253	24,730	8,140	32,870	
dI	-167	-11	-178	-386	-115	-501	-679	-523	-1,202	
EI	45,244	1,607	46,851	9,931	11,607	21,538	68,389	24,933	93,322	
ΔI	-186	-12	-198	679	578	1,257	1,059	1,087	2,146	
P	5,891	388	6,279	14,727	4,783	19,510	25,789	9,227	35,016	

TABLE A-XIII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1959

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,244	1,607	46,851	9,931	11,607	21,538	68,389	24,933	93,222	38,938
R	6,275	413	6,688	15,337	12,615	27,952	28,365	35,820	38,584	38,584
R'					6,275	6,275		28,365	2,764	
D	603	23	626	292	207	499	1,125	376	1,501	2,375
FS				347	246	593	593	199	792	
CSP	50,916	1,997	52,913	24,629	17,494	42,123	95,036	31,813	126,849	35,820
M	6,536	416	6,952	18,209	6,969	25,178	32,130	11,977	44,107	
AM	6,497	413	6,910	18,100	6,928	25,028	31,938	11,815	43,753	
OS	1,491	95	1,586	4,154	1,590	5,744	7,330	6,164	13,494	
IS	1,452	92	1,544	4,045	1,549	5,594	7,138	6,002	13,140	
CS	5,045	321	5,366	12,703	4,861	17,564	22,930	7,683	30,613	
ACS	5,045	321	5,366	14,055	5,379	19,434	24,800	5,812	30,613	
dI	39	3	42	109	41	150	192	162	354	
EI	45,871	1,676	47,547	10,574	12,115	22,689	70,236	26,000	96,236	
ΔI	627	69	696	643	508	1,151	1,847	1,067	2,914	
P	5,672	390	6,062	14,698	5,887	20,585	26,647	6,880	33,527	

TABLE A-XIV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1960

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	45,871	1,676	47,547	10,574	12,115	22,689	70,236	26,000	96,236	39,818
R	6,900	404	7,304	16,165	13,279	29,444	29,848	36,901	39,818	
R'					6,900	6,900		29,848	2,917	
D	625	25	650	312	216	528	1,178	389	1,567	2,531
FS				356	247	603	603	199	802	386
CSP	52,146	2,055	54,201	26,071	18,031	44,102	98,303	32,465	130,465	36,901
M	7,305	447	7,752	19,134	7,492	26,626	34,378	12,054	46,432	
AM	7,360	450	7,810	19,278	7,548	26,826	34,636	12,261	46,897	
OS	1,529	94	1,623	4,005	1,568	5,573	7,196	5,787	12,983	
IS	1,584	97	1,681	4,149	1,624	5,773	7,454	5,994	13,448	
CS	5,776	353	6,129	13,722	5,373	19,095	25,224	8,225	33,449	
ACS	5,776	353	6,129	15,129	5,924	21,053	27,182	6,267	33,449	
dI	-55	-3	-58	-144	-56	-200	-258	-207	-465	
EI	46,370	1,702	48,072	10,942	12,107	23,049	71,121	26,198	97,319	
ΔI	499	26	525	368	-8	360	885	198	1,083	
P	6,275	379	6,654	15,497	5,916	21,413	28,067	6,465	34,532	

TABLE A-XV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1961

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	46,370	1,702	48,072	10,942	12,107	23,049	71,121	26,198	97,319	
R	6,791	353	7,144	16,561	13,812	30,373	30,726	38,161	41,022	41,022
R'					6,791	6,791		30,726	2,861	
D	604	23	627	308	215	523	1,150	380	1,530	2,481
FS				369	256	625	625	207	832	380
CSP	52,557	2,032	54,589	26,826	18,657	45,483	100,072	33,046	133,118	38,161
M	6,576	423	6,999	20,064	8,112	28,176	35,175	11,854	47,029	
AM	6,684	430	7,114	20,397	8,247	28,644	35,758	12,339	48,097	
OS	1,398	90	1,488	4,264	1,725	5,988	7,476	6,217	12,693	
IS	1,506	97	1,603	4,597	1,859	6,456	8,059	6,702	14,761	
CS	5,178	333	5,511	14,330	5,794	20,124	25,635	7,701	33,336	
ACS	5,178	333	5,511	15,800	6,388	22,188	27,699	5,637	33,336	
dI	-108	-7	-115	-333	-135	-468	-538	-485	-1,068	
EI	47,379	1,699	49,078	11,026	12,269	23,295	72,373	27,409	99,782	
ΔI	1,009	-03	1,006	84	162	246	1,252	1,211	2,463	
P	6,187	330	6,517	15,884	6,550	22,434	28,951	6,848	35,799	

TABLE A-XVI

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, U. S., 1962

	Cows (c) (i=1	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBS)
					(1000 Head)					
BI	47,379	1,699	49,078	11,026	12,269	23,295	72,373	27,409	99,782	40,960
R	7,287	350	7,637	17,886	14,389	32,275	32,625	39,718	42,613	42,613
R'					7,287	7,287		32,625	2,895	
D	619	23	642	323	217	540	1,182	389	1,571	2,535
FS				371	248	619	619	203	822	360
CSP	54,047	2,026	56,073	28,218	18,906	47,124	103,197	33,910	137,107	39,718
M	7,057	369	7,426	20,869	8,044	28,913	36,339	12,081	48,420	
AM	7,236	378	7,614	21,397	8,248	29,645	37,259	12,814	50,073	
OS	1,604	84	1,688	4,743	1,828	6,571	8,259	6,584	14,843	
IS	1,783	93	1,876	5,271	2,032	7,303	9,179	7,317	16,496	
CS	5,453	285	5,738	14,685	5,660	20,345	26,083	7,494	33,577	
ACS	5,453	285	5,738	16,126	6,216	22,342	28,080	5,497	33,577	
dI	-179	-9	-188	-528	-204	-732	-920	-733	-1,653	
EI	48,594	1,741	50,335	12,092	12,690	24,782	75,117	28,413	103,530	
ΔI	1,215	42	1,257	1,066	421	1,487	2,744	1,004	3,748	
P	6,668	327	6,995	17,192	6,637	23,829	30,824	6,501	37,325	

APPENDIX B

TABLE B-I

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1947

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,473	54	1,527	161	327	488	2,015	709	2,724	1,164
R	179	18	197	477	354	831	849	1,165	1,240	1,240
R'					179	179		849	75	
D	21	1	22	8	6	14	36	13	49	48
FS				7	3	10	10	3	13	27
CSP	1,631	71	1,702	623	493	1,116	2,818	1,009	3,827	1,165
M										
AM	377	30	407	567	215	782	1,189	470	1,659	
OS	91	7	98	470	168	638	736	264	1,000	
IS	102	9	111	89	35	124	235	103	338	
CS	286	23	309	79	37	116	425	234	659	
ACS	286	23	309	97	47	144	453	206	659	
NOS	-11	-2	-13	381	133	514	501	161	662	
EI	1,356	50	1,406	145	313	458	1,864	642	2,506	
ΔI	-117	-4	-121	-16	-14	-30	-151	-67	-218	
P	158	17	175	462	166	628	803	300	1,103	

TABLE B-II

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1948

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,356	50	1,406	145	313	458	1,864	642	2,506	1,112
R	199	16	215	425	326	751	767	1,112	1,175	1,175
R'					199	199		767	63	
D	18	1	19	7	5	12	31	11	42	43
FS				7	5	12	12	4	16	20
CSP	1,537	65	1,602	556	430	986	2,588	972	3,560	1,112
M										
AM	326	25	351	478	147	625	976	413	1,389	
OS	69	5	74	399	113	512	586	232	818	
IS	101	8	109	80	29	109	218	92	310	
CS	257	20	277	68	29	97	374	197	571	
ACS	257	20	277	79	34	113	390	181	571	
NOS	-32	-3	-35	319	84	403	368	140	508	
EI	1,312	48	1,360	158	312	470	1,830	651	2,481	
ΔI	-44	-2	-46	13	-1	12	-34	9	-25	
P	181	15	196	411	117	528	724	330	1,054	

TABLE B-III

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1949

	Cows (c) (i=1)	Bulls (b) (i=2	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,312	48	1,360	158	312	470	1,830	651	2,481	1,181
R	234	17	251	411	357	768	785	1,166	1,231	1,231
R'					234	234		785	65	
D	20	1	21	7	6	13	34	14	48	47
FS				6	5	11	11	4	15	18
CSP	1,526	64	1,590	556	424	980	2,570	1,014	3,584	1,166
M										
AM	238	23	261	474	124	598	859	466	1,325	
OS	53	5	58	362	101	463	521	294	815	
IS	79	8	87	86	30	116	203	118	321	
CS	185	18	203	106	21	127	330	180	510	
ACS	185	18	203	112	23	135	338	172	510	
NOS	-26	-3	-29	276	71	347	318	176	494	
EI	1,367	49	1,416	168	330	498	1,914	666	2,580	
ΔI	55	1	56	10	18	28	84	15	99	
P	214	16	230	398	112	510	740	363	1,103	

TABLE B-IV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1950

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,367	49	1,416	168	330	498	1,914	666	2,580	1,203
R	281	21	302	443	403	846	867	1,216	1,278	1,278
R'					281	281		867	62	
D	18	1	19	7	5	12	31	11	42	44
FS				5	4	9	9	3	12	18
CSP	1,630	69	1,699	599	443	1,042	2,741	1,001	3,742	1,216
M										
AM	252	24	276	519	117	636	912	421	1,333	
OS	84	7	91	421	100	521	612	299	911	
IS	81	8	89	93	30	123	212	165	377	
CS	168	17	185	92	17	109	294	128	422	
ACS	168	17	185	98	17	115	300	122	422	
NOS	3	-1	2	328	70	398	400	134	534	
EI	1,459	53	1,512	173	356	529	2,041	745	2,786	
ΔI	92	4	96	5	26	31	127	79	206	
P	263	20	283	431	113	544	827	335	1,162	

TABLE B-V

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1951

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,459	53	1,512	173	356	529	2,041	745	2,786	1,313
R	308	25	333	390	462	852	877	1,249	1,314	1,314
R'					308	308		877	65	
D	19	1	20	6	5	11	31	12	43	48
FS				5	4	9	9	4	13	17
CSP	1,748	77	1,825	552	501	1,053	2,878	1,101	3,979	1,249
M										
AM	249	28	277	437	113	550	827	423	1,250	
OS	93	11	104	349	97	446	550	316	866	
IS	87	10	97	86	33	119	216	147	363	
CS	156	17	173	81	14	95	268	116	384	
ACS	156	17	173	88	16	104	277	107	384	
NOS	6	1	7	263	64	327	334	169	503	
EI	1,586	59	1,645	201	421	622	2,267	825	3,092	
ΔI	127	6	133	28	65	93	226	80	306	
P	289	24	313	379	145	524	837	356	1,193	

TABLE B-IV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1952

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,586	59	1,645	201	421	622	2,267	825	3,092	1,475
R	353	27	380	477	458	935	962	1,396	1,472	1,472
R'					353	353		962	76	
D	22	1	23	7	6	13	36	14	50	54
FS				7	5	12	12	5	17	22
CSP	1,917	85	2,002	664	515	1,179	3,181	1,240	4,421	1,396
M										
AM	262	28	290	545	136	681	971	567	1,538	
OS	77	9	86	423	115	538	624	429	1,053	
IS	76	8	84	92	30	122	206	158	364	
CS	185	19	204	115	20	135	339	146	485	
ACS	185	19	204	122	21	143	347	138	485	
NOS	1	1	2	331	85	416	418	271	689	
EI	1,731	65	1,796	211	409	620	2,416	831	3,247	
ΔI	145	6	151	10	-12	-2	149	6	155	
P	331	26	357	463	94	557	914	415	1,329	

TABLE B-VII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1953

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,731	65	1,796	211	409	620	2,416	831	3,247	1,593
R	343	24	367	537	422	959	983	1,548	1,629	1,629
R'					343	343		983	81	
D	23	1	24	8	5	13	37	15	52	55
FS				8	6	14	14	6	20	26
CSP	2,051	88	2,139	732	477	1,209	3,348	1,375	4,723	1,548
M										
AM	340	31	371	573	114	687	1,058	672	1,730	
OS	90	11	101	409	68	477	578	460	1,038	
IS	81	7	88	85	24	109	197	154	351	
CS	250	20	270	158	45	203	473	219	692	
ACS	250	20	270	164	46	210	480	212	692	
NOS	9	4	13	324	44	368	381	306	687	
EI	1,792	64	1,856	244	387	631	2,487	857	3,344	
ΔI	61	-1	60	33	-22	11	71	26	97	
P	320	23	343	521	68	589	932	544	1,476	

TABLE B-VIII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1954

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,792	64	1,856	244	387	631	2,487	857	3,344	1,649
R	306	17	323	579	421	1,000	1,017	1,635	1,712	1,712
R'					306	306		1,017	77	
D	22	1	23	9	5	14	37	15	52	51
FS				8	5	13	13	6	19	26
CSP	2,076	80	2,156	806	492	1,298	3,454	1,454	4,908	1,635
M										
AM	389	27	416	686	175	861	1,277	695	1,972	
OS	121	9	130	535	130	665	795	482	1,277	
IS	82	6	88	80	27	107	195	146	341	
CS	268	18	286	143	42	185	471	224	695	
ACS	268	18	286	151	45	196	482	213	695	
NOS	39	3	42	455	103	558	600	336	936	
EI	1,769	59	1,828	200	344	544	2,372	905	3,277	
ΔI	-23	-5	-28	-44	-43	-87	-115	48	-67	
P	284	16	300	562	105	667	967	597	1,564	

TABLE B-IX

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1955

	Cow (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,769	59	1,828	200	344	544	2,372	905	3,277	1,521
R	259	18	277	630	389	1,019	1,037	1,465	1,548	1,548
R'					259	259		1,037	83	
D	20	1	21	8	4	12	33	13	46	58
FS				8	4	12	12	5	17	25
CSP	2,008	76	2,084	814	466	1,280	3,364	1,315	4,679	1,465
M										
AM	407	23	430	668	194	862	1,292	566	1,858	
OS	145	9	154	537	156	693	847	369	1,216	
IS	81	4	85	81	26	107	192	133	325	
CS	262	14	276	118	34	152	428	214	642	
ACS	262	14	276	131	38	169	445	197	642	
NOS	64	5	69	456	130	586	655	236	891	
EI	1,682	57	1,739	227	298	525	2,264	882	3,146	
ΔI	-87	-2	-89	27	-46	-19	-108	-23	-131	
P	239	17	256	614	122	736	992	410	1,402	

TABLE B-X

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1956

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,682	57	1,739	227	298	525	2,264	882	3,146	1,447
R	269	17	286	572	416	988	1,005	1,375	1,456	1,456
R'					269	269		1,005	81	
D	20	1	21	8	4	12	33	12	45	54
FS				8	4	12	12	4	16	27
CSP	1,931	73	2,004	783	437	1,220	3,224	1,236	4,460	1,375
M										
AM	373	21	394	664	173	837	1,231	569	1,800	
OS	96	6	102	486	136	622	724	384	1,108	
IS	68	4	72	67	24	91	163	134	297	
CS	277	15	292	156	31	187	479	213	692	
ACS	277	15	292	178	37	215	507	185	692	
NOS	28	2	30	419	112	531	561	250	811	
EI	1,626	56	1,682	186	288	474	2,156	801	2,957	
ΔI	-56	-1	-57	-41	-10	-51	-108	-81	-189	
P	249	16	265	556	139	695	960	354	1,314	

TABLE B-XI

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1957

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,626	56	1,682	186	288	474	2,156	801	2,957	1,317
R	234	15	249	566	373	939	954	1,290	1,369	1,369
R'					234	234		954	79	
D	20	1	21	8	5	13	34	13	47	54
FS				6	4	10	10	3	13	25
CSP	1,840	70	1,910	738	418	1,156	3,066	1,121	4,187	1,290
M										
AM	353	22	375	588	161	749	1,124	453	1,577	
OS	96	6	102	439	130	569	671	292	963	
IS	68	5	73	60	24	84	157	131	288	
CS	257	16	273	128	26	154	427	187	614	
ACS	257	16	273	149	31	180	453	161	614	
NOS	28	1	29	379	106	485	514	161	675	
EI	1,555	53	1,608	210	281	491	2,099	799	2,898	
ΔI	-71	-3	-74	24	-7	-17	-57	-2	-59	
P	214	14	228	552	130	682	910	320	1,230	

TABLE B-XII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1958

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,555	53	1,608	210	281	491	2,099	799	2,898	1,322
R	266	18	284	541	413	954	972	1,275	1,354	1,354
R'					266	266		972	79	
D	21	1	22	8	5	13	35	12	47	57
FS				6	4	10	10	4	14	22
CSP	1,800	70	1,870	737	419	1,156	3,026	1,086	4,112	1,275
M										
AM	260	15	275	509	113	622	897	306	1,203	
OS	71	5	76	380	94	474	550	229	779	
IS	57	3	60	55	23	78	138	170	308	
CS	189	10	199	117	17	134	333	91	424	
ACS	189	10	199	129	19	148	347	77	424	
NOS	14	2	16	325	71	396	412	59	471	
EI	1,597	58	1,655	283	329	612	2,267	950	3,217	
ΔI	42	5	47	73	48	121	168	151	319	
P	245	17	262	527	138	665	927	287	1,214	

TABLE B-XIII

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1959

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,597	58	1,655	283	329	612	2,267	950	3,217	1,405
R	282	16	298	606	457	1,063	1,079	1,312	1,394	1,394
R'					282	282		1,079	82	
D	18	1	19	9	5	14	33	12	45	62
FS				6	4	10	10	4	14	20
CSP	1,861	73	1,934	874	495	1,369	3,303	1,167	4,470	1,312
M										
AM	221	15	236	616	182	798	1,034	343	1,377	
OS	94	8	102	471	146	617	719	293	1,012	
IS	39	2	41	62	31	93	134	151	285	
CS	127	7	134	129	32	161	295	70	365	
ACS	127	7	134	145	36	181	315	50	365	
NOS	55	6	61	409	115	524	585	142	727	
EI	1,679	60	1,739	320	344	664	2,403	975	3,378	
ΔI	82	2	84	37	15	52	136	25	161	
P	264	15	279	591	166	757	1,036	217	1,253	

TABLE B-XIV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1960

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,679	60	1,739	320	344	664	2,403	975	3,378	1,461
R	311	17	328	657	510	1,167	1,184	1,392	1,477	1,477
R'					311	311		1,184	85	
D	19	1	20	10	5	15	35	12	47	67
FS				9	5	14	14	4	18	18
CSP	1,971	76	2,047	958	533	1,491	3,538	1,167	4,705	1,392
M										
AM	258	16	274	744	228	972	1,246	346	1,592	
OS	114	10	124	579	189	768	892	295	1,187	
IS	52	3	55	86	43	129	184	216	400	
CS	144	6	150	149	35	184	334	71	405	
ACS	144	6	150	165	39	204	354	51	405	
NOS	62	7	69	493	146	639	708	79	787	
EI	1,765	63	1,828	300	348	648	2,476	1,037	3,513	
ΔI	86	3	89	-20	4	-16	73	62	135	
P	292	16	308	638	189	827	1,135	192	1,327	

TABLE B-XV

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1961

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (i=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,765	63	1,828	300	348	648	2,476	1,037	3,513	1,518
R	328	15	343	674	580	1,254	1,269	1,469	1,556	1,556
R'					328	328		1,269	87	
D	20	1	21	9	6	15	36	12	48	70
FS				9	5	14	14	5	19	17
CSP	2,073	77	2,150	956	589	1,545	3,695	1,220	4,915	1,469
M							1,287	376	1,663	
AM	242	16	258	771	280	1,051	1,309	392	1,701	
OS	110	9	119	614	234	848	967	355	1,322	
IS	55	3	58	95	60	155	213	227	440	
CS	132	7	139	145	41	186	325	54	379	
ACS	132	7	139	157	46	203	342	37	379	
NOS	55	6	61	519	174	693	754	128	882	
EI	1,886	64	1,950	280	369	649	2,599	1,055	3,654	
ΔI	+121	+1	+122	-20	+21	+1	+123	+18	+141	
P	308	14	322	656	241	897	1,219	183	1,402	

TABLE B-XVI

THE ESTIMATES OF THE BALANCE SHEET VARIABLES, OKLAHOMA, 1962

	Cows (c) (i=1)	Bulls (b) (i=2)	Cow-Bull (cb)	Steers (s) (i=3)	Heifers (h) (l=4)	Steer-Heifer (sh)	All Cattle (ac)	Calves (cv)	T.C.C.[a] (T)	Newborn Calves[b] (NBC)
					(1000 Head)					
BI	1,886	64	1,950	280	369	649	2,599	1,055	3,654	1,603
R	308	14	322	745	547	1,292	1,306	1,582	1,664	1,664
R'					308	308		1,306	82	
D	20	1	21	9	5	14	35	12	47	65
FS				8	5	13	13	5	18	17
CSP	2,174	77	2,251	1,008	598	1,606	3,857	1,314	5,171	1,582
M							1,374	425	1,799	
AM	286	14	300	804	303	1,107	1,407	453	1,860	
OS	150	9	159	639	255	894	1,053	405	1,458	
IS	60	2	62	93	63	156	218	235	453	
CS	136	5	141	149	42	191	332	70	402	
ACS	136	5	141	165	48	213	354	48	402	
NOS	90	7	97	546	192	738	835	170	1,005	
EI	1,948	65	2,013	297	358	655	2,668	1,096	3,764	
ΔI	62	1	63	17	-11	6	69	41	110	
P	288	13	301	728	229	957	1,258	259	1,517	

APPENDIX C

APPENDIX TABLE C-I

BEGINNING INVENTORIES OF CATTLE AND CALVES BY TYPES & CALF CROP, UNITED STATES, 1947-62

	Kept For Milk				Other						Total Cattle & Calves	Calf Crop
Year	Cows	Heifers	Calves	Total	Cows	Heifers	Calves	Steers	Bulls	Total		
	(1000 Head)											
1947	25842	5524	6317	37683	16488	4636	12804	7109	1834	48871	80554	34703
1948	24615	5550	6004	36169	16101	4518	12046	6672	1756	41002	77171	33125
1949	23862	5327	6081	35270	15919	4657	12033	7270	1681	41560	70830	33748
1950	23853	5394	6208	35455	16743	4755	12516	6805	1690	42508	77963	34899
1951	23568	5493	6337	35398	18526	5122	14319	7029	1689	46685	82083	35825
1952	23060	5694	6481	35235	20863	5971	15829	8400	1774	52837	88072	38273
1953	23549	5893	6479	35921	23291	6535	17440	9147	1907	58320	94241	41261
1954	23896	5873	6392	36161	25050	6365	17978	8229	1896	59518	95679	42501
1955	23462	5786	6094	35342	25659	6514	18804	8444	1829	61250	96592	42112
1956	22912	5407	5890	34209	25371	6206	18869	9483	1762	61691	95900	41376
1957	22325	5267	5699	33291	24534	5926	18405	8391	1713	59569	92860	39905
1958	21265	5126	5571	31962	24165	5903	18275	9252	1619	59214	91176	38860
1959	20132	5050	5526	30708	25112	6557	19407	9931	1607	62614	93322	38938
1960	19527	5079	5575	30181	26344	7036	20425	10574	1676	66055	96236	39353
1961	19342	5060	5546	29948	27028	7047	20652	10942	1702	67371	97319	39954
1962	19148	4960	5414	29522	28231	7309	21995	11026	1699	70260	99782	40960

APPENDIX TABLE C-II

BEGINNING INVENTORIES OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	42,330	1,834	7,109	10,160	61,433	19,121	80,554
1948	40,625	1,756	6,672	10,068	59,121	18,050	77,171
1949	39,781	1,681	7,270	9,984	58,716	18,114	76,830
1950	40,596	1,690	6,805	10,148	59,239	18,724	77,963
1951	42,094	1,689	7,029	10,615	61,427	20,656	82,083
1952	43,923	1,774	8,400	11,665	65,762	22,310	88,072
1953	46,840	1,907	9,147	12,428	70,322	23,919	94,241
1954	48,946	1,896	8,229	12,238	71,309	24,370	95,679
1955	49,121	1,829	8,444	12,300	71,694	24,898	96,592
1956	48,283	1,762	9,483	11,613	71,141	24,759	95,900
1957	46,859	1,713	8,991	11,193	68,756	24,104	92,860
1958	45,430	1,619	9,252	11,029	67,330	23,846	91,176
1959	45,244	1,607	9,931	11,607	68,389	24,933	93,322
1960	45,871	1,676	10,574	12,115	70,236	26,000	96,236
1961	46,370	1,702	10,942	12,107	71,121	26,198	97,319
1962	47,379	1,699	11,026	12,269	72,373	27,409	99,782

APPENDIX TABLE C-III

ESTIMATED REPLACEMENTS OF CATTLE & CALVES BY CLASSES,
UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	7,292	752	10,933	10,670	22,355	33,498	36,677
1948	7,234	635	9,957	9,829	20,421	31,990	34,848
1949	7,160	673	10,088	9,836	20,597	32,233	35,136
1950	7,963	710	10,568	10,783	22,061	34,152	36,977
1951	8,020	806	10,880	11,223	22,909	33,028	35,838
1952	9,164	827	11,383	12,335	24,545	35,291	38,216
1953	10,267	752	12,640	13,318	26,710	39,144	42,163
1954	9,305	587	13,889	13,297	27,773	41,122	44,135
1955	8,819	553	14,915	12,364	27,923	39,862	42,811
1956	8,013	514	15,052	12,127	27,693	38,714	41,626
1957	7,329	481	15,562	11,932	27,975	38,734	41,538
1958	6,506	412	15,376	11,717	27,505	37,341	40,062
1959	6,275	413	15,337	12,615	28,365	35,820	38,584
1960	6,900	404	16,165	13,279	29,848	36,901	39,818
1961	6,791	353	16,561	13,812	30,726	38,161	41,022
1962	7,287	350	17,886	14,389	32,625	39,718	42,613

APPENDIX TABLE C-IV

ESTIMATED MARKETINGS OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	9,822	937	12,667	3,555	26,981	13,893	40,874
1948	9,086	828	10,739	2,764	23,417	12,607	36,024
1949	7,074	784	12,427	2,620	22,905	21,627	35,532
1950	7,223	842	12,165	2,434	22,664	12,028	34,692
1951	7,379	920	12,007	2,332	22,638	11,328	33,966
1952	7,197	855	13,039	2,561	23,652	12,246	35,898
1953	8,843	865	15,290	3,309	28,307	14,431	42,738
1954	10,108	747	15,609	4,158	30,622	15,514	46,136
1955	10,801	712	15,919	4,566	31,998	15,297	47,295
1956	10,623	647	17,935	4,950	34,155	15,578	49,733
1957	9,705	655	17,436	5,179	32,975	14,620	47,595
1958	7,660	504	17,709	5,301	31,174	13,110	44,284
1959	6,536	416	18,209	6,969	32,130	11,977	44,107
1960	7,305	447	19,134	7,492	34,378	12,054	46,432
1961	6,576	423	20,064	8,112	35,175	11,854	47,029
1962	7,057	369	20,869	8,044	36,339	12,081	48,420

APPENDIX TABLE C-V

ESTIMATED ADJUSTED MARKETINGS OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle & Calves
				(1000 Head)			
1947	10,279	981	13,257	3,721	28,238	14,610	42,848
1948	9,562	871	11,301	2,909	24,643	13,104	37,747
1949	7,361	816	12,930	2,726	23,833	13,087	36,920
1950	7,646	891	12,878	2,577	23,992	12,778	36,770
1951	7,382	920	12,011	2,333	22,646	11,333	33,979
1952	7,187	854	13,020	2,557	23,618	12,223	35,841
1953	9,007	881	15,574	3,371	28,833	14,807	43,640
1954	10,411	769	16,076	4,283	31,539	16,131	47,670
1955	10,940	721	16,123	4,625	32,409	15,585	47,994
1956	10,667	650	18,009	4,970	34,296	15,687	49,983
1957	10,051	678	18,057	5,363	34,149	15,079	49,228
1958	7,827	515	18,059	5,416	31,853	13,633	45,486
1959	6,497	413	18,100	6,928	31,938	11,815	43,753
1960	7,360	450	19,278	7,548	34,636	12,261	46,897
1961	6,684	430	20,397	8,247	35,758	12,339	38,097
1962	7,236	378	21,397	8,249	37,259	12,814	50,073

APPENDIX TABLE C-VI

ESTIMATED INSHIPMENTS OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	1,924	184	2,482	697	5,287	3,015	8,302
1948	2,097	191	2,478	638	5,404	2,191	7,595
1949	1,669	185	2,930	318	5,402	2,677	8,079
1950	1,811	211	3,051	611	5,684	3,212	8,896
1951	1,864	232	3,032	589	5,717	3,468	9,185
1952	1,634	194	2,960	581	5,369	3,722	9,091
1953	1,524	149	2,636	571	4,880	3,487	8,367
1954	1,955	144	3,019	805	5,923	3,984	9,907
1955	1,963	129	2,893	830	5,815	4,080	9,895
1956	1,856	113	3,133	864	5,966	4,643	10,609
1957	1,892	127	3,398	1,009	6,426	4,666	11,092
1958	1,750	115	4,047	1,211	7,123	5,493	12,616
1959	1,452	92	4,045	1,549	7,138	6,002	13,140
1960	1,584	97	4,149	1,624	7,454	5,994	13,448
1961	1,506	97	4,597	1,859	8,059	6,702	14,761
1962	1,783	93	5,271	2,032	9,179	7,317	16,496

APPENDIX TABLE C-VII

ESTIMATED COMMERCIAL SLAUGHTER OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	8,355	797	9,668	2,713	21,533	13,013	34,546
1948	7,465	680	8,145	2,096	18,386	11,766	30,152
1949	5,692	631	9,655	2,035	18,013	10,828	28,841
1950	5,835	680	9,488	1,898	17,901	9,973	27,874
1951	5,518	688	8,516	1,654	16,376	8,418	24,794
1952	5,553	660	9,732	1,911	17,856	8,894	26,750
1953	7,483	732	12,652	2,738	23,605	11,668	35,273
1954	8,456	625	12,584	3,352	25,017	12,746	37,763
1955	8,977	592	12,552	3,601	25,722	12,377	38,099
1956	8,811	537	13,726	3,788	26,862	12,512	39,374
1957	8,159	551	13,509	4,013	26,232	11,904	38,136
1958	6,077	400	13,144	3,934	23,555	9,315	32,870
1959	5,045	321	12,703	4,861	22,930	7,683	30,163
1960	5,776	353	13,772	5,373	25,224	8,225	33,449
1961	5,178	333	14,330	5,794	25,635	7,701	33,336
1962	5,453	285	14,685	5,660	26,083	7,494	33,577

APPENDIX TABLE C-VIII

ESTIMATED ADJUSTED COMMERCIAL SLAUGHTER OF CATTLE AND CALVES BY CLASSES, UNITED STATES, 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	8,355	797	10,775	3,024	22,951	11,595	34,546
1948	7,465	680	8,823	2,271	19,239	10,913	30,152
1949	5,692	631	10,000	2,108	18,431	10,410	28,841
1950	5,835	680	9,827	1,966	18,308	9,566	27,874
1951	5,518	688	8,979	1,744	16,929	7,865	24,794
1952	5,553	660	10,060	1,976	18,249	8,501	26,750
1953	7,483	732	12,938	2,800	23,953	11,320	35,273
1954	8,456	625	13,057	3,478	25,616	12,147	37,763
1955	8,977	592	13,230	3,795	26,594	11,505	38,099
1956	8,811	537	14,876	4,106	28,330	11,044	39,374
1957	8,159	551	14,659	4,354	27,773	10,413	38,136
1958	6,077	400	14,048	4,205	24,730	8,140	32,870
1959	5,045	321	14,055	5,379	24,800	5,813	30,613
1960	5,776	353	15,129	5,924	27,182	6,267	33,449
1961	5,178	333	15,800	6,388	27,699	5,637	33,336
1962	5,453	285	16,126	6,216	28,080	5,497	33,577

APPENDIX TABLE C-IX

ESTIMATED PRODUCTION OF CATTLE AND CALVES BY CLASSES, UNITED STATES 1947-62

Year	Cows	Bulls	Steers	Heifers	Cattle	Calves	Total Cattle and Calves
				(1000 Head)			
1947	6,650	719	10,338	2,932	20,639	10,524	31,163
1948	6,621	605	9,421	2,187	18,834	10,977	29,811
1949	6,507	640	9,535	2,272	18,954	11,020	29,974
1950	7,333	679	10,051	2,433	20,496	11,498	31,994
1951	7,347	773	10,350	2,794	21,264	9,519	30,783
1952	8,470	793	10,807	2,739	22,809	10,110	32,919
1953	9,589	721	12,020	2,610	24,940	11,771	36,711
1954	8,631	558	13,272	3,540	26,001	12,675	38,676
1955	8,139	525	14,269	3,108	26,041	11,366	37,407
1956	7,387	488	14,384	3,786	25,945	10,389	36,334
1957	6,730	457	14,920	4,190	26,297	10,155	36,452
1958	5,891	388	14,727	4,783	25,789	9,227	35,016
1959	5,672	390	14,698	5,887	26,647	6,880	33,527
1960	6,275	379	15,497	5,916	28,067	6,465	34,532
1961	6,187	330	15,884	6,550	28,951	6,848	35,799
1962	6,668	327	17,192	6,637	30,824	6,501	37,325

APPENDIX TABLE C-X

ESTIMATED DISCREPANCY OF TOTAL CATTLE AND CALVES AND IMPORTS, EXPORTS AND NET-IMPORTS OF LIVE CATTLE, UNITED STATES, 1947-62

Year	Discrepancy	Imports	Exports	Net-Imports
		(1000 Head)		
1947	-1,974	84.5	10.2	74.3
1948	-1,723	461.7	7.3	454.4
1949	-1,388	430.5	5.4	425.1
1950	-2,078	461.0	8.4	452.6
1951	-13	239.0	8.4	230.6
1952	57	140.5	10.8	129.7
1953	-902	198.2	14.8	183.4
1954	-1,534	86.1	21.3	64.8
1955	-699	314.4	34.9	279.5
1956	-250	159.4	36.9	122.5
1957	-1,633	727.9	43.9	684.0
1958	-1,202	1,152.4	25.6	1,126.8
1959	354	708.8	50.7	658.1
1960	-465	663.2	32.2	631.0
1961	-1,068	1,042.7	24.0	1,018.7
1962	-1,653	1,250.0	19.3	1,230.7

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