AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

378.794
A475734
80-5

Waite

Giannini Foundation of Agricultural Economics

INFORMATION SERIES 80-5

TRENDS IN CALIFORNIA LIVESTOCK AND POULTRY PRODUCTION, CONSUMPTION, AND FEED USE: 1961-1978

Waite Memorial Book Collection
Division of Agricultural Economics

Division of Agricultural Sciences
UNIVERSITY OF CALIFORNIA
PRINTED NOVEMBER 1980

BULLETIN
1899

University of California, Davis
Department of Agricultural Economics

TRENDS IN CALIFORNIA LIVESTOCK AND POULTRY PRODUCTION, CONSUMPTION, AND FEED USE: 1961-1978

by

G. A. King*, J. C. Fitz**, C. M. Warner***, and A. C. Bywater****

* Professor, Department of Agricultural Economics, University of California, Davis.

** Assistant Economist, California Department of Water Resources.

*** Formerly Associate Economist, California Department of Water Resources.

**** Assistant Professor and Nutritionist in the Experiment Station, University of California, Davis.

The University of California Cooperative Extension in compliance with the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and the Rehabilitation Act of 1973 does not discriminate on the basis of race, creed, religion, color, national origin, sex, or mental or physical handicap in any of its programs or activities. Inquiries regarding this policy may be directed to: Affirmative Action Officer, Cooperative Extension, 317 University Hall, University of California, Berkeley, California 94720, (415) 642-0931.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture, Jerome B. Siebert, Acting Director, Cooperative Extension, University of California.

3m-11/80-VL/LAM

378.794
A475734
80-5

TABLE OF CONTENTS

Page

Foreword 1

Summary 2

Introduction 6

The Demand and Supply of Livestock and Poultry Products 7

California Feed Supply and Utilization 11

Feed Concentrates 11

Hay and Roughage 16

Estimated Feed Use by Type of Livestock and Poultry 16

Aggregate Feed Use 18

Feed Use by Type of Livestock 21

Estimated Land and Water Used to Produce Feed 30

References 35

Appendix A--1976 California Livestock Numbers and Feed Requirements 38

Appendix B--Tables of Estimated Composition of Rations for Livestock and Poultry 74

Appendix C--Tables of Livestock and Poultry Statistics, 1961-1978 82

LIST OF TEXT TABLES

Table		Page
1	Sources of California Beef, Pork and Broiler Supplies, 1971	10
2	Feed Concentrates: California Supply and Distribution, 1961-65 Average and 1974-76 Average	12
3	By-Product Feeds: California Supply and Distribution, 1961-65 Average and 1974-76 Average	14 & 15
4	Hay and Silage: California Supply and Distribution, 1961-65 Average and 1974-76 Average	17
5	Estimates of Feed Concentrates, Hay and Pasture Used by Livestock and Poultry: California, 1961-65 and 1974-76 Averages	20
6	California Dairy Animal Numbers, Estimated Feed Per Head and Total Fed Annually, 1961-1965 and 1974-1976	23
7	California Beef Cattle Numbers, Estimated Feed Per Head and Total Quantities Fed Annually, 1961-1965 and 1974-1976	24
8	California Sheep and Lamb Numbers, Estimated Feed Per Head and Total Quantities Fed Annually, 1961-1965 and 1974-1976	26
9	California Hog Numbers, Estimated Concentrates Fed Per Head and Total Concentrates Fed Annually, 1961-1965 and 1974-1976	27
10	California Poultry Numbers, Estimated Concentrates Fed Per Head and Total Concentrates Fed Annually 1961-1965 and 1974-1976	29
11	Land and Water: Extimated Use for Livestock Feed Production, California, 1975	32

FOREWORD

The purpose of this report is to provide an overview of the feed-livestock economy of California during the period 1961 to 1978. It is a joint report by economists in the Department of Water Resources and by economists and animal nutritionists at the University of California, Davis. This study will be followed by two other reports by others dealing more explicitly with factors affecting the future of the livestock and poultry industries, with projections of these industries, and with the related land and water requirements.

This research is based partly on previously published and unpublished reports on the feed-livestock economy of California. An analysis of feed use in 1961-65 by Snider and King [1970] is the basis for the current analysis. Important information for that report was provided in a California Department of Agriculture report by Thomas and Braun [1965], which presented livestock and poultry rations developed in cooperation with specialists at the University. Projections of feed and livestock use for 1985 were developed by King, Carter, and Dudek [1977], building, in part, on a study by Mel Warner of the Department of Water Resources. The present study revised previous estimates to provide a consistent basis for comparison between 1961-65 and 1974-76. This report will then form the basis for analyzing future trends in feed and livestock production to be presented in subsequent reports. We wish to express our thanks to the careful review comments on earlier drafts of this report, particularly by Jerry Foytik. Also, appreciation is given to Beth Connelly for typing the table-laden manuscript.

SUMMARY

The California feed-livestock and poultry sectors are a vital part of the state's agriculture. In this summary, we highlight the major findings of the report which trace past trends in these industries from 1961 to 1978. Detailed analysis is given of feed use by livestock and poultry during the periods 1961-1965 and 1974-1976.

Land and Water

1. In 1975, an estimated 42 percent of total water applied for agriculture was used to produce livestock feed, including grain (2.7 million acre-feet), hay (5.6 million acre-feet) and irrigated pasture (5.2 million acre feet), -- 13.5 million acre-feet for these uses out of a total of 31.7 million acre-feet for irrigated agriculture.
2. Land allocable to production of livestock feed in 1975 included 1,665,000 acres of grain, 1,650,000 acres of hay, 1,200,000 acres of irrigated pasture plus use of 35,968,000 acres of range land. The use of land for grain production is related to the relative profitability of alternative crops and the importance of grain in crop rotations.
3. The 1975 irrigated acreage for livestock feed is estimated at 3,632,000 acres, or 41 percent of the total irrigated acreage in the state.

Feed Concentrates

1. Livestock and poultry used an average of 8.7 million tons of feed concentrates annually in 1974-1976, compared with

annual use of 7.0 million tons in 1961-1965. The 1.7 million ton increase was about half grain and half by-product feeds.

2. Feed grain production was practically equal for the two periods at 2.6 million tons. Wheat production increased sharply from 259,000 tons to 1,544,000 tons, but feed use of wheat increased marginally due to a strong export market during the 1974-1976 period.

3. Shipments of feed grains into California exceed local production, and the increased levels of grain use is reflected in these inshipments. Analysis of the state's livestock and poultry industries must consider its competitive position, as compared with other regions, both in grain and livestock production.

4. By-product feed production has increased during the past two decades, as have inshipments of feeds such as soybean meal and molasses.

5. Beef cattle and poultry each consume about 3.0 million tons of feed concentrates; dairy cattle, about 2.4 million tons; and only minor amounts used for hog and sheep production.

Hay and Pasture

1. Alfalfa hay production averaged 6.7 million tons in 1974-1976; other hay, 0.7 million tons--a three percent increase in total hay production since the 1961-65 period.

2. Dairy cattle used 5.9 million tons of hay annually and beef cattle, 2.0 million tons. Only minor amounts of hay were used for sheep and lambs.
3. Irrigated pasture and range land contribute an estimated 26.5 million animal unit months of grazing, allocated among beef cattle (74 percent), dairy cattle (16 percent), and sheep and lambs (10 percent).
4. Range land provided an economic return from livestock grazing estimated at 204 million dollars in 1973, according to a study by A. D. Reed [1974].

Livestock and Poultry Products

1. U.S. consumers allocate almost half of their at-home food expenditures for livestock and poultry products. Expenditures on individual commodities may vary over time, associated with changes in prices, real income levels, and tastes and preferences.
2. California production of lamb, eggs, and turkey meat exceeds local consumption of these products. Other regions, however, provide an estimated 51 percent of beef consumed in the state, 98 percent of the pork and about 60 percent of the poultry meat. Some dairy products, such as cheese, may be shipped into California but consumption of most dairy products is met from local production.
3. The future levels of production of livestock and poultry products depend on a complex set of factors associated with feed conversion efficiency and interregional

considerations relating to intermediate product (e.g., feeds) and final product (meat) production and demand. These outcomes then determine the derived demand for water and land used in production. This study hopefully provides useful information on some aspects of the framework needed for a more complete analysis of the feed-livestock economy, and the derived demand for land and water.

INTRODUCTION

Any economic analysis of the future of the California feed-livestock economy must first consider past developments in the industry. The major purpose of this report is to provide such background information on livestock and poultry production, the sources and uses of feed grains, by-products and roughage by type of livestock, and the related land and water used in this production. Subsequent reports will provide projections of California production under specified conditions as to resource availability, technology, and interregional competition.

The trend analysis covers the period from 1961 to 1978, with detailed feed-livestock analyses for 1961-65 and 1974-76. The comparison periods are selected to avoid unusual situations associated with a particular year. For certain products, in particular cattle, the years may not be entirely representative due to cyclical production adjustments; however, basic data are provided in the appendix to allow qualitative adjustments to these base periods when making projections of future developments.

The report provides, first, a review of the demand for livestock and poultry products, with emphasis on U.S. per capita consumption trends for major categories. Detailed information on California consumption is not available, but some information for selected years is given. Next, California livestock and poultry production trends are reviewed, followed by a review of trends in the feed supply and estimated utilization by livestock and other uses. The major analysis relates the feed supply to use by

various types of poultry and livestock. A summary is given of the land and water used in livestock feed production in California.

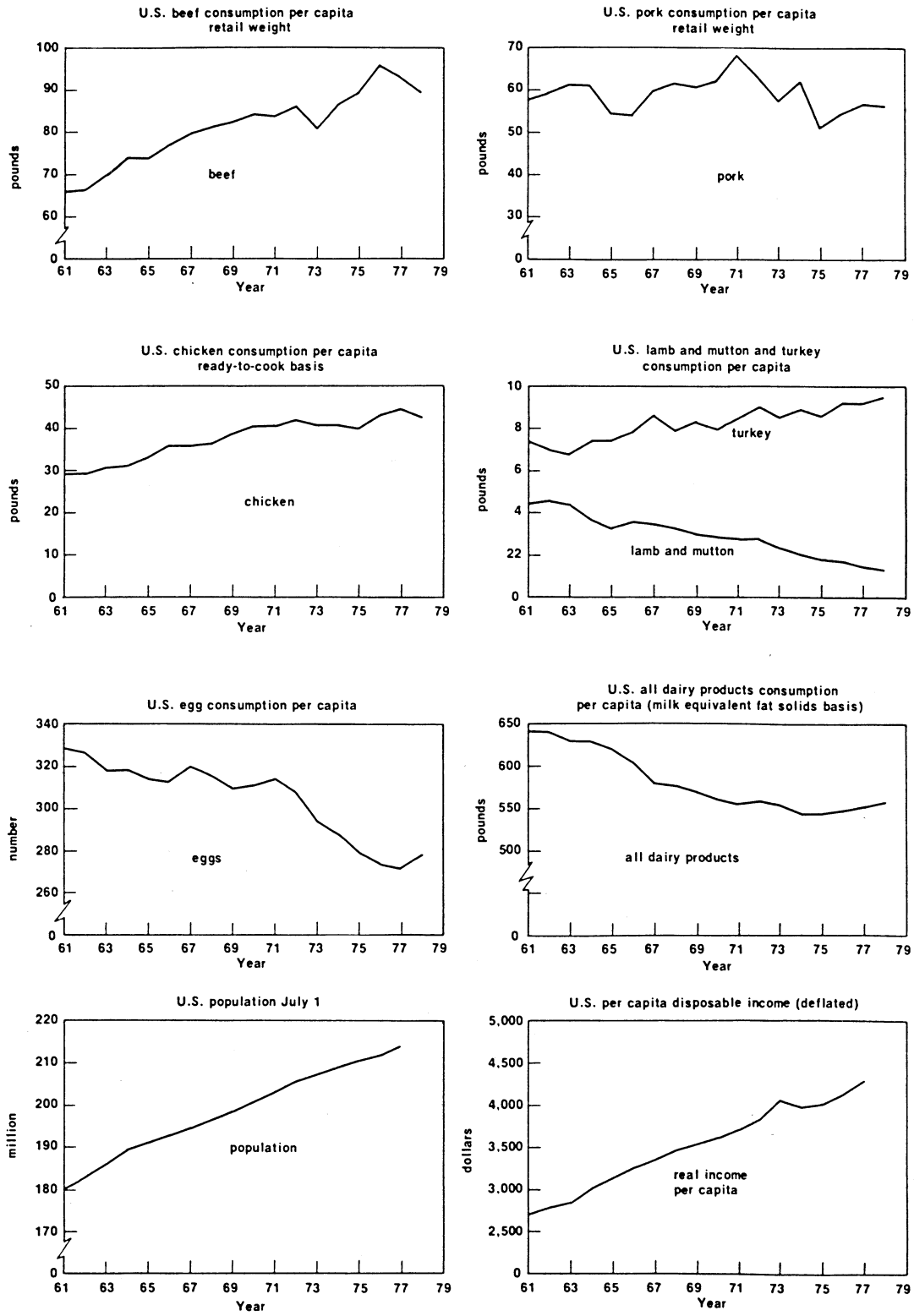
THE DEMAND AND SUPPLY OF LIVESTOCK AND POULTRY PRODUCTS

Demand

U.S. consumers allocate almost half of their at-home food expenditures for livestock and poultry products. In 1972, 48.3 percent of the consumer's food dollar was for purchases of red meats (27.7 percent), poultry meats (4.3 percent), eggs (2.4 percent) and dairy products (13.9 percent), as reported by Salathe [1979]. Expenditures on individual commodities may change over time due to changes in relative prices, real income levels, and tastes and preferences.

Trends in U.S. per capita consumption of major items are shown in Figure 1 for the period 1961 to 1978. Beef, chicken, and turkey meat consumption has increased markedly whereas pork consumption has shown considerable variation associated with cyclical supply response. Per capita consumption of lamb, eggs, and all dairy products each has decreased considerably over the past two decades. A detailed analysis of individual dairy products would show divergent trends within the aggregate, with cheese consumption increasing and consumption of products such as condensed and evaporated milk trending downward. Per capita consumption is influenced by changes in real income, prices, and tastes. Consumers have elected to spend less of their total expenditures on food over this period; 16.8 percent was allocated to food (at home and away from home) in 1976, as compared with 19.9 percent in 1961. Total demand for food depends also on the population

Figure 1
Trends in U.S. Per Capita Consumption of Selected Livestock and Poultry Products and in U.S. Population and Real Income Per Capita, 1961-1978



Source: U.S. Economics, Statistics and Cooperations Services (1979)

level which increased from 180 million in 1961 to about 215 million in 1978.

California consumption trends are not available since information is not available on quantities shipped into and out of the state. It is reasonable to assume that California trends in per capita consumption parallel those for the U.S. for most commodities. There is evidence from occasional surveys, however, that the level of per capita consumption may differ by region. For example, in 1965 the average Western consumer ate more beef and eggs and less pork and chicken than the average U.S. consumer.

Supply

The U.S. supply of livestock and poultry products is mainly from domestic sources; however, nonfed beef and lamb meat imports were about seven percent of production in 1974-76. Exports accounted for about three percent of chicken and turkey meat production in this period. There is trade in other products but imports are about equal to exports (see U.S. ESCS [1978]).

California is dependent on shipments from other states particularly for beef, pork, and broiler meat. We estimate that in 1971 California obtained from other areas 51 percent of its carcass beef, 98 percent of its pork, and about 60 percent of its poultry meat (see Table 1). It is estimated that some dairy products such as cheese are shipped into California, but the lamb, eggs, and turkey meat are exported from the state to other parts of the nation.

Table 1

Sources of California Beef, Pork and Broiler Supplies, 1971

Source	Beef supply		Pork supply		Broilers and fryers	
	Dressed weight	Percentage of total	Dressed weight	Percentage of total	Ready-to-cook weight	Percentage of total
	million pounds	percent	million pounds	percent	million pounds	percent
California slaughter						
California feedlots	1,208	43.4	--[a]	--	--	--
Other California sources	169	6.0	25.1	2.5	257	42
Inshipments for immediate slaughter	356	12.8	217.6	21.9	--	--
TOTAL	1,733	62.2	242.7	24.4	257	42
Meat inshipments	913	32.8	719.9	72.3	351	58[b]
Imports	139	5.0	33.1	3.3	--	--
TOTAL Supply	2,785	100.0	995.7	100.0	608	100

a/ Dashes indicate data not relevant.
b/ Includes only truck receipts of fryers in the San Francisco and Los Angeles areas. We estimate total inshipments may equal as much as 70 percent of total supply.

Sources: Beef inshipments and imports: James H. Cothern, Demand and Supply of Beef for California Markets, Davis: California Agricultural Extension AXT-381, August 1973.
Slaughter and California feedlots: estimated dressed weight of 607 pounds per animal.
Pork Supply: James A. Cothern, "Economic Problems and Opportunities for California Pork Producers," Davis: California Agricultural Experiment Service paper presented January 25, 1974.
Broilers and fryers: see Appendix Table C-8.

CALIFORNIA FEED SUPPLY AND UTILIZATION

Feed Concentrates

California livestock and poultry producers used an estimated 8.5 million tons of feed concentrates in 1974-76 (see Table 2). This aggregate consisted of feed grains (58 percent), wheat (2 percent), high-protein by-product feeds (12 percent) and other by-product and supplements (28 percent). Here, a brief review is given of a few important aspects of this feed supply and utilization.

Feed grains

An important aspect of the California industry is its dependence on feed grains produced in other states. Shipments into California of 3.0 million tons in 1974-76, exceeded California's production of 2.6 million tons. In 1961-65, California production was about the same as in 1974-76 (2.6 mil. tons), but inshipments were only 2.1 million tons. Thus, the increase in feed grains used by livestock between these periods was accomplished by inshipments rather than by local production.

The composition of both feed grain production and inshipments has changed over time, with corn production and use increasing rapidly and barley and grain sorghums decreasing in relative importance. Such changes are related to uneven technological developments among grains, to the composition of the livestock-poultry inventory, and to supply response by region in

Table 2

Feed Concentrates: California Supply and Distribution, 1961-65 Average and 1974-76 Average

Item	Supply				Distribution[a]				
	Beginning stocks January 1	Production	Imports and inshipments	Total supply	Ending stocks December 31	Exports	Seed	Food and industry	Livestock feed
	1,000 tons								
1961-65 average									
Grain									
Barley	647	1,755	204	2,606	641	78	71	109	1,707
Corn	121	233	446	800	129	16	1	46	608
Grain sorghum	785	494	1,419	2,698	646	219	2	—	1,831
Oats	33	92	42	167	33	—	16	4	114
Total	1,586	2,574	2,111	6,271	1,449	313	90	159	4,260
Wheat	259	259	557	1,075	256	145	14	512	148
All grain	1,845	2,833	2,668	7,346	1,705	458	104	671	4,408
By-products									
High protein	—[b]	603	186	901	—	—	—	—	901
Other	—	1,323	453	1,776	—	227	—	—	1,549
Total	—	2,038	639	2,677	—	227	—	—	2,450
TOTAL	1,845	4,871	3,307	10,023	1,705	685	104	671	6,858
1974-76 average									
Grain									
Barley	388	1,301	330	2,019	427	—	59	100	1,433
Corn	374	797	1,424	2,595	421	123	4	82	1,965
Grain sorghum	178	419	1,132	1,729	150	150	2	—	1,427
Oats	21	70	72	163	21	—	17	10	115
Total	961	2,587	2,958	6,506	1,019	273	82	192	4,940
Wheat	349	1,544	897	2,790	500	1,322	55	712	201
All grain	1,310	4,131	3,855	9,296	1,519	1,595	137	904	5,141
By-products									
High protein	—	633	360	993	—	—	—	—	993
Other	—	1,774	810	2,584	—	198	—	—	2,386
Total	—	2,407	1,170	3,577	—	198	—	—	3,379
TOTAL	1,310	6,538	5,025	12,873	1,519	1,793	137	904	8,520

a/ Seed use is estimated based on seeding rates and planted acreage. Food and industry use also is estimated based on various industry sources.

b/ Dashes indicate data are not available.

Sources: Grain: Federal-State Market News Service [1979]
By-products: see Table 3

the U.S. Also, the dynamics of export demand may influence yearly changes in production of individual grains. These grains are generally substitutable, within limits, on the basis of net energy content. Thus, the major factors associated with long-term changes in individual feed grain use are related to technology of production, interregional competition, and to some extent the composition of the California livestock and poultry production.

Wheat

California production has increased markedly over the past two decades, associated with the introduction of new high-yielding varieties and a strong export demand. Feed use is of minor importance in California due to more favorable returns in flour milling and other food uses.

By-product feeds

High-protein by-product feeds include such items as soybean meal, cottonseed and other oilseed meal, fish meal and meat scraps and meal. These feeds are particularly important in poultry rations and as protein supplements in some livestock rations. California produces about two-thirds of its high protein by-product feed requirements (see Table 3). The data on high-protein and other by-product feeds, however, are not reported as accurately as for feed grains, and probably underestimate available supplies.

Other supplements include alfalfa meal and pellets, dried beet pulp, fats, millfeeds, molasses, and mineral and vitamin supplements. About 75 percent of such feeds are produced in California. The availability of a wide variety of by-product feeds and roughages in California is an important reason for the location of certain livestock industries

Table 3

By-Product Feeds: California Supply and Distribution, 1961-65 Average and 1974-76 Average

Item	1961-65					1974-76				
	Production	Imports and rail receipts	Supply	Exports	Available for livestock feeding	Production	Imports and rail receipts	Supply	Exports	Available for livestock feeding
	1,000 tons					1,000 tons				
High protein										
Cottonseed meal	327	—[a]	327	—	327	291	—	291	—	291
Fish meal and products	21[b]	59[c]	80	—	80	43	9	52	—	52
Meat scraps and meal	177	—	177	—	177	139	—	139	—	139
Soybean meal	—	127	127	—	127	—	351	351	—	351
Other[d]	190	—	190	—	190	160	—	160	—	160
Total	715	186	901	—	901	633	360	993	—	993
Other supplements										
Alfalfa pellets and meal	406[c]	—	406	227[e]	179	337	—	337	198	139
Dried beet pulp	290	—	290	—	290	445	—	445	—	445
Fats	100	—	100	—	100	185	—	185	—	185
Millfeeds, wheat and rice	220	103[f]	323	—	323	305	260	565	—	565
Minerals and vitamins	115	115	230	—	230	200	200	400	—	400
Molasses	192	235	427	—	427	302	350	652	—	652
Total	1,323	453	1,776	227	1,549	1,774	810	2,584	198	2,386
TOTAL	2,038	639	2,677	227	2,450	2,407	1,170	3,577	198	3,379

a/ Dashes indicate data not available.
b/ 1962-65 average.
c/ 1963-65 average.
d/ Includes such meals as copra, linseed, corn gluten, feather, brewers dried grains, and dried milk products. Production levels are rough estimates based on various industry sources.
e/ 1964-65 average.
f/ 1965.

Sources: Cottonseed meal production, fish meal production and imports, soybean meal rail receipts, alfalfa pellet and meal production and exports and millfeed rail receipts: Federal-State Market News Service, Feedstuff Prices in California, Monthly and Yearly Averages, 1959-1967, 1973-1977, Sacramento (processed).
(Sources continued on next page)

(Table 3 sources continued)

Meat meal and scraps production was estimated by applying the California proportion of U.S. commercial cattle slaughter (Livestock and Meat Statistics, U.S. Economics, Statistics and Cooperative Services [1977]) to reported U.S. production of meat meal and tankage, Feed Situation, FdS-267, U.S. Economics Research Service [1977].

Dried beet pulp production is estimated as the California share of sugar beet production multiplied by the reported U.S. use of dried beet pulp used in animal feeding reported in the Feed Situation, (see above reference) U.S. Economic Research Service [1977].

Fat used as annual feed is derived from typical rations for the respective periods.

Millfeed production includes only wheat and rice. California wheat millfeed production is reported in Current Industrial Reports, Flour Milling Products, U.S. Bureau of the Census [1977]. California rice millfeed is estimated by applying California's percent of U.S. rice production to U.S. rice millfeed production as reported in the Feed Situation, U.S. Economic Research Service [1977].

Minerals and vitamins use is based on typical livestock and poultry rations and estimates of numbers fed. California production is estimated at 50 percent of that fed.

Molasses production refers to beet molasses only. U.S. beet molasses production is reported in Molasses Market News, U.S. Agricultural Marketing Service [1977]. California production is estimated by applying the proportion of that state's sugar beet production to U.S. beet molasses production.

in the state. However, it was noted previously that the level of feeding is dependent on feeds shipped in from other areas, under current economic conditions.

Hay and Roughage

California hay production was 7.6 million tons in 1974-76, of which 87 percent was alfalfa and the remainder was grain and other hay (see Table 4). Some hay is shipped into California, mainly from Nevada, which added 173 thousand tons to supplies in this period. California exports alfalfa as pellets (198 thousand tons) and hay cubes (71 thousand tons). Production of hay cubes is not reported.

There are various roughages utilized by livestock, as noted in the rations given in Appendix B. These include corn and sorghum silage for which production is reported (see Table 4) and straw, cottonseed hulls, and other forages for which production is not reported. Corn silage production in California has increased markedly in recent years.

Another important feed source is irrigated pasture and range land. Production is difficult to estimate, but a rough estimate of animal unit requirements is noted in the following section.

ESTIMATED FEED USE BY TYPE OF LIVESTOCK AND POULTRY

The purpose of this section is to present estimates of feed used by individual types of livestock and poultry. The procedure is to: (1) calculate the numbers of poultry and livestock fed annually in the two comparison periods; (2) obtain from various sources typical rations by type of livestock; and (3) calculate the estimated concentrates fed per

Table 4

Hay and Silage: California Supply and Distribution,
1961-65 Average and 1974-76 Average

Item	1961-65				1974-76			
	Production	Shipped into California	Exported	Fed	Production	Shipped into California	Exported	Fed
	1,000 tons				1,000 tons			
Hay								
Alfalfa	6,223	167 a/	227 b/	6,163	6,664	173 c/	269 d/	6,568
Grain	740	— e/	—	740	600	—	—	600
Other	446	—	—	446	366	—	—	366
Total	7,409	167	227	7,349	7,630	173	269	7,534
Silage								
Corn	1,305	—	—	1,305	3,265	—	—	3,265
Sorghum	252	—	—	252	179	—	—	179
Total	1,557	—	—	1,557	3,444	—	—	3,444

a/ 1963-65 average.
b/ 1963-64 average (pellets).
c/ Excludes shipments from Arizona
d/ Alfalfa pellets and meal (see Table 3)
e/ Dashes indicate data are not available.

Sources: Hay: Federal-State Market News Service [1978].
Silage: California Crop and Livestock Reporting Service [1979].

year so that the total is approximately equal to the aggregate available for feeding given in the previous section of this report. We wish to emphasize that this procedure is subject to error, since typical rations can be only approximated for state-wide feeding conditions, and data on weight gains in feedlots, for example, are not reported and should be treated as rough estimates. (See Appendix Tables B-2 and B-3).

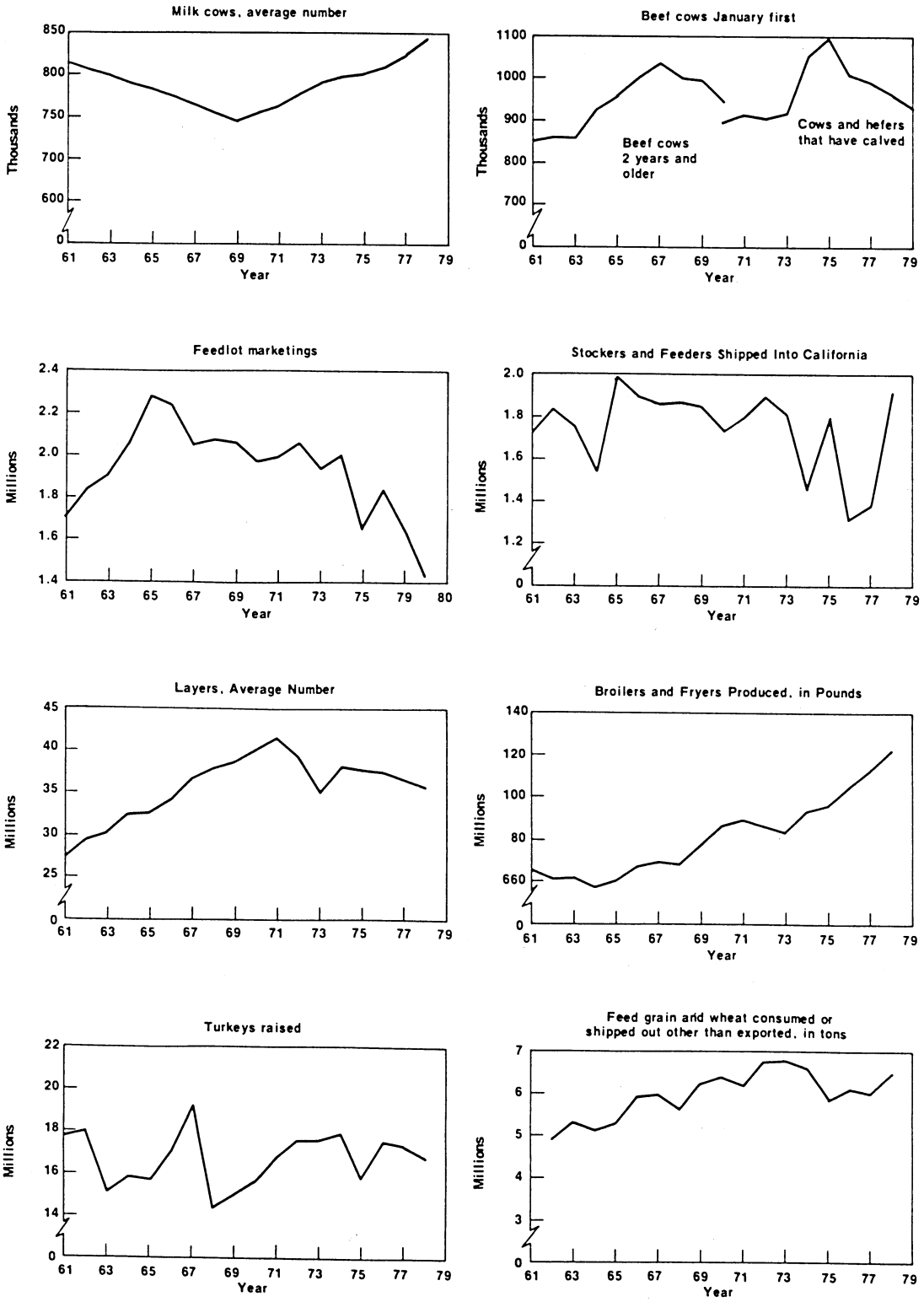
Before presenting results for individual types of livestock, a brief summary is given of aggregate feed use and trends in livestock numbers.

Aggregate Feed Use

The demand for feed is derived from the demand for livestock and poultry produced in California. Trends in numbers, shown in Figure 2, give one indication of changes over time. Other factors include the level of feeding related to milk production per cow, for example, and changes in feed conversion efficiency.

The estimated aggregates of concentrates, roughage and pasture used by livestock and poultry are shown in Table 5. These aggregates exclude amounts fed to horses, pets and rabbits. The total amount of grain fed, calculated in detail using rations and animal numbers (discussed subsequently), corresponds closely to that shown previously (Table 2) for grain available for livestock feed. Estimates of by-products fed, using typical rations, exceed reported available supplies by about two percent. One only has to inspect a list of by-product feeds in a least-cost dairy or beef cattle ration, however, to realize that many feeds are not reported and thus are not included in the Table 3 aggregate.

Figure 2
Trends in California Livestock and Poultry Numbers and in Feed Grains
1961-1978



Source: See Appendix C.

Table 5

Estimates of Feed Concentrates, Hay and Pasture Used by Livestock and Poultry: California, 1961-65 and 1974-76 Averages

Item	Concentrates			Hay or hay equivalent	Pasture
	Grain	By-products	Total		
	1,000 tons				1,000 AUM
1961-65 average					
Dairy cattle	618	872	1,490	4,967	6,705
Beef cattle	1,760	862	2,622	1,765	16,900
Sheep and lambs	7	1	8	16	4,877
Hogs	109	18	127	0	0
Poultry	1,840	923	2,763	0	0
Total	4,334	2,676	7,010	6,748	28,482
1974-76 average					
Dairy cattle	884	1,502	2,386	5,879	4,407
Beef cattle	2,033	937	2,970	1,995	19,465
Sheep and lambs	5	a/	5	11	2,583
Hogs	84	16	100	0	0
Poultry	2,144	1,074	3,218	0	0
Total	5,150	3,529	8,679	7,885	26,455

a/ Less than 1,000 tons.

Source: See Tables 6 to 10 for individual types of livestock.

There are similar data problems with the hay and roughage estimates. The supply of roughage includes hay and silage. If silage is converted to hay equivalent on a dry weight basis, the silage supply is multiplied by one-third.[1/] This provides an estimated 1974-76 silage supply of 1.3 million tons (one-third of the 3.4 mil. tons shown in Table 4) in addition to the 7.6 million tons of hay. The total supply of 8.9 million tons compares with estimated use of 7.9 million tons. The California horse population was about 835,000 in 1972.[2/] So it is reasonable to assume that horses use the 1 million ton difference, since horses on the average consume over a ton of hay annually.

Pasture use is estimated at 26.5 million animal unit months for 1974-76 which is somewhat lower than in 1961-65 due to reduced sheep and lamb numbers and more intensive dairy animal production practices. Supply and utilization data for pasture and rangeland noted in the previous section, must be considered as only rough approximations, subject to unknown ranges of error.

Feed Use by Type of Livestock

The following discussion of estimates of feed use by type of livestock and poultry will highlight briefly important changes between the two periods. Feed use by livestock type is based on typical rations given in Appendix B and yearly data on livestock and poultry numbers given in Appendix C.

1/ An alternative way of calculating feed requirements and supplies is on a net energy or total digestible nutrient basis. Feed requirements for a single year, 1976, are so calculated in the appendix.

2/ Unpublished data provided by the American Horse Council, Inc., Washington, D.C.

Dairy cattle

Milk production in California has increased steadily over the past decade, with the average number of milk cows about equal in 1961-65 and 1974-76. Milk production per cow, however, increased sharply, from 10,100 pounds in 1961 to 14,462 pounds in 1977. Concentrate and hay feeding has increased accordingly (see Table 6). The amount of pasture used, measured in animal unit months, has decreased over time associated with more intensive methods of milk production and raising replacements.

Beef cattle

Feedlot operations utilize about 34 percent of total feed grains and by-products fed in California as well as substantial quantities of hay (Table 7). Feedlot marketings increased sharply during the early 1960's, and remained at about two million head from 1967 to 1974 (see Figure 2). Feedlot marketings dropped sharply in 1975, both in California and in all states, associated with unfavorable economic conditions in the livestock industry.

Feeders and stockers shipped into California are the main source of animals for feedlots. Typically, about 1.8 million head are shipped to California annually (see Figure 2). About 0.4 million head are shipped out of California, mainly from Northern California. The regional nature of livestock production will be discussed in a subsequent report and will not be duplicated here, but attention should be given to Appendix A which traces the regional California throughput of beef cattle for a single year, 1976.

Table 6

California Dairy Animal Numbers, Estimated Feed Per Head and Total Fed Annually, 1961-1965 and 1974-1976

Year	Type of animal	Number per 100 cows	Total number fed per year a/	Estimated quantity fed per head b/					Estimated total quantity fed				
				Feed grains	Other concentrates	Total concentrates	Hay	Pasture	Feed grains	Other concentrates	Total concentrates	Hay	Pasture
			1000 head	pounds				AUM	1000 tons				1000 AUM
1961-1965 average	Milk cows, ave/year	100.0	798	1,370	1,897	3,267	10,795	4.5	546	756	1,322	4,307	3,591
	Replacement heifers	32.6	260	275	444	719	3,650	5.6	36	58	94	117	1,456
	Heifer calves	32.6	260	275	444	719	900	5.6	36	58	94	474	1,456
	Steer and bull calves	2.9	23	- c/	-	-	900	5.6	-	-	-	10	129
	Bulls	1.6	13	-	-	-	9,000	5.6	-	-	-	59	73
	Total	-	-	-	-	-	-	-	618	872	1,490	4,967	6,705
1974-1976 average	Milk cows, ave/year	100.0	803	1,912	3,198	5,110	12,200	1.1	768	1,284	2,052	4,898	883
	Replacement heifers	39.5	296	392	734	1,126	5,329	5.6	58	108	166	789	1,658
	Heifer calves	39.5	296	392	734	1,126	900	5.6	58	108	166	133	1,658
	Steer and bull calves	2.6	21	-	-	-	900	5.6	-	-	-	9	146
	Bulls	1.4	11	-	-	-	9,000	5.6	-	-	-	50	62
	Total	-	-	-	-	-	-	-	884	1,502	2,386	5,879	4,407

a/ Data on milk cows and replacement heifers (1970 to date) are given in Appendix Table B-1. Heifer calves, steer and bull calves, and dairy bulls for 1961-1965 are as reported in earlier issues. These data are not reported subsequent to 1970 and are estimated by the same "numbers per 100 cows" as in 1961-1965.

b/ Estimate for milk cows based on estimated feed fed per hundredweight of milk. Summary information on production and consumption are noted below:

Year	Production per cow d/	Feed per cwt. milk e/			Total milk production d/
		Grain	Other	Total concentrates	
	pounds	pounds			mil. lbs.
1961-1965 average	10,492	13.05	18.55	31.6	8,368
1974-1976 average	13,714	16.5	20.2	36.7	11,011

c/ Dashes indicate data not relevant.
d/ See Appendix Table C-1.
e/ See Appendix Table B-1 for rations for milk cows.

Table 7

California Beef Cattle Numbers, Estimated Feed Per Head and Total Quantities Fed Annually, 1961-1965 and 1974-1976

Year	Type of animal	Number per 100 cows	Total number fed per year	Estimated quantity fed per head					Estimated total quantity fed				
				Feed grains	Other concentrates	Total concentrates	Hay	Pasture	Feed grains	Other concentrates	Total concentrates	Hay	Pasture
			1000 head	pounds				AUM	1000 tons				1000 AUMs
1961-1965 average	Feedlot marketings	-a/	1,957	1,730.0	820	2,550.0	480	-	1,690	800	2,490	470	-
	Cows that have calved	100.0	889	22.5	90	112.5	2,000	11.7	10	40	50	889	10,400
	Heifer replacements	34.6	308	-	-	-	1,400	5.6	-	-	-	216	1,700
	Lightweight calves fed	-	200	600.0	225	825.0	1,425	-	60	22	82	142	-
	Calves raised	88.0	785	-	-	-	-	5.6	-	-	-	-	4,400
	Bulls	7.8	69	-	-	-	1,400	5.6	-	-	-	48	400
	Total	-	-	-	-	-	-	-	1,760	862	2,622	1,765	16,900
1974-1976 average	Feedlot marketings	-	1,612	2,240.0	960	3,200.0	600	-	1,805	775	2,580	445	-
	Cows that have calved	100.0	1,054	25.0	90	115.0	2,000	11.7	13	47	60	1,054	12,330
	Heifer replacements	23.0	242	-	-	-	1,400	5.6	-	-	-	169	1,355
	Lightweight calves fed	-	1,000	430.0	230	660.0	540	-	215	115	330	270	-
	Calves raised	90.0	950	-	-	-	-	5.6	-	-	-	-	5,320
	Bulls	7.8	82	-	-	-	1,400	5.6	-	-	-	57	460
	Total	-	-	-	-	-	-	-	2,033	937	2,970	1,995	19,465

a/ Dashes indicate data not relevant.

Sources: Numbers fed: Appendix Table C-2. Rations: Appendix Tables B-2 and B-3.

The beef cow herd in California has shown cyclical inventory movements associated with variations in profitability and also in adjustments to range conditions of the recent drought years. The importance of pasture to this segment of the livestock industry is reflected in Table 5 where it is estimated that about three-fourths of all pasture was for beef animals in 1974-76. Use of rangeland for grazing is another important feed source.

Sheep and lambs

Sheep production in California (and the U.S.) has continued to decline over the past two decades. There were 1.4 million head of ewes one year old and older on January 1, 1961 but only 0.8 million head in 1978. On the demand side, consumer preferences appear to have changed in favor of competing meats. On the supply side, strong competition for available rangeland from beef cattle, as well as from nonagricultural uses, has been a factor in reducing numbers (Reed [1974]). Labor and predator problems also have plagued California's sheep industry in recent years. Most of the lambs from California flocks and lambs shipped into the state are fed on pasture, but some grain and other supplements are fed. Estimated animal feed use in 1961-65 and 1974-76 is given in Table 8.

Hogs

Hog production has continued to decline in California. Pigs saved in 1977 were 195,000 as compared with 482,000 in 1961. Most of our pork supply for consumption in the state is shipped in from the Midwest, as noted previously. One important change over the period of analysis is the increase in dressed weight per head, associated with the leaner-type hog produced in the country (see Table 9).

Table 8

California Sheep and Lamb Numbers, Estimated Feed Per Head and Total Quantities Fed Annually, 1961-1965 and 1974-1976

Year	Type of animal	Number per 100 ewes	Total number per year	Estimated quantity fed per head					Estimated total quantity fed				
				Feed grains	Other concentrates	Total concentrates	Hay	Pasture[a]	Feed grains	Other concentrates	Total concentrates	Hay	Pasture[a]
			1000 head	pounds				AUMs	1000 tons				1000 AUMs
1961-1965 average	Ewes 1 year and over	100.0	1,293	10[b]	[c]	10.0	16	2.35	6.5	-	6.5	10.3	3,039
	Feedlot lambs	2.3	30	42	36	78.0	240	-	0.7	0.5	1.2	3.6	-
	Lambs and yearlings on pasture	87.2	1,127	-	-	-	-	1.00	-	-	-	-	1,127
	Ewe lamb replacements[d]	20.0	259	-	-	-	16	2.30	-	-	-	2.1	596
	Rams and replacements	3.8	50	-	-	-	16	2.30	-	-	-	0.4	115
	Total	-	-	-	-	-	-	-	7.2	0.5	7.7	16.4	4,877
1974-1976 average	Ewes 1 year and over	100.0	866	10	-	10.0	-	2.35	4.3	-	4.3	6.9	2,035
	Feedlot lambs	2.5	19	-	36	78.0	240	-	0.4	0.3	0.7	2.3	-
	Lambs and yearlings on pasture	88.1	763	-	-	-	-	1.00	-	-	-	-	305
	Ewe lamb replacements[d]	20.0	173	-	-	-	16	2.30	-	-	-	1.4	208
	Rams and replacements	3.6	29	-	-	-	16	2.30	-	-	-	.2	35
	Total	-	-	-	-	-	-	-	4.7	0.3	5.0	10.8	2,583

a/ Excludes stubble and aftermath. Based on estimates of A. D. Reed.
b/ Allowance for concentrate supplement for pregnant ewes.
c/ Dashes indicate data not relevant.
d/ Assumes 20 percent replacement rate for ewes 1 year old and older.

Sources: Numbers: See Appendix Table C-4. Rations: See Appendix Table B-4.

Table 9

California Hog Numbers, Estimated Concentrates Fed Per Head and Total Concentrates Fed Annually, 1961-1965 and 1974-1976[a/]

Year	Type of animal	Number per 100 pigs saved	Total number per year	Estimated concentrates fed per head			Estimated total concentrates fed		
				Feed grains	Other concentrates	Total	Feed grains	Other concentrates	Total
			1000 head	pounds			1000 tons		
1961-1965 average	Pigs saved	100	308	-[b/]	-	-	-	-	-
	Grain-fed pigs	72	222	985	163	1,148	109.3	18.1	127.4
	Total	-	-	-	-	-	109.3	18.1	127.4
1974-1976 average	Pigs saved	100	194	-	-	-	-	-	-
	Grain-fed pigs	80	155	1,087	199	1,286	84.2	15.5	99.7
	Total	-	-	-	-	-	84.2	15.5	99.7

a/ Data on pigs saved are from the California Crop and Livestock Reporting Service, California Livestock Statistics (various issues), Sacramento (processed). Number of grain fed pigs is based on estimated proportion of pigs saved that are grain-fed. The basis of feed requirements is:

Year	Production from grain-fed hogs (estimated dressed weight excluding lard)			Feed required per pound of dressed weight[d/]		
	Estimated number	Average dressed weight/head[c/]	Estimated production	Feed grains	Other concentrates	Total concentrates
	1000 head	pounds	mil. lbs.	pounds		
1961-1965 average	222	143	31.7	6.9	1.1	8.0
1974-1976 average	206	166	34.2	6.6	1.2	7.8

b/ Dashes indicate data are not relevant.
c/ U.S. average as reported in U.S. Economics, Statistics, and Cooperatives Service, Livestock and Meat Statistics, Statistical Bulletin No. 522 (various issues), Washington (processed). The increase in average dressed weight is due to the reduction in lard content since average liveweights have remained relatively constant.
d/ See Appendix Table B-5.

Feed use by hogs in California is minor when compared with that of other types of livestock, but these animals can utilize by-products that might otherwise be wasted. Recall that our list of available by-products underestimates the total supply. The rations specified here are based on estimated typical statewide rations given in Appendix B.

Poultry

The California poultry industry consists of three important producing sectors: eggs, turkeys, and broilers and fryers. Poultry used about three million tons of feed concentrates annually in recent years.

Egg production--Total egg production increased from 6.1 billion in 1961 to 9.0 billion in 1976, associated with increased number of layers, but egg production per bird has remained relatively constant. Layers are the major users of feed concentrates within the poultry aggregate (see Table 10). California currently produces more eggs than it consumes, as noted previously.

Broiler production--Broiler and fryer production in California (and the U.S.) has increased rapidly during the past two decades (see Figure 2). There have been important gains in feed conversion efficiency that have served to dampen price increases and thus have made broiler meats attractive to consumers on a price relative basis. In 1974-76 annual feed use for broiler production was estimated at 451,000 tons as compared with 270,500 tons for 1961-65 (see Table 10). California faces competition in broiler production, primarily from the Southeast, in supplying the market here.

Table 10

California Poultry Numbers, Estimated Concentrates Fed Per Head and Total Concentrates Fed Annually 1961-1965 and 1974-1976

Year	Type of poultry	Total number per year	Estimated quantity fed per head[a/]			Estimated total quantity fed		
			Feed grains	Other concentrates	Total concentrates	Feed grains	Other concentrates	Total concentrates
		1000 birds	pounds			1000 tons		
1961-1965 average	Layers, including replacements	29,943	79.0	37.0	116.0	1,182.8	553.9	1,736.7
	Broilers produced	60,115	5.6	3.4	9.0	168.3	102.2	270.5
	Broiler breeding flock	427	115.5	55.0	170.5	24.7	11.7	36.4
	Turkeys raised	16,450	49.7	27.3	77.0	408.8	224.5	633.3
	Turkey breeding flock	961	115.2	64.8	180.0	55.4	31.1	86.5
	Total	-[b/]	-	-	-	1,840.0	923.4	2,763.4
1974-1976 average	Layers, including replacements	37,242	79.0	37.0	116.0	1,471.0	689.0	2,160.0
	Broilers produced	97,051	6.0	3.3	9.3	291.1	160.1	451.2
	Broiler breeding flock	682	113.3	58.3	171.6	38.6	19.9	58.5
	Turkeys raised	17,055	35.1	21.5	56.6	299.3	183.3	482.6
	Turkey breeding flock	770	114.0	56.0	170.0	43.9	21.6	65.5
	Total	-	-	-	-	2,143.9	1,073.9	3,217.8

a/ Data given below were used in estimating quantities fed per head:
b/ Dashes indicate data not relevant.

Year	Eggs			Broilers			Broiler breeding flock				Turkeys raised			Turkey breeding flocks	
	Production per bird			Weight per bird				Egg production (85 percent hatch)			Weight per bird				
	Number	Dozen	Feed per dozen	Live	Ready to cook (72 percent yield)	Feed per pound dressed weight	Broiler chicks hatched	Number	dozen	Feed per dozen eggs	Live	Ready-to-cook (80 percent yield)	Feed per pound dressed weight	Eggs per bird	Added feed per egg
	number		pounds	pounds				mil. lbs.		pounds	pounds			number	pounds
1961-1965	225	18.75	6.2	3.7	2.66	3.38	65	76	6.33	11.5	19.3	15.4	5.0	72	2.5
1974-1976	225	18.75	6.2	4.3	3.10	3.00	104	122	10.17	11.5	18.6	14.9	3.8	85	2.0

Sources: Numbers: Appendix Tables C-8 and C-9. Rations: Appendix Tables B-6 and B-7.

Turkey production--Although California is an important producer of turkey meat in the U.S., its market share has decreased from 18 percent in 1961-65 to about 13 percent in 1974-76 while U.S. consumption per capita has shown a steady increase over the past two decades (Figure 1).

Numbers of turkeys raised in California have shown sharp fluctuations over the past two decades (Figure 2). There have been important gains in feed conversion efficiency in recent years, which has allowed turkey to compete well with other meats (Table 10). In California the number of turkeys raised averaged 17.1 million in 1974-76 as compared with 16.4 million in 1961-65; however, due to increased feeding efficiency, total annual tonnage of feed used decreased from an estimated 633,300 tons (1961-65 average) to 482,600 tons annually in 1974-76. Additional feed is used by the turkey breeding flock.

ESTIMATED LAND AND WATER USED TO PRODUCE FEED

Here, we give estimates of land and water used for livestock feed in California in 1975. Land includes an estimate of the harvested acreage of grain used for feed, hay acreage, irrigated pasture, and nonirrigated range land. No allowance is made for land used to produce by-products (such as cottonseed meal) since land is more appropriately allocated to the primary product (cotton lint). Also, water used in livestock production and processing is not included.

Harvested Acreage

In 1975, California harvested acreage was 9,454,000 acres, including field crops (6,616,000), vegetables (909,000), and tree fruits, nuts and

grapes (bearing and nonbearing acreage of 1,929,000). About 47 percent of the harvested field crop acreage is for feed grains, wheat and hay (see Table 11).

Not all of the grain production is used for livestock feed since other uses, such as for food and industry, are important, particularly for wheat. Since shipments into the state are important, any allocation of local and imported grain to a particular utilization is arbitrary. For our purposes, we calculated the percentage that quantities fed in 1974-1976 were of California production plus imports and inshipments (see Table 11). Applying these percentages to 1975 harvested grain acreage of 2,801,000 gives an estimated acreage for livestock feed of 1,665,000. Hay acreage adds 1,650,000 acres. Thus, 3,315,000 acres were devoted to the production of livestock feed, or 50 percent of the total field crop acreage.

Estimates of the water applied on this livestock feed acreage are 2,671,000 acre-feet for grain plus 5,732,000 acre-feet for hay. As noted in Table 11, these estimates are based on the percentage of harvested acreage of each crop that is irrigated, as given in the 1974 Census of Agriculture, and unpublished estimates of applied water per acre irrigated. (Highstreet, et al, 1979).

Irrigated Pasture

About 1.2 million acres are used for livestock as irrigated pasture. Assuming 4.3 acre-feet of water per irrigated acre gives an estimated 5.2 million acre-feet for 1975. Thus, the total water used for livestock feed (grain, hay, and irrigated pasture) is 13.5 million acre-feet which is 42 percent of the 32 million acre-feet applied in 1975.

Table 11

Land and Water: Estimated Use for Livestock Feed Production, California, 1975

Item	1975 harvested acreage	1974 percentage irrigated	Derived irrigated acreage a/	Applied water per acre irrigated	Derived total water applied b/	Estimated percentage for livestock feed c/	Derived water use for livestock feed d/	Estimated land used for livestock feed e/	
								Harvested acreage	Irrigated acreage
	1000 acres	percent	1000 acres	acre-feet	1000 acre-feet	percent	1000 acre-feet	1000 acres	
Grain									
Barley	1,060	52	551	1.7	937	88	825	933	485
Corn, including silage	420	98	412	3.4	1,401	88	1,233	370	363
Sorghum for grain	207	97	201	2.5	502	92	462	190	184
Oats	113	32	36	1.7 g/	61	81	49	92	29
Wheat	1,001	53	531	2.4	1,274	8	102	80	42
Total	2,801	- f/	1,731	-	4,175	-	2,671	1,665	1,103
Hay									
Alfalfa	1,120	95	1,064	4.8	5,107	100	5,107	1,120	1,064
Other	530	50	265	2.0	530	100	530	530	265
Total	1,650	80	1,329	-	5,637	-	5,637	1,650	1,329
Irrigated pasture	1,200	100	1,200	4.3	5,160	100	5,160	1,200	1,200
Total	5,651	-	4,260	-	14,972	-	13,468	4,515	3,632
Total irrigated land	-	-	8,780	-	31,690	-	-	-	-
Range land	-	-	-	-	-	-	-	35,968	-

a/ Calculated by multiplying percentage irrigated by harvested acreage.
b/ Calculated by multiplying derived irrigated acreage by applied water per acre irrigated.
c/ Calculated from Table 2 as the 1974-1976 average quantity fed to livestock as a percentage of the sum of California production plus feed shipped into the state.
d/ Calculated by multiplying derived total water applied by the estimated percentage for livestock feed.
e/ Calculated by multiplying acreage data by the estimated percentage for livestock feed.
f/ Dashes indicate data not relevant.
g/ Source is 1974 Census of Agriculture.

Sources: Harvested acreage of crops: California Crop and Livestock Reporting Service, Annual Field Crop Summary. Irrigated pasture: Rough estimate by authors. Percentage irrigated: U.S. Bureau of the Census, 1974 Census of Agriculture, Vol. 1, Part 5, p. I-23. Applied water per acre irrigated: Unpublished report by Highstreet, et al., 1979. Total irrigated acreage and total water applied: California Department of Water Resources, The California Water Plan, Outlook in 1974, Bulletin No. 160-74, November 1974. Range land: A. D. Reed, The Contribution of Range to the Economy of California, University of California Extension Report MA-82, 6174, Davis.

Range Land

An estimate of range land used for grazing by beef breeding herds, stocker cattle, sheep, plus some horses, goats, and dairy stock is provided by Reed [1974] and is summarized as acreage and animal unit months (AUM) as follows:

Ownership	Acres	AUM
	Thousands	
Private ownership	23,211	13,100
U.S. Forest	5,004	408
Bureau of Land Management	7,753	445
TOTAL	35,968	13,953

The estimate of total pasture used annually in 1974-1976 is 26.5 million animal units months. If range land contributes 14.0 million AUM, then irrigated pasture would contribute 12.5 million AUM. The AUM per acre then is .39 for range land and about 10.4 for irrigated pasture. Governmental policy on the use of grazing lands may influence the quantity and quality of this source of feed in the future.

Summary

Land and water used in 1975 for livestock feed and forage production is summarized briefly as follows:

Item	Land		Water applied
	Total	Irrigated	
	million acres		million acre-feet
Crop land			
Grain	1.7	1.1	2.7
Hay	1.6	1.3	5.6
Irrigated pasture	1.2	1.2	5.2
TOTAL	4.5	3.6	13.5
Range land	36.0	-0-	-0-

Use of range land for livestock grazing provides an economic return not otherwise available, with an estimated value of $204 million [Reed, 1974]. The use of by-product feeds and the grazing of livestock on fields after harvest provide further economic use of resources that otherwise would be

The economics of water use for livestock feed production and for irrigated pasture is a complicated issue in which consideration must be given to the use of resources noted above in addition to the role of inshipments of grain and/or livestock products from other areas.

REFERENCES

California Crop and Livestock Reporting Service. Annual Livestock Slaughter, 1978, Sacramento: March 1979.

_____. California Dairy Industry Statistics, 1977, Sacramento, 1978.

_____. California Field Crop Statistics, 1977-1978, Sacramento, 1979.

_____. California Livestock Statistics, 1978, Sacramento, 1979.

_____. Production and Marketing Eggs, Chickens and Turkeys, California - 1978, Sacramento, 1979.

California Department of Finance. Population Estimates for California Counties, Sacramento: Report 78E-2 (and various issues), December 1978.

California Department of Food and Agriculture. Bureau of Milk Stabilization, Standard Milk Production Cost Index, Sacramento: 200-009 (Rev. 7-75) 1979.

California Department of Water Resources. The California Water Plan, Outlook in 1974, Sacramento: Bulletin No. 160-74, November 1974.

Cothern, James H. Demand and Supply of Beef for California Markets, Davis: California Agricultural Extension AXT-381, August 1973.

_____. "Economic Problems and Opportunities for California Pork Producers," Davis: California Agricultural Extension Service, paper presented January 25, 1974.

Federal-State Market News Service. Feedstuff Prices in California Monthly and Yearly Averages, Sacramento: (processed), various issues, 1977.

Federal-State Market News Service. Alfalfa Hay: California Market Summary, 1977, Los Angeles: September 1978.

_____. Grain: California Market Summary 1978 (annual issues for various years), Fresno: June 1979.

Highstreet, Allan, Carole Frank Nuckton, and Gerald L. Horner. "Agricultural Water Use and Costs in California," Department of Agricultural Economics, University of California, Davis, Working Paper No. 79-13, 1979.

King, Gordon A., Harold O. Carter, and Daniel J. Dudek. Projections of California Crop and Livestock Production to 1985, Berkeley: Giannini Foundation Information Services in Agricultural Economics No. 77-3, 1977.

National Research Council. Nutrient Requirements of Beef Cattle, 5th edition, Washington, 1976.

_____. Nutrient Requirements of Dairy Cattle, 5th edition, Washington, 1978.

_____. Nutrient Requirements of Poultry, 6th edition, Washington, 1971.

_____. Nutrient Requirements of Swine, 7th edition, Washington, 1973.

Reed, A. D. The Contribution of Range Land to the Economy of California, Davis: California Cooperative Extension, May 1974.

Salathe, Larry E. Household Expenditure Patterns in the United States, Washington: U.S. Economics, Statistics, and Cooperative Services Tech. Bul. No. 1603, April 1979.

Snider, Gary, and Gordon King. The California Feed-Livestock Balance in 1961-65, Berkeley: Giannini Foundation Research Report No. 310, July 1970.

Thomas, John W., and Elmer W. Braun. Utilization of Feedstuffs by California Feeding Industries, Calendar Year 1963, Sacramento, California Department of Agriculture, 1965.

U.S. Agricultural Marketing Service. Molasses Market News, 1976, Denver: April 1977.

U.S. Bureau of the Census. 1974 Census of Agriculture, Vol. 1, Part 5, Table 25, p. I-23.

_____. Current Industrial Reports, Flour Milling Products, 1977.

U.S. Department of Agriculture. Agriculture Statistics, 1978, Washington.

U.S. Economic Research Service. Feed Situation, Washington: Fd S-267 (and various issues), 1977.

U.S. Economics, Statistics and Cooperative Services. Cattle on Feed, various issues, Washington, 1977.

U.S. Economics, Statistics and Cooperative Services. Livestock and Meat Statistics, Supplement for 1977, Washington: Statistical Bulletin No. 522, 1977.

_____. Food Consumption, Prices, and Expenditures, Washington: Supplement for 1977 to Agricultural Economics Report No. 138, September, 1979.

APPENDIX A

1976 CALIFORNIA LIVESTOCK AND POULTRY NUMBERS AND ESTIMATED FEED REQUIREMENTS[1/]

This section analyzes the supply and disposition of livestock and poultry for a particular year, 1976, and provides a more detailed analysis of feed requirements by season than is possible using average data shown previously in this report. Animal numbers are presented first, followed by estimated feed requirements in terms of animal unit months (AUM) for grazing livestock and total digestible nutrients (TDN) for housed or otherwise confined stock.

Livestock and Poultry Numbers

Tables on various classes of livestock and poultry are generally self-explanatory and no detailed summary is given in the text. However, the reasons for certain estimating procedures will be given.

Cattle

The stock of cattle on January 1, 1976 was 5 million head. This was augmented by 1.6 million calves born plus shipments of cattle into California of 1.8 million (see Appendix Table A-1). This total supply of 8.4 million is balanced with disposition as marketings, death losses and ending inventory. In deriving information on supply and disposition of various classes, estimates are required of death losses from particular classes and of culls and sales of breeding animals and young stock since published data do not include a complete breakdown of all stock. Reported deaths are 65,000 head

---

1/ This section was contributed by A. C. Bywater. Thanks are extended to J. Dunbar, C. Pelisier, D. Bath, and R. Ernst.

Appendix Table A-1

Cattle: Supply and Disposition, California, 1976

Item	Supply: Beginning inventory January 1, 1976	Supply: Additions 1976	Item	Disposition: Ending inventory January 1 1976	Disposition: Uses in 1977
	1,000 head			1,000 head	
Cattle					
Cows	1820		Cows	1800	
Bulls	85		Bulls	71	
Heifer replacements	560		Marketed		2917.0
Inshipments for breeding		41.0 a/	Deaths		31.4 b/
Young Stock					
Calves (less than 500 lbs.)	1165		Calves (less than 500 lbs)	1070	
Steers	1180		Steers	1120	
Nonreplacement heifers	190		Nonreplacement heifers	164	
Calves born		1610.0	Heifers retained as replacements	525	
Inshipments: feeder cattle		1323.0			
slaughter cattle		406.0	Deaths: calves		170.0 b/
			stockers and feeders		33.6 b/
			Farm slaughter		68.0
			Calves marketed		410.0
Total inventory/additions	5000	3380.0	Total inventory/disposition	4750	3630.0
Total		8380.0	Total		8380.0
Marketings					
Sources: Feedlot		1844.0	Reported marketings: cattle		2917.0
Inshipments; slaughter cattle		406.0	calves		410.0
Est. culls and sales; cattle		603.6 c/			
young stock		473.4 d/			
Total		3327.0 e/			3327.0

a/ Reported inshipments of 1,770,000 head include 1,323,000 stockers and feeders, 406,000 slaughter cattle leaving 41,000 head assumed breeding animals.

b/ Reported cattle deaths of 65,000 are allocated proportionally between the breeding herd and all other cattle over 500 lbs; calf deaths of 170,000 are reported separately.

c/ See Appendix Table A-2.

d/ See Appendix Table A-3.

e/ Reported slaugther of 3,211,000 head (2,855,000 cattle; 356,000 calves) implies 116,000 head marketed but not slaughtered.

Source: California Crop and Livestock Reporting Service California Livestock Statistics, Sacramento, 1979.

for cattle and 170,000 head for calves. Cattle deaths are allocated to all classes of stock over 500 lbs. proportional to the total numbers in each class. This represents an average death rate of 1.25 percent. Calf losses are allocated between calf inventory and newborn animals assuming death losses from inventory equal the death rate of older stock (i.e., 1.25 percent) and that remaining deaths are of newborn--155,400 head or 9.65 percent. Allocation of losses between beef and dairy calves is proportional to the number in each class; although the cause of losses in the two industries are likely to be different, there is no indication that death rates differ significantly.

A summary of marketing sources is given in Appendix Table A-1. Feedlots accounted for 1.8 million cattle marketed in 1976, inshipments of cattle for slaughter equaled a further 0.4 million and the remainder are estimated culls and sales from the breeding herd and surplus young stock. Both the latter estimates and the published total marketing figures are balance items between supply and other disposition. Reported slaughter of approximately 2.86 million head of cattle and .36 million head of calves results in 116,000 head being marketed and not slaughtered in state. These animals are assumed to be shipped out of state although reported outshipments were 469,700 during 1976. This latter figure presumably includes animals which are shipped out without change in ownership.

Estimated culls and sales from the breeding herd are derived in Appendix Table A-2, with beef and dairy animals separated out to allow the calculation of feed requirements for each. The general procedure is one of balancing beginning and ending inventory data, adjusted for inshipments and death losses. The estimated total culls and sales of 603,600 will be used

Appendix Table A-2

Cattle Breeding Herd: Estimated Culls and Sales; California 1976

Beginning inventory and additions	1,000 head	Ending inventory, death losses, culls and sales	1,000 head
Beef			
Cows, January 1, 1976	1010.0	Cows, January 1, 1977	991.0
Heifer replacements, January 1, 1976	240.0	Est. deaths:[b/] from cow inventory	12.9
Inshipments	15.7[a/]	from heifer inventory	3.0
		Est. culls and sales	258.8[c/]
Total	1265.7	Total	1265.7
Dairy			
Cows, January 1, 1976	810.0	Cows, January 1, 1977	809.0
Heifer replacements, January 1, 1976	320.0	Est. deaths:[b/] from cow inventory	10.4
Inshipments	25.3[a/]	from heifer inventory	4.0
		Est. culls and sales	331.9[c/]
Total	1155.3	Total	1155.3
Bulls			
Beef bulls, January 1, 1976	70.0[d/]	Beef, January 1, 1977	56.0[d/]
Dairy bulls, January 1, 1976	15.0	Dairy, January 1, 1977	15.0
Replacements	e/	Est. Deaths[b/]	1.1
		Est. culls and sales net of replacements	12.9
Total	85.0	Total	85.0
		Total culls and sales	603.6[c/]

a/ See Appendix Table A-1 footnote a/; reported inshipments of dairy cattle number 25,300, remainder of 41,000 total breeding inshipments assumed to be beef animals.

b/ Total reported cattle deaths of 65,000 head allocated proportionally between all classes of breeding animals and other cattle over 500 lbs. (Appendix Table A-3).

c/ Culls and sales are estimated so as to balance supply and disposition.

d/ Allocation of bulls between dairy and beef described in text.

e/ Data not available.

Source: California Livestock Statistics, 1977--See Appendix Table A-1.

subsequently in calculating feed requirements. The division of bulls between beef and dairy animals is made on the assumption that there are an average of five bulls (including immature bulls and bulls at specialist breeding or artificial insemination centers) for each of approximately 3,000 dairies in the state, for a total of 15,000 dairy bulls. The remainder of reported bull numbers are considered to be beef bulls.

Supply and disposition of young stock are shown in Appendix Table A-3 divided into calves and stocker cattle and feedlot cattle. Calf births are allocated between beef and dairy animals based on reported cow inventories on January 1, 1976. Division of the calf inventory between beef and dairy calves is based on the assumption that beef calves on hand are those born in Fall, 1975 in Central and Southern California and that the remainder are dairy calves. The number of Fall-born calves is estimated from the cow inventory for relevant counties. Calf deaths are allocated as previously noted. Total supply of calves and stockers including January 1 inventory and 1976 births amount to just under 3.2 million head. After allowance for death losses and ending inventories of calves, retained heifers, replacements and stocker cattle, approximately 0.94 million head are available for feedlot placement or sale.

Feedlot cattle are of particular importance in California. For 1976, the beginning inventory was 960,000, with 1,985,000 reported placed on feed. Of those placed on feed, 289,000 are reported to include movements from feedlots to pasture and shipments to other feedlots as well as death losses. The latter is estimated at 28,500 which almost certainly is an underestimate for two reasons. First it is based on a proportional distribution of deaths among all classes of stock over 500 lbs. A higher death rate might

Appendix Table A-3

Young Stock: Supply and Disposition, California, 1976

Beginning inventory and additions	1,000 head	Ending inventory, death losses, marketings and estimated surplus	1,000 head
Calves and Stocker Cattle			
Calf inventory, January 1, 1976	(1165.0)[a]	Calf inventory, January 1, 1977	(1070.0)[a]
Beef	711.3	Beef	687.1
Dairy	453.7	Dairy	382.9
Calves born in 1976	(1610.0)[a]	Calf deaths:[b]	
Beef	893.5	From inventory: Beef	8.9
Dairy	716.5	Dairy	5.7
Stocker inventory, January 1, 1976	410.0[c]	From 1976 crop: Beef	86.2
		Dairy	69.2
		Heifer replacements, January 1, 1977	
		Beef	210.0
		Dairy	315.0
		Stocker inventory, January 1, 1977	472.0[c]
		Est. stocker deaths	5.1[d]
		Calves and stockers available	942.9[e]
Total	3185.0	Total	3185.0
Feedlot Cattle			
Inventory, January 1, 1976	960.0	Inventory, January 1, 1977	812.0
Placed on feed	1985.0	Marketed	1844.0
		Est. deaths	28.5[d]
		Other disappearance	260.5[f]
Total	2945.0	Total	2945.0
Balance, All Young Stock			
Inshipments, feeder cattle	1323.0	Net placements on feed	1724.5[g]
Calves and stockers available	942.9	Farm slaughter	68.0
		Est. surplus calves and stockers	473.4[e]
Total	2265.9	Total	2265.9

a/ Inventory numbers and births allocated between beef and dairy based on inventories and location of cows as described in text and illustrated in Appendix Figures A-1 and A-2.

b/ Reported calf deaths of 170,000 allocated between inventory and 1976 crop assuming death loss from inventory is equal to death rate of breeding herd and other cattle over 500 lbs. (1.25%) with remaining deaths allocated to newborn (equals 9.65%). Allocation between beef and dairy is proportional to numbers of animals.

c/ Stocker inventory calculated as steers plus other heifers minus animals on feed.

d/ See Appendix Table A-1 footnote b/.

e/ Balance between supply and disposition.

f/ Data reported in Cattle on Feed indicate disappearance from feedlots of 289,000 head including deaths, movement to pasture and to other feedlots for further feeding. This number deducts estimated death loss.

g/ Number placed on feed minus other disappearance.

Sources: California Livestock Statistics, 1977--see Appendix Table A-1; and Cattle on Feed, various monthly issues, 1977, California Crop and Livestock Reporting Service, Sacramento.

be expected in feedlots than in other situations even though losses in the Imperial Valley, which accounts for a large proportion of cattle on feed in the state, appear to be consistently lower than in other major cattle feeding areas. Second, the estimate is the sum of deaths allocated to the beginning feedlot inventory and inshipments of feeder cattle only; deaths of state born calves and stockers, some of which must enter feedlots, are accounted separately since there is no way to allocate these deaths to the periods before and after placement on feed. Recognizing this deficiency, net placements on feed are estimated as total placements minus disappearance other than deaths, or (1,985,000-260,500) 1,724,500 head.

The balance of all young stock including supplies of in-state calves and stockers, inshipments of feeder cattle, net feedlot placements and reported farm slaughter results in estimated surplus young stock of 473,400 head. Estimated feed requirements, described subsequently, are based on the distribution of stock derived here.

Sheep

The 1976 beginning-year inventory of sheep and of lambs on feed of 1.1 million was augmented by the 1976 lamb crop (738,000) plus shipments into California of stockers and feeders (198,000) and those for immediate slaughter (645,000). Of these stockers and feeders, 37,000 are estimated requirements for the breeding flock with the remainder (161,000) considered as feeder lambs (see Appendix Table A-4). The disposition of sheep and lambs is a straightforward accounting of inventory levels and marketings. Note, however, that total marketings of 1,458,000 exceed reported slaughter (1,307,000) by 151,000 head which are assumed to be permanent outshipments (not reported by

Appendix Table A-4

Sheep: Supply and Disposition, California, 1976

Item	Supply: Beginning inventory January 1, 1976	Supply: Additions in 1976	Item	Disposition: Ending inventory January 1, 1977	Disposition: Uses in 1976
	1,000 head			1,000 head	
Sheep					
Ewes	811		Ewes	770	
Wethers and rams	29		Wethers and rams	27	
Total	(840)				
Replacements			Deaths		60
Ewes	89		Marketings		128
Rams	19				
Total	(108)				
Shipped into California		37 a/			
Young Stock					
Lambs on feed	182		Lambs on feed	213	
Lambs docked		738	Stock ewe lambs	82	
Shipped into California			Stock wether and ram lambs	21	
as feeders		161 a/	Deaths		67
for slaughter		645	Farm slaughter		13
			Marketings		685
			Shipped in for slaughter		645
Total	1130	1581		1113	1598
Total supply/disposition		2711			2711
Summary					
Beginning inventory		1130	Ending inventory		1113
Inshipments		843	Deaths		127
Lambs docked		738	Farm slaughter		13
			Marketings		1458 b/
Total		2711			2711

a/ Inshipments of sheep and lambs are reported as 198,000 head. An estimated 37,000 head are required to balance supply and disposition in the breeding herd and the remaining 161,000 are assumed to be feeder lambs.

b/ Reported slaughter of 1,307,000 and marketings of 1,458,000 leaves marketings not slaughterd of 151,000 which are assumed to be permanent outshipments of fat lambs for the Easter market.

Source: California Livestock Statistics, (see Appendix Table A-1).

CCLRS) of fat lambs for the spring market. The total number of feeder lambs placed on feed will be discussed in conjunction with the estimation of feed requirements.

Hogs and Pigs

Of the total 1976 slaughter of 1,550,000 hogs in California, 1,375,000 are shipped in for immediate slaughter. The California pig crop was 206,000 in 1976. The supply and disposition of hogs and pigs, shown in Appendix Table A-5, are reported data except for an allocation of reported deaths between the breeding herd and young stock, based on beginning inventory levels. Note also that breeding herd "culls and sales" and young stock "surplus state-born pigs" are estimated such that supply and disposition balance for the year. Also, there is a slight discrepancy between reported marketings and slaughter of 5,000 which is termed as "estimated marketings not slaughtered." Again, this is a minor difference attributable to reporting errors.

Poultry

The 1976 supply and disposition of layers, broilers and turkeys, are given in Appendix Table A-6. All data are as reported except death losses and beginning-year inventory of broiler chicks and young turkeys. The beginning inventory of broiler chicks is based on eggs hatched during the four weeks prior to December 1, or one-half of the eight weeks required for growth to slaughter weight. Similarly, turkey inventory numbers are based on eggs hatched during the 12 weeks prior to December 1, or one-half of the 24 weeks required for growth to slaughter weight.

Estimated Feed Requirements

Livestock and poultry feed requirements for 1976 are in general calculated as requirements per animal (or bird) times the number of animals.

Appendix Table A-5

Hogs and Pigs: Supply and Disposition, California, 1976

Item	Supply: Beginning inventory December 1, 1975	Supply: Additions in 1976	Item	Disposition: Beginning inventory December 1, 1976	Disposition: Uses in 1976
	1,000 head			1,000 head	
Breeding herd and Young Stock					
Breeding pigs	26.0		Breeding pigs	24.0	
Market hogs	112.0		Market hogs	109.0	
Inshipments		(1,393.0)	Inshipments		
for breeding		18.0	for slaughter		1,375.0
for slaughter		1,375.0	Deaths		22.0 a/
Pigs saved		206.0	Farm slaughter		22.0
			Marketings		185.0
Total	138.0	1,599.0		133.0	1,604.0
Total supply/disposition		1,737.0			1,737.0
Breeding Herd					
Breeding pigs	26.0		Breeding pigs	24.0	
Inshipment for breeding		18.0	Estimated		
			deaths		1.6 a/
			culls and sales		18.4 b/
Total	26.0	18.0		24.0	20.0
Total supply/disposition		44.0			44.0
Young Stock					
Market hogs	112.0		Market hogs	109.0	
Pigs saved		206.0	Farm slaughter		22.0
			Estimated deaths		20.4 a/
			Estimated surplus state-born pigs		166.6 b/
Total	112.0	206.0		109.0	209.0
Total supply/disposition		318.0			318.0
Total Marketings and Slaughter					
Inshipments for slaughter		1,375.0	Reported slaughter		1,555.0
Marketings		(185.0)	Estimated marketings not slaughtered		5.0
Estimated culls		18.4			
Estimated surplus pigs		166.6			
Total		1,560.0			1,560.0

a/ Reported deaths are allocated to breeding herd and young stock on the basis of beginning inventory numbers.

b/ Calculated to balance supply and disposition.

Source: California Livestock Statistics (see Appendix Table A-1).

Appendix Table A-6

Poultry: Supply and Disposition, California, 1976

Item	Supply: Beginning inventory December 1, 1975	Supply: Additions in 1976	Item	Disposition: Ending inventory December 1, 1976	Disposition: Uses in 1976
Laying Flock					
Hens	22,978		Hens	21,969	
Pullets of laying age	14,714		Pullets	14,953	
Other chickens	240				
Pullets reaching laying age		21,962	Other	250	
			Mature birds sold		17,429
			Assumed death loss		5,293 a/
Total		21,962		37,172	22,722
Total supply/disposition		59,894			59,894
Replacement Layers					
Pullets not of laying age	10,139		Pullets not of laying age	9,019	
Placements of pullets		24,631	Pullets raised		21,962
Total	10,139	24,631	Assumed death loss		3,789 a/
Total supply / disposition		34,770		9,019	25,751
					34,770
Broilers					
Eggs hatched			Eggs hatched		
Nov.-Dec. 1975	17,043		Nov.-Dec. 1976	17,580	
1976		113,266	Broilers produced		104,950
			Assumed death loss		7,779 a/
Total	17,043	113,266		17,580	112,729
Total supply/disposition		130,309			130,309
Turkeys					
Eggs hatched, Aug.-Dec. 1975	3,357		Eggs hatched, Aug.-Dec. 1975	3,701	
1976		20,318	Turkeys raised		17,514
			Assumed death loss		2,460 a/
Total	3,357	20,318		3,701	19,974
Total supply/disposition		23,675			23,675

a/ Death losses were estimated so as to balance supply and disposition; death rates implied for each class are laying flock 8.8 percent, replacement layers 10.89 percent, broilers 5.96 percent, and turkeys 10.39 percent.

Source: California Crop and Livestock Reporting Service, Production and Marketing Eggs, Chickens and Turkeys, California-1978, Sacramento.

Note that stocker cattle and replacement heifers may be grazed out of state for extended periods and thus total requirements may differ somewhat from available supply. Without more comprehensive data on such cattle shipments, it was not considered reasonable to adjust data for minor grazing done outside of California.

Two terms are used in estimating feed requirements; animal unit months and total digestible nutrients. Because of the enormous variation in the quantity and quality of available forage (annual rangelands, irrigated pasture, crop stubble and conserved forages), it was considered inappropriate to describe grazing requirements in terms more sophisticated than animal unit months (AUM). On the other hand, for more controlled feeding situations requirements are expressed in terms of total digestible nutrients (TDN). Feed requirements for swine and poultry, which are usually expressed in terms of digestible energy (DE) or metabolizable energy (ME), have been converted to TDN as follows:

$$DE = ME/0.96$$

$$TDN(lb) = 2.2 \times TD(kg) = \frac{DE(Mcals)}{4.409}$$

Beef Herd

There are important differences in calving and culling practices between northeastern parts of California and the remainder of the state. Although there is variation in all areas both as a matter of deliberate choice and because of variations in the distribution of calving on individual ranches, the majority of calves in the northeast are born in late Winter/early Spring whereas elsewhere the majority are born in Fall and early Winter. For purposes here, cows in five northern counties (enumerated in footnote (a) of

Appendix Table A-7) are assumed to calve in Spring (with a mean of February) and cows in other counties are assumed to calve in the Fall (with a mean of October). Culling of beef cows is assumed to occur six months prior to the specified calving month in calculating feed requirements. Deaths and breeding stock shipped into the state are assumed to occur uniformly throughout the year, with a mean date of July 1, implying six months of feeding per animal. The stock and flow of cattle are seen more clearly in Appendix Figure A-1.

Feed requirements for cows and heifers, including an allowance for the calf to three months of age, are specified as one AUM for each of 12 months, and for bulls, 1.25 AUM. Annual total AUM are shown in Appendix Table A-7 for animals fed 12 months, and for those fed a specified number of months as explained in footnotes to the table. For example, the beginning inventory of cows in the northern counties of 150,300 is divided into those fed all year (109,900), deaths which are assumed to be fed for six months (1,900) and culls which are assumed to be fed for eight months (38,500). A total of 14 million AUM is estimated as feed requirements for the beef breeding herd. Requirements for dairy and beef young stock will be presented following the discussion of dairy cattle.

Dairy Cattle

Average milk production per cow for the state is about 14,150 pounds per year. However, this average hides a tremendous range in individual performance as evidenced by the fact that average production for individual counties ranges from less than 6,000 pounds to over 19,000 pounds per cow. To take account of the different feed requirements for varying levels of production, the following procedure was adopted:

Appendix Table A-7

Beef Breeding Herd: Estimated Feed Requirements, 1976

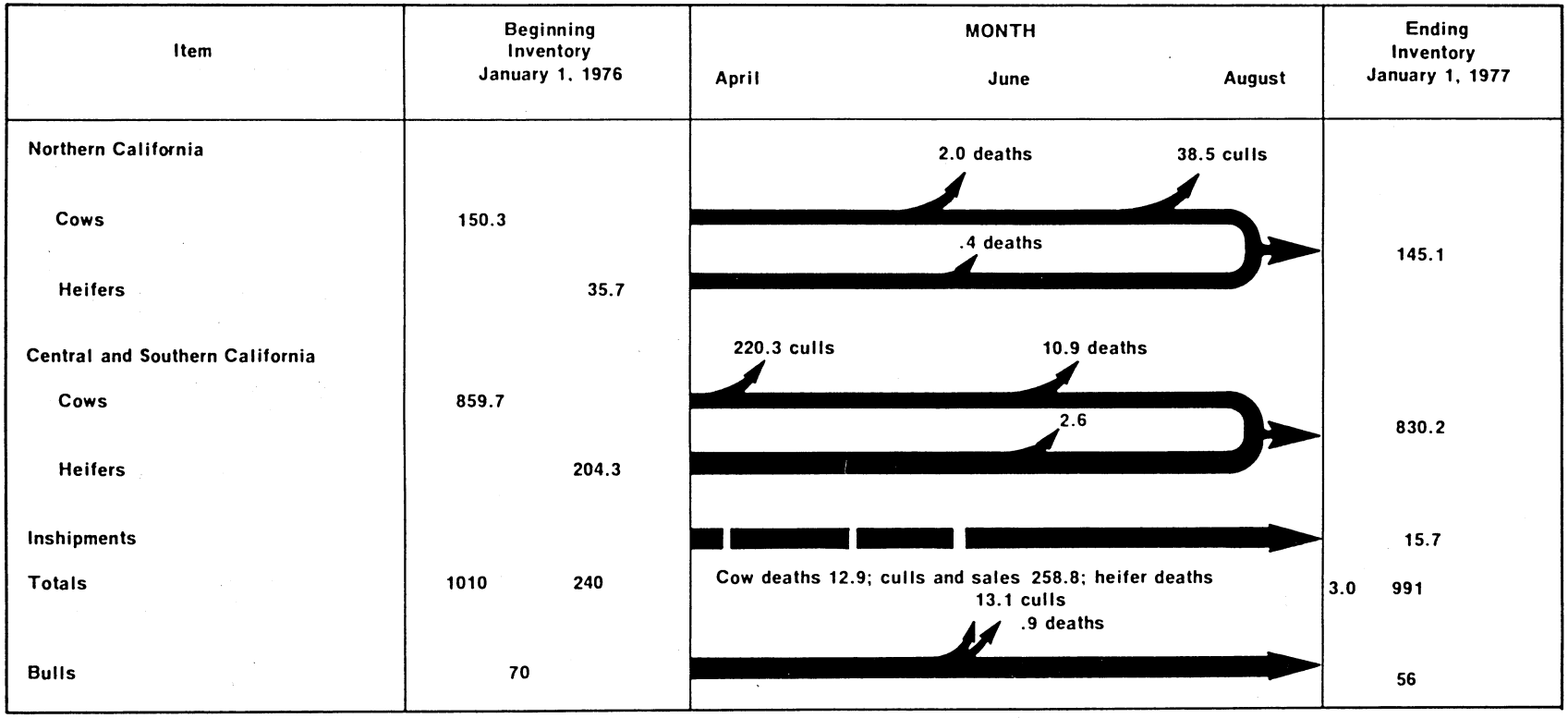
Item	Number of animals	Animal units per head	Estimated feed requirements	
			Time on feed	Total requirement
	1,000 head	AU	months	1,000 AUM
Northern California[a/]				
Cows, January 1, 1976	(150.3)	-[b/]	-	-
Fed all year	109.9	1.0	12	1318.8
Deaths	1.9	1.0	6[c/]	12.0
Culls	38.5	1.0	8[d/]	308.0
Heifers, January 1, 1976	(35.7)	-	-	-
Fed all year	35.3	1.0	12	423.6
Deaths	0.4	1.0	6[c/]	2.4
Central and Southern California[a/]				
Cows, January 1, 1976	(859.7)	-	-	-
Fed all year	628.6	1.0	12	7453.2
Deaths	10.9	1.0	6[c/]	65.4
Culls	220.3	1.0	4[d/]	881.2
Heifers, January 1, 1976	(204.3)	-	-	-
Fed all year	201.7	1.0	12	2420.4
Deaths	2.6	1.0	6[c/]	15.6
Shipments into California	15.7	1.0	6[c/]	94.2
Bulls	(70.0)	-	-	-
Fed all year	56.0	1.25	12	840.0
Bulls and deaths	14.0	1.25	6[c/]	105.0
Total Feed Requirements	-	-	-	13,939.8

a/ Northern California includes Lassen, Modoc, Plumas, Shasta and Siskiyou counties in which calving is assumed to occur in Spring; remaining counties (central and southern California) are assumed to calve in Fall.
b/ Dashes indicate data not relevant.
c/ Average time on feed assuming even distribution of deaths, culling and inshipments.
d/ Time on feed assuming culling occurs six months prior to calving in Fall (October) and Spring (February).

Source: California Livestock Statistics (see Appendix Table A-1) distribution of replacements, deaths and culls proportional to cow inventories in counties listed in footnote a/.

Appendix Figure A-1

Estimated Distribution of Beef Cattle, California, 1976
(All Data in Thousand Head)



Source: California Livestock Statistics, see Appendix Tables A-1 and A-2.

1. Five groups of annual milk yield per lactation period of 44 weeks were specified; namely 7,000, 11,000, 14,000, 17,000 and 21,000 pounds (see Appendix Table A-8).
2. Average daily milk yield for each week of lactation for each group was estimated using standard lactation curves. For example, the low-yield group of 7,000 pounds produces for 44 weeks with an average daily yield of 22.73 pounds of milk.
3. The minimum TDN per 100 pounds of dry weight of the ration are specified as 65, 70, and 75 pounds associated with average daily milk production (3.5 percent fat) of 30, 50, and 65 pounds, respectively. For example, group 3 cows (14,000 pounds annually) are fed for 10 weeks a ration with 75 percent TDN; 10 weeks at 70 percent TDN; and 24 weeks at 65 percent TDN.
4. The TDN requirement for each sub-period is based on 0.304 pounds TDN per pound of milk produced plus a maintenance requirement for a lactating cow (1,300 pounds) of 9.29 pounds TDN per day. A sample calculation is provided in footnote (b), Appendix Table A-8.
5. Total TDN requirements for each lactation group (Appendix Table A-9) are calculated for an estimated distribution of lactations between groups based on average reported yields and cow numbers for individual counties adjusted to obtain state totals for milk production and number of lactations. The latter is taken as 811,000 which is the reported average number through the year of cows and heifers which have calved. Also included are feed requirements for 810,000 dry periods (10 weeks) based on cow inventory and requirements for 15,000 bulls as described in Appendix Table A-2.

Appendix A-8

Dairy Cows: Estimated TDN Requirements Per Cow For Lactation Periods, With Varying Annual Milk Yields

44-Week lactation yield by group		Estimated TDN requirements per lactation sub-period, with the minimum TDN concentration, in pounds per 100 pounds of dry weight ration of:[a]								
		65			70			75		
Group	Milk yield	Sub-period	Daily average yield	TDN requirements per sub-period	Sub-period	Daily average yield	TDN requirements per sub-period	Sub-period	Daily average yield	TDN requirements per sub-period
no.	pounds	weeks	pounds	pounds	weeks	pounds	pounds	weeks	pounds	pounds
1	7,000	44	22.73	4,989.6 [b]	- [c]	-	-	-	-	-
2	11,000	34	31.10	4,461.2	10	51.41	1,744.3	-	-	-
3	14,000	24	32.73	3,232.3	10	56.00	1,841.0	10	65.43	2,042.7
4	17,000	17	34.23	2,347.1	10	55.53	1,832.0	17	75.87	3,850.2
5	21,000	10	38.91	1,478.3	10	53.94	1,798.1	24	86.42	5,974.4

a/ Minimum ration TDN concentrations are set at 65, 70, and 75 pounds of TDN per 100 pounds of feed for daily milk yield of 30, 50, and over 65 pounds, respectively.

b/ Calculated according to National Research Council Requirements of 0.304 lbs. TDN per lb. of milk produced plus maintenance requirement for lactating cow (1300 lbs.) of 9.29 lbs. TDN per day. Average daily yield for each week of lactation for each group has been estimated using standard lactation curves. Sample calculation is: no. of weeks (44) times days per week (7) times (average daily yield (22.73) times TDN per lb. (.304) plus maintenance (9.29)) = 4989.6.

c/ Dashes indicate data not relevant.

Source: Nutrient Requirements of Dairy Cattle, 5th revised edition 1978, N.R.C. Washington. California Dairy Industry Statistics, 1977. Crop and Livestock Reporting Service, Sacramento.

Appendix Table A-9

Dairy Cattle: Estimated Total TDN Requirements
California, 1976

Item	Number of animals a/	TDN concentration/requirement, lactating cows						Other	
		65		70		75		60	
		Per cow	Total	Per cow	Total	Per cow	Total	Per animal	Total
	1,000	lbs.	1,000 lbs.	lbs.	1,000 lbs.	lbs.	1,000 lbs.	lbs.	1,000 lbs.
Lactation group									
1	31	4,990	154,678	- b/	-	-	-	-	-
2	167	4,461	745,015	1,744	291,298	-	-	-	-
3	373	3,232	1,205,648	1,842	687,058	2,043	761,908	-	-
4	207	2,347	485,844	1,832	397,220	3,850	796,987	-	-
5	33	1,478	48,784	1,798	59,339	5,974	197,154	-	-
Dry period	810	-	-	-	-	-	-	676	547,949
Bulls	15	-	-	-	-	-	-	2,920	43,800
Total	-	-	2,639,969	-	1,416,916	-	1,756,049	-	591,749

a/ California Dairy Industry Statistics report average number during the year of cows and heifers that have calved as 811,000. Although this is greater than inventory levels at the beginning or end of the year, it is assumed to be a more accurate reflection of numbers of lactations since culling would normally occur towards the end of lactation. The number of dry periods is taken as 810,000.

b/ Dashes indicate data not relevant.

Source: California Dairy Industry Statistics--see Appendix Table A-8.

Appendix Figure A-2

Estimated Distribution of Calves and Young Stock, California, 1976
(All Data in Thousand Head)

Item	Beginning Inventory January 1, 1976	Month (Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.)	Ending Inventory January 1, 1977
Beef Calves:			
Northern		133 born; 12.8 deaths; 120.2 weaned; 54 sold	210 replacements; 472 stockers
Central and Southern	711.3	8.9 deaths; 702.4 weaned; 86.6 surplus; 760.5 born; 73.4 deaths	687.1 calves
Stocker Cattle	410	5.1 deaths; 404.9 surplus	
Dairy Calves	453.7	5.7 deaths; 133 surplus; 69.2 deaths; 716.5 born; 264.4 surplus	315 replacements; 382.9 calves
Totals: Replacement Stocker	410	Calf births 1610; Surplus calves and stockers 942.9; Calf deaths: From Inventory 14.6; Newborn 155.4	525; 472
Totals: Cattle Calves	1165		1070
Feedlot Cattle	960	28.5 deaths; 1724.5 net placemats; 1844 marketed	812

Source: California Livestock Statistics see Appendix Table A-1

Young Cattle

Feed requirements for young stock are calculated as before in terms of animal unit months for grazing animals and total digestible nutrients for animals in confinement.

A number of assumptions concerning the disposition of young stock have to be made in order to arrive at these estimates. Some are simplifications in the sense of aggregating known variations; others are necessary simply because of a lack of quantitative information. Major assumptions include the following.

It is assumed that all beef calves remain with the breeding herd on rangeland or other grazing until weaning in September in the northeastern counties or June in the remainder of the state. This implies that calves are weaned between seven and eight months of age on average and that they consume significant amounts of forage for approximately five months. These calves are either retained as replacements, in which case they remain on grazing, or are (retained or) sold as stocker cattle to both out-of-state and in-state operations. California-born calves remaining in state may enter feedlots at a later date but it is assumed that few are placed on feed in California directly at weaning. The feedlot industry is divided into two components; the feedlots of Imperial County, and the remainder mainly in the San Joaquin Valley and central and southern coastal regions. Sources of feeder cattle include primarily mixed weight cattle shipped in mainly from Arizona, Nevada, Texas and the Southeastern states [California Livestock Statistics, 1977]; medium to heavy weight feeders from California and the Northwest; and surplus dairy calves. The vast majority of cattle on feed in Imperial County originate from out of state with some light weight dairy calves coming in from

other areas in California. Most of the heavier weight California-born calves and stockers, if they remain in state, and the remainder of the dairy calves are fed out in the San Joaquin and along the coastal range. The average market weight for all feedlots is assumed to be 1,050 lbs. For simplicity, two in-weights are assumed: 500 lbs. average for calves, and 700 lbs. for stockers and feeders. Based on numbers of animals in feedlots in different weight classes reported in Cattle on Feed, 60 percent of all animals are assumed to enter at 500 lbs. and 40 percent at 700 lbs.

Information on the disposition of dairy calves not retained as replacements is extremely limited. It is assumed that most of the 356,000 head of calves slaughtered in the state are surplus dairy calves. These arise from two main sources; specialist white veal operations which probably account for a fairly small proportion and other calf raising operations which market animals either as vealers or to feedlots depending on market conditions. Surplus calves are normally collected from dairies within the first two weeks of life and are raised on milk replacers and increasing amounts of dry feeds. Slaughter weights vary considerably, particularly where there is flexibility in marketing as veal or to feedlots. An average and somewhat arbitrary weight of 250 lbs. is assumed.

The estimated distribution of all young cattle is illustrated in Figure A-2. Feed requirements of beef calves and stockers are shown in Table A-10 calculated separately for surviving animals and for losses as with the beef herd. All surviving spring-born calves in the northeastern counties (120,200) are assumed to be on hand as stockers or replacements at the end of the year the remainder of the ending inventory of stockers and replacements (561,800) are assumed to be calves born in central and southern areas in Fall 1975 and

Appendix Table A-10

Beef Calves and Stockers: Estimated Feed Requirements, California, 1976

Item	Number of animals	Estimated Feed Requirement		
		Animal units per head	Time on feed	Total requirement
	1,000 head	AU	months	1,000 AUM
Northern California				
Calves born February 1976	(13.3) a/	- b/	-	-
Grazed until weaned at eight months	120.2	.4	5	240.4
Deaths	12.8	.4	1	5.1
Grazed as stockers and replacements	120.2 c/	.6	3	216.4
Central and Southern California				
Calf inventory January 1, 1976	(711.3) d/	-	-	-
Grazed until weaning at eight months	702.4	.4	5	1404.8
Deaths	8.9	.4	1	3.6
Sold at weaning	54 e/	-	-	--
Grazed as stockers and replacements	561.8 c/	.6	6	2022.5
Surplus stockers	86.6 f/	.6	4	207.8
Calves born October 1976	(760.5) a/	-	-	-
Stocker Inventory January 1, 1976	(410.0)	-	-	-
Grazed until sale	404.9	.6	2	485.9
Deaths	5.1	.6	1	3.1
Total Feed Requirements	-	-	-	4589.6

a/ Distribution of calf births between Northern and remaining counties proportional to cow inventory as described in Table A-7. Calves born in Central and Southern counties are assumed to have no grazing requirement since they are less than three months of age by the end of the year--see Figure A-2.

b/ Dashes indicate data not relevant.

c/ Ending inventory of replacements and stocker cattle is (210,000 + 472,000) 682,000; all Northern counties calves weaned in September (120,200) are assumed to be on hand as replacements or stockers at the end of the year; other replacements and stockers (561,800) are assumed to be animals retained from the January 1, 1976 calf inventory--see footnote d/.

d/ Estimate of surviving beef calves born October 1975.

e/ California Livestock Statistics report marked increases in cattle and calf outshipments in April, May and June which coincides with weaning of Fall-born calves. Calves marked and not slaughtered (410,000 - 356,000) 54,000 are assumed to be beef calves shipped out at weaning.

f/ Central and Southern calves not identified as outshipments or replacements and stockers are assumed to be grazed for an average of four months before disposition as feeders.

Source: California Livestock Statistics (see Appendix Table A-1). See also Appendix Figure A-2.

listed in the beginning inventory in 1976. The Fall 1976 calf crop in central and southern California is assumed to have no feed requirements during 1976 since they are less than three months of age by the end of the year. Animals from the beginning calf inventory (estimated as 711,300) which are not on hand as stockers and replacements as described above are assumed to be death losses (8,900) requiring only one month of feed on average; sold at weaning (54,000) or stocked after weaning for an average of four months (86,600). The beginning inventory of stocker cattle (410,000) adjusted for death losses is assumed to be grazed for an average of two months before disposition as feeders.

Feed requirements in pounds TDN for both dairy calves and feedlot animals are shown in Appendix Table A-11. TDN requirements are based on recommended daily allowances published by the National Research Council (Nutrient Requirements of Dairy Cattle, 1978; Nutrient Requirements of Beef Cattle, 1976). For dairy calves monthly requirements were calculated from three weeks to 15 months of age assuming an average growth rate of 1.5 lbs./day; assumptions were made regarding the average age and length of feeding for each group as described below, and total requirements were summed from the appropriate monthly amounts. A similar procedure was utilized for feedlot cattle except that requirements were calculated for 100 lb. weight increases rather than increases in age, and two feeding regimes are assumed; a growing ration of 70 percent TDN giving 2.0 lbs./day gain from 500 to 700 lbs., and a fattening ration of 75 percent TDN giving 2.9 lbs./day gain from 700 to 1050 lbs.

Dairy calves on hand at the beginning of 1976 (453,700) are assumed to be a mixture of those to be retained as replacements and surplus calves raised for veal or sale to feedlots. Average age is assumed to be three months so

Appendix Table A-11

Feedlot Cattle and Dairy Calves: Estimated Feed Requirements, California, 1976

Item	Number of animals	Time on feed	TDN concentration requirement[c/]			
			TDN per animal		Total requirement	
			70	75	70	75
	1,000	months	lbs.	lbs.	1,000 lbs.	1,000 lbs.
Dairy Calves[a/]						
Calf inventory, January 1, 1976	(453.7)	- [b/]	-	-	-	-
Retained as replacements, January 1, 1977	315.0	12	2742		863,730	
Deaths	5.7	1	126		718	
Surplus	133.0	2	273		36,309	
Calves born during 1976	(716.5)	-	-	-	-	-
Calf inventory, January 1, 1977	382.9	3	218		83,472	
Deaths	69.2	1	35		2,422	
Surplus	264.4	5	491		128,820	
Total feed requirements	-	-	-		1,115,471	-
Feedlot Cattle[a/]		days				
Finished in 1976						
Beginning inventory, January 1, 1976	960.0	94		1482	-	1,422,720
Placed on feed	844.0	188	654	2004	578,136	1,771,536
Not finished						
Ending inventory, January 1, 1977	812.0	94	654	522	531,048	423,864
Deaths	28.5	94	654	522	18,639	14,877
Total feed requirements	-	-	-	-	1,127,823	3,632,997

a/ See Appendix Figure A-3 for assumed supply and distribution of animals.
b/ Dashes indicate data not relevant.
c/ Ration TDN concentrations and methods of calculating requirements per animal are described in text.

Sources: Animal Numbers, California Livestock Statistics--see Appendix Table A-1.
Feed requirements, Nutrient Requirements of Dairy Cattle, 5th edition, 1978; Nutrient Requirements of Beef Cattle, 5th edition, 1976, NRC Washington.

that animals listed in the ending inventory as replacements (315,000) require 12 months of feeding (from three to 15 months of age) and surplus calves (133,000) are fed from three to five months. Calves born during 1976, adjusted for death losses supply 382,900 as ending inventory with an average age of three months (fed from three weeks to three months) and 264,400 surplus calves fed to five months. Requirements for feedlot cattle are calculated for four groups as shown in Table A-11. Within each group, 60 percent are assumed to be animals placed on feed at 500 lbs. and 40 percent are assumed to be placed at 700 lbs. Days on feed and total TDN requirement per animal are the weighted means of these values calculated as described above. Thus the beginning inventory of 960,000 is assumed to comprise 60 percent animals fed for 116 days (half the estimated feeding period of 232 days) and requiring 1764 lbs. of 75 percent TDN ration, and 40 percent animals fed for 61 days (feeding period 122 days), requiring 1060 lbs. of the same ration giving a weighted mean of 94 days and 1482 lbs. of feed.

Sheep

Feed requirements are estimated for various categories of sheep as shown in Appendix Table A-12. Assumptions underlying these data are as follows. Lambing occurs more or less continuously from about November to March, with a mean date of January. The average breeding date is then mid-August, and culling is specified to occur about 1-1/2 months after lambing. Of the 840,000 ewes and rams on hand January 1, 1976, deaths account for 60,000, culls an additional 128,000 and the remainder (652,000) plus replacements (108,000) and inshipped breeding stock (37,000) form the inventory at the end of the year (797,000). All animals are on feed for 12 months except for culls

Appendix Table A-12

Sheep: Estimated Feed Requirements In
Animal Unit Months, California, 1976

Item	Number of animals	Feed requirements		
		Per animal	Time on feed	Total
	1,000	AU	months	1,000 AUM
Ewes and Rams	(840)			
Inventory January 1, 1976	652	0.20	12.0	1,564.8
Deaths	60	.20	6.0	72.0
Culls (marketings)	128	.20	1.5	38.4
Replacements	(108)			
Ewes	89	.20	12.0	213.6
Rams	19	.20	12.0	45.6
Inshipments-breeding	37	.2	5.5	81.4
Lambs docked	(738)			
On pasture	671	.10	3.0	201.3
Deaths	67	a/	a/	a/
Lambs Retained as Replacements	103	.15	6.0	92.7
Feeder Lambs	460	.15	3.0	207.0
Total feed requirements	- b/	-	-	2,516.8

a/ Death is assumed to occur prior to requiring feed other than that required by ewes.

b/ Dashes indicate data not relevant.

Source: California Livestock Statistics, see Appendix Table A-1.

(1.5 months as noted above), deaths are assumed to occur at mid-year (six months on feed), and breeding stock shipped into California are assumed to be at mid-July or one month prior to breeding, (on feed for 5-1/2 months). The flow of sheep and lambs is illustrated in Appendix Figure A-3.

Lamb feed requirements are for animals on pasture for three months (671,000).

Hogs and Pigs

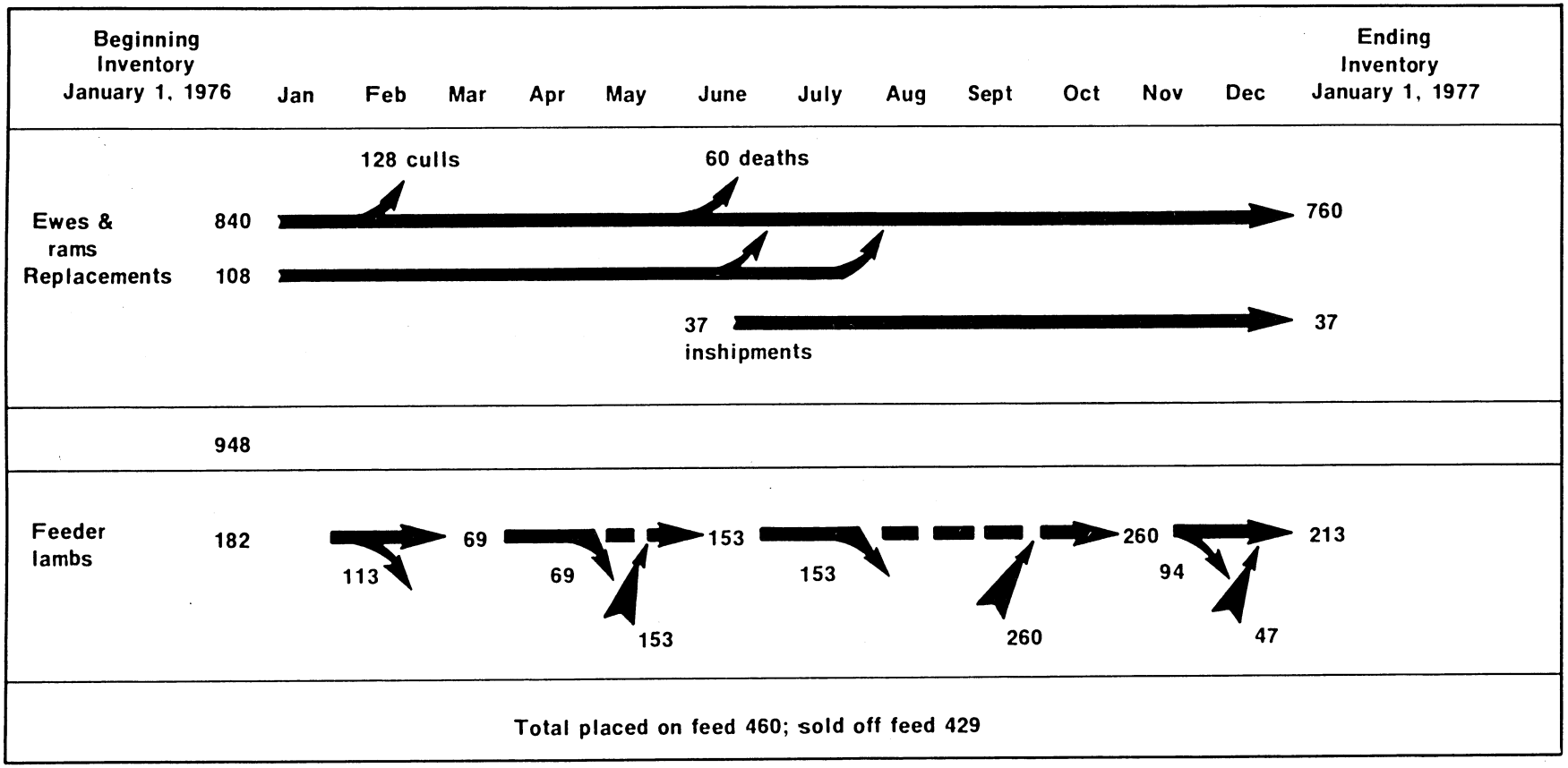
Numbers of farrowings are reported for two periods of the year; December 1 to June 1 (15,000) and June 1, to December 1 (14,000). Feed requirements for lactating sows, as given by the National Research Council report Nutrient Requirements of Swine, 1973, are 8.7 pounds of TDN per day and 3.3 pounds per day for all other breeding stock (TDN concentration of 75 pounds of TDN per 100 pounds of feed). Piglets are assumed to be weaned at 30 days; thus, sows are on the higher feed requirements for 30 days and on the lower requirements for the remainder of the six-month period (see Appendix Table A-13).

The number of breeding pigs on December 1, 1975 was reported as 26,000 and as 24,000 as of December 1, 1976. We estimate the June 1 number to be 25,000 or the average of these figures. This allows yearly data on other breeding stock, culls and deaths, and animals shipped into California, to be allocated between the two periods in proportion to numbers of breeding pigs (see Appendix Table A-13). The feeding period for inshipped animals and culls and deaths is three months, or one-half of the six-month period (see Appendix Figure A-4).

Feed requirements for market hogs are based on a fattening period of 115 days, starting at 40 pounds liveweight and finishing at 220 pounds. This period is divided into three stages as follows:

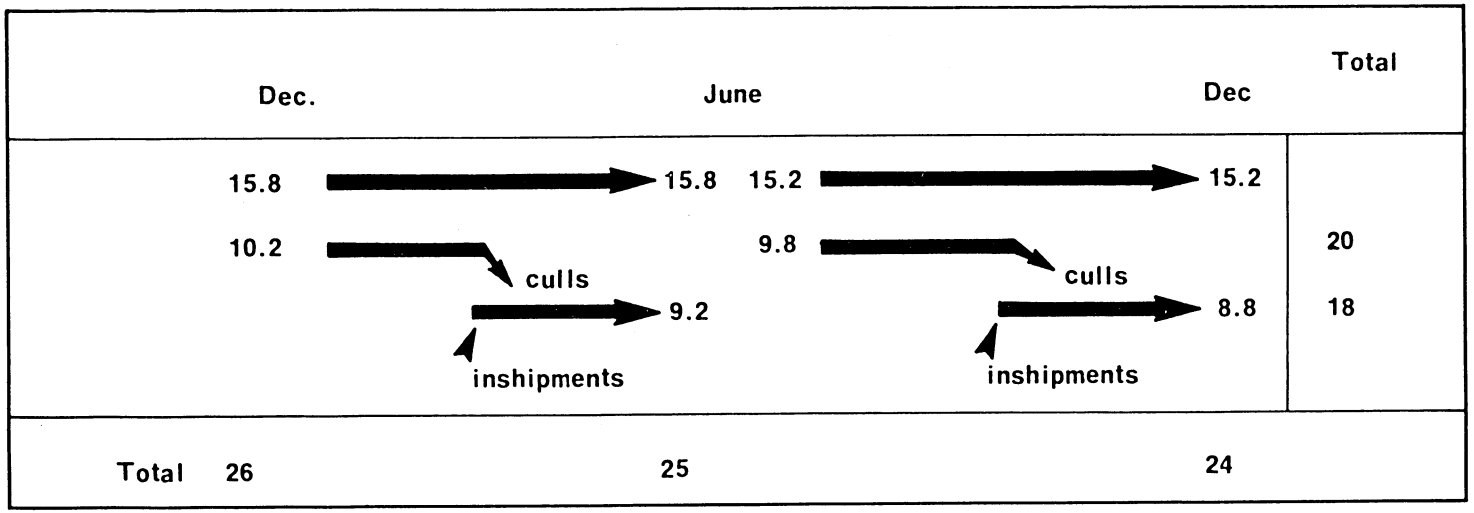
Appendix Figure A-3

Estimated Distribution of Sheep and Lambs
(All Data in Thousand Head)



Source: California Livestock Statistics, see Appendix Table A-1.

Appendix Figure A-4
Estimated Distribution of Breeding Pigs



Source: California Livestock Statistics, see Appendix Table A-1.

Appendix Table A-13

Breeding Pigs: Estimated Feed Requirements in Total Digestible Nutrients, California, 1976

Item	December 1, 1975-June 1, 1976				June 1, 1976-December 1, 1976			
		Feed				Feed		
	Number	Amount per day	Time on feed	Total	Number	Amount per day	Time on feed	Total
	1,000	TDN	days	1,000 TDN	1,000	TDN	days	1,000 TDN
Breeding Pigs	(26.0)	- a/	-	-	(25.0)	-	-	-
Lactating sows								
Before weaning	15.0	8.7	30	3,915.0	14.0	8.7	30	3,654.0
After weaning	15.0	3.3	152	7,425.0	14.0	3.3	152	6,930.0
Other breeding stock	0.8	3.3	182	480.5	1.2	3.3	182	720.7
Culls and deaths	10.2	3.3	91	3,063.1	9.8	3.3	91	2,942.9
Shipped into California for Breeding	9.2	3.3	91	2,762.8	8.8	3.3	91	2,642.6
Total (6 months) feed requirements	-	-	-	17,646.4	-	-	-	16,890.2
Total (year) feed requirements	-	-	-	-	-	-	-	34,536.6

a/ Dashes indicate data not relevant.

Source: Number of farrowings: California Livestock Statistics (see Appendix Table A-1).
Feed requirements: Nutrient Requirements of Swine, 7th edition, 1973, NRC Washington.

Weight Lbs.	Time on Feed Days Days	TDN Per Day Lbs.
40-75	30	2.8
75-125	32	4.2
125-220	53	5.8

These feed requirements were used to calculate total requirements for numbers of animals, by weight class, in the beginning and ending inventories and for pigs finished during the year but not reported in the beginning inventory. A feed allowance is calculated also for deaths assumed to occur, on the average, half-way through the 115 day feeding period (see Appendix Table A-14).

Poultry

Feed requirements are presented for four types of poultry; namely, the egg laying flock, broilers and fryers, turkeys and the turkey breeding flock. Poultry numbers are from Appendix Table A-6 and here estimates are given for time on feed, feed per bird and total feed requirements in terms of total digestible nutrients.

The laying flock feed use is primarily by hens and pullets of laying age, as shown in Appendix Table A-15. Feed requirements are based on an average production per bird of 225 eggs a year for an average flock size of 37,522,000, with replacements, culls, and deaths assumed to occur about at mid-year. Numbers of replacement pullets fed are estimated as explained in Appendix Table A-15. Time on feed for those in the beginning inventory is ten weeks, or from age of 10 weeks to age of 20 weeks when birds become layers. The number raised during the year includes those reaching laying age plus those in the year end inventory not of laying age.

Appendix Table A-14

Market Hogs: Estimated Feed Requirements in Total Digestible Nutrients, California, 1976

Item	Number of animals	Feed requirements		
		Time on feed	Feed per animal	Total
	1,000 head	days	TDN	1,000 TDN
Beginning inventory (12/1/75) by weight class (pounds)				
Less than 60	44.0	115	523.3	23,026
60-120	26.0	82	426.6	11,092
120-180	22.0	39	225.7	4,965
180-220	16.0	11	637.0	1,018
Over 220	4.0	a/	a/	a/
Total	112.0	- b/	-	-
Pigs finished during year but not in beginning Inventory	83.8 c/	115	523.3	43,856
Ending inventory (12/1/76) by weight class (pounds)				
Less than 60	44.0	d/	d/	d/
60-120	28.0	33	96.7	2,708
120-180	20.0	76	297.6	5,952
180-220	14.0	104	459.7	6,435
Over 200	3.0	115	523.3	1,569
Total	109.0	-	-	-
Deaths	20.4	58	200.1	4,081
Total feed requirements	-	-	-	104,704

a/ Assumes animals are slaughtered.
b/ Dashes indicate data not relevant.
c/ Calculated as total marketings plus farm slaughter (188,600) plus death of pigs on hand in beginning inventory (7,200) less pigs on hand in beginning inventory (112,000).
d/ Assumes no dry feed needed.

Source: Inventory numbers: California Livestock Statistics (see Appendix Table A-1)
Feed requirements: Nutrient Requirements of Swine (see Appendix Table A-13)

Appendix Table A-15

Poultry: Estimated Feed Requirements in Total Digestible Nutrients, California, December 1, 1975

Item	Number of Birds	Feed Requirements: Age range or total time on feed	Feed Requirements: Feed per bird	Feed Requirements: Total
	1,000	Weeks	TDN	1,000 TDN
Laying Flock				
Hens and pullets of laying age, December 1, 1975	37,552	(52)	59.30	2,226,834
Pullets reaching laying age during year	(21,962) a/	- b/	-	-
in beginning inventory	10,139	10-20	9.17	92,940
raised during the year	11,823 c/	0-20	15.19	179,576
Pullets not of laying age December 1, 1976	9,019	0-10	6.02	54,313
Pullet death losses	3,789 d/	0-10	6.02	22,817
Total	-	-	-	2,576,480
Broilers and Fryers				
Broilers produced	(104,950)	-	-	-
Hatched in November, 1975	17,043	5-8	5.15	87,744
Hatched and raised, 1976	87,907	0-8	7.05	620,050
Hatched and died, 1976	7,779	0-4	1.91	14,820
Ending inventory-eggs hatched in December, 1976	17,580	0-4	1.91	33,492
Total	-	-	-	756,106
Turkeys				
Turkeys raised	(17,514)	-	-	-
Hatched in September-November 1975	3,357	12-24	39.13	131,359
Hatched and raised, 1976	14,157	0-24	55.09	779,901
Hatched and died, 1976	2,460	0-12	15.96	39,262
Ending inventory-eggs hatched in September-November, 1976	3,701	0-12	15.96	59,068
Total	-	-	-	1,009,590
Turkey Breeding Flock				
Breeder hens, December 1, 1975	700	(26)	76.4	53,475
Replacement flock	600	24-39	35.3	21,155
Total feed requirements	-	-	-	74,630

a/ Estimated as shown in Appendix Table A-6.
b/ Dashes indicate data are not relevant.
c/ Calculated as number of pullets reaching laying age during year less numbers in beginning inventory.
d/ Death losses plus pullets not of laying age as of December 1, 1976 plus pullets raised during the year are equal to total placements reported in Appendix Table A-6.

Sources: Numbers are from Appendix Table A-6 except where noted.
Feed requirements: Nutrient Requirements of Poultry, 6th Edition, 1971, NRC Washington.
Rooney, W. F. (1976) Chicken Fryer Production: Management, Costs and Returns. Leaflet 2648. University of California, Division of Agricultural Science.
Schroeder, J. P., undated, Turkey Feed Consumption, University of California, Division of Agricultural Sciences Extension leaflet.

Broiler feed estimates are based on reported numbers produced of 104,950. Beginning and ending year inventory data and estimated death losses are as explained in conjunction with Appendix Table A-6. The feed requirements are given in Appendix Table A-15. Similar comments apply to turkeys raised.

Feed requirements for breeding turkeys are calculated on the assumption that each bird produces (and requires feeding) for six months, is then culled and replaced by an incoming bird. The total number of such six-month production periods is taken as 700,000--the beginning inventory. In addition to feed required during production, incoming birds require feeding for a period of 15 weeks beyond that accounted under turkeys hatched and raised to bring them into production. The total number of such additional rearing periods is taken as 600,000, equivalent to the ending inventory.

All Livestock and Poultry

A summary of grazing (in animal units) and feed requirements (in total digestible nutrients) is given in Appendix Table 16. As previously mentioned, these estimates are based on estimated requirements per animal multiplied by numbers of animals in each class. Several minor anomalies exist in these estimates which cannot be isolated because of lack of suitable data. The more important of these are as follows. The total AUM of grazing is based on the numbers of animals that are normally maintained or raised in nonconfinement situations, principally the beef herd and nonfeedlot cattle, and the sheep flock. Many of these animals receive supplements at grazing including hay, grains, oil seed meals and liquid supplements. No attempt has been made to separate these feeds from total requirements. Also some classes of animals notably stocker cattle and replacement heifers may be grazed out of state for periods of time. This grazing remains within the estimated requirement.

Appendix Table A-16

All Livestock and Poultry: Total Feed Requirements, California, 1976

Item	Total TDN requirements by ration: (pounds of TDN per 100 pounds of feed) 60	65	70	75	Grazing[a]
	million pounds (TDN)				1,000 AUM
Dairy animals					
Cows					
lactating	-	2,640.0	1,416.9	1,756.0	-
dry	547.9	-	-	-	-
Heifers, calves	-	-	1,115.5	-	-
Culls	43.8	-	-	-	945
Total	591.7	2,640.0	2,531.4	1,756.0	3,901
Beef cattle					
Feedlot	-	-	1,127.8	3,633.0	-
Cows	-	-	-	-	10,039
Heifers	-	-	-	-	2,956
Calves, stockers	-	-	-	-	4,590
Bulls	-	-	-	-	945
Total	-	-	1,127.8	3,633.0	18,530
Sheep, all	-	-	-	-	2,517
Hogs					
Breeding herd	-	-	-	34.5	
Broilers	-	-	-	104.7	
	-	-	-	139.2	-
Poultry					
Layers	-	-	2,576.5	-	-
Broilers	-	-	-	756.1	-
Turkeys					
raised	-	-	1,009.6	-	-
breeding flock	-	74.6	-	-	-
Total	-	74.6	3,586.1	756.1	-
Total	591.7	2,674.6	7,245.3	6,284.3	24,948

a/ Includes annual rangeland grazing, irrigated pasture, cropped stubble and conserved forages.

Source: Appendix Tables A-7 through A-15.

Finally, grazing includes not only rangeland and irrigated pasture, but temporary grazing, crop stubbles and opportunity feeds of one sort or another--some cull fruit and vegetables, processing wastes, etc.

APPENDIX B

TABLES OF ESTIMATED COMPOSITION OF RATIONS FOR LIVESTOCK AND POULTRY

Table B-1: Dairy Cattle Rations: Estimated Percentage Composition, 1963, 1973 and 1978.

Table B-2: Heavyweight Feeder Rations: Estimated Percentage Composition, 1963, 1973 and 1978.

Table B-3: Lightweight Feeder Rations: Estimated Percentage Composition, 1963, 1973 and 1978.

Table B-4: Feedlot Lamb Rations: Estimated Percentage Composition, 1963 and 1973.

Table B-5: Swine Rations: Estimated Percentage Composition, 1963 and 1973.

Table B-6: Poultry Rations: Estimated Percentage Composition, 1963, 1973 and 1978.

Table B-7: Turkey Rations: Estimated Percentage Composition, 1963, 1973 and 1978.

Appendix Table B-1

Dairy Cattle Rations: Estimated Percentage Composition, 1963, 1973 and 1978[a/]

Feed	1963		1973		1978	
	Concentrates	Concentrates and roughage	Concentrates	Concentrates and roughage	Concentrates	Concentrates and roughage
	percent					
Grain						
Barley	20.8	4.09	23.2	6.56	17.2	5.2
Corn	9.0	1.77	10.1	2.85	10.1	3.0
Grain sorghum	11.5	2.26	12.9	3.64	12.9	3.9
Wheat	-- [b/]	--	--	--	3.0	0.9
Total	41.3	8.12	46.2	13.05	43.2	13.0
Other concentrates						
Cottonseed meal	5.0	0.98	5.6	1.58	5.6	1.5
Other protein feed	7.1	1.40	3.4	0.97	12.4	3.3
Dried beet pulp	15.3	3.01	17.1	4.83	17.1	4.6
Citrus pulp	0.4	.08	0.4	0.12	0.4	0.1
Millfeeds	24.2	4.76	19.7	5.54	13.7	3.7
Minerals and vitamins	1.5	.29	1.8	0.52	1.8	0.5
Molasses	5.2	1.02	5.8	1.64	5.8	1.5
Total	58.7	11.54	53.8	15.20	56.8	15.2
Total concentrates	100.0	19.66	100.0	28.25	100.0	28.2
Hay or equivalent	--	80.34	--	71.75	--	71.8
Total ration	--	100.00	--	100.00	--	100.00

a/ An estimate of the amount of concentrates per 100 pounds of milk, provided by the Bureau of Milk Stabilization, California Department of Agriculture, is as follows: 1963, 31.61 pounds (3.8 percent milk fat); 1973, 36.71 pounds (3.5 percent milk fat); and 1978,

b/ Dashes indicate data are not relevant.

Source: Donald L. Bath, Extension Dairyman, University of California, Davis.

Appendix Table B-2

Heavyweight Feeder Rations: Estimated Percentage Composition, Statewide Average, 1963, 1973 and 1978[a/]

Feed	1963		1973		1978	
	Concentrates	Concentrates and roughage	Concentrates	Concentrates and roughage	Concentrates	Concentrates and roughage
	percent					
Grain						
Barley	48.9	41.4	21.5	18.0	20.0	18.0
Corn	2.0	1.7	17.9	15.0	16.7	15.0
Grain sorghum	17.1	14.5	25.0	21.0	23.3	21.0
Wheat	0	0	7.1	6.0	6.7	6.0
Total	68.0	57.6	71.5	60.0	66.7	60.0
Other concentrates						
Cottonseed meal	2.6	2.2	--[b/]	--	--	--
Other protein	5.2	4.4	--	--	--	--
Dried beet or citrus pulp	11.0	9.3	11.9	10.0	11.1	10.0
Fat	2.5	2.1	3.6	3.0	3.3	3.0
Millseeds	2.7	2.3	2.3	1.9	8.9	8.0
Minerals and vitamins	1.3	1.1	2.4	2.0	2.2	2.0
Molasses	6.7	5.7	8.3	7.0	7.8	7.0
Total	32.0	27.1	28.5	23.9	33.3	30.0
Total concentrates	100.0	84.7	100.0	83.9	100.0	90.0
Hay or equivalent	--	15.3	--	16.1	--	10.0
Total ration	--	100.0	--	100.0	--	100.0

a/ The following data also were obtained as to weight gains and feed requirements:

Year	Assumed weight gain		Feed inputs			
				per pound of gain		
	Total	Per day	Per day	Total	Concentrates	Hay
1963	400	--	--	7.6	6.4	1.2
1975	500	2.5	19.00	7.6	6.4	1.2

b/ Dashes indicate data are not relevant.

Source: 1963 rations are from John A. Hopkin and Robert Kramer, Cattle Feeding in California [1965].
1973 and 1978 rations are from John Dunbar, Extension Animal Scientist, University of California, Davis.

Appendix Table B-3

Lightweight Feeder Rations: Estimated Percentage Composition, Statewide Average, 1963, 1973 and 1978[a/]

Feed	1963		1973		1978	
	Concentrates	Concentrates and roughage	Concentrates	Concentrates and roughage	Concentrates	Concentrates and roughage
	percent					
Grain						
Barley	36.4	13.3	22.9	12.5	21.9	12.0
Corn	-- [b/]	--	16.5	9.0	16.5	9.0
Grain sorghum	36.6	13.4	22.0	12.0	21.9	12.0
Wheat	--	--	3.6	2.0	3.7	2.0
Total	73.0	26.7	65.0	35.5	64.0	35.0
Other concentrates						
Cottonseed meal	27.0	10.0	9.0	5.0	--	--
Other protein	--	--	--	--	--	--
Dried beet or citrus pulp	--	--	9.0	5.0	9.0	5.0
Fat	--	--	3.6	2.0	3.6	2.0
Millfeeds	--	--	--	--	9.0	5.0
Minerals and vitamins	--	--	0.9	0.5	1.8	1.0
Molasses	--	--	12.5	7.0	12.6	7.0
Total	27.0	10.0	35.0	19.5	36.0	20.0
Total concentrates	100.0	36.7	100.0	55.0	100.0	55.0
Roughage						
Hay	--	63.3	--	40.0	--	40.0
Straw, milo stalks or cottonseed hulls	--	--	--	5.0	--	5.0
Total	--	63.3	--	45.0	--	45.0
Total ration	--	100.0	--	100.0	--	100.0

a/ The following data also were obtained as to weight gains and feed requirements:

Year	Animal weight		Weight gain		Feed inputs	
	in	out	Total	Daily	Daily	per pound gain
1963	400	600	200	1.33	15.0	11.3
1973	350	550	200	2.00	12.0	6.0
1978	350	550	200	2.15	12.5	5.8

b/ Dashes indicate that data are not relevant.

Sources: 1963 ration, Horace T. Strong and Reuben Albaugh, Animal Husbandmen.
1973 and 1978 rations, John R. Dunbar, Extension Animal Scientist, University of California, Davis.

Appendix Table B-4

Feedlot Lamb Rations: Estimated Percentage Composition, Statewide Average, 1963 and 1973 a/

Feed	1963	1973
	percent	
Grain		
Barley	60.0	64.6
Corn	16.6	18.5
Grain sorghum	4.0	3.7
Oats	6.1	2.8
Wheat		
Total	86.7	89.6
Other supplements		
Cottonseed meal	7.1	4.6
Other protein	.8	.6
Dried beet pulp	4.0	3.7
Molasses	1.4	1.5
Other		
Total	13.3	10.4
Total	100.0	100.0

a/ Concentrates account for only a small proportion of the total feed consumed by sheep since the major source is pasture (see Table 8).

Source: G. M. Spurlock, Extension Animal Husbandman, University of California, Davis.

Appendix Table B-5

Swine Rations: Estimated Percentage Composition, 1963 and 1973[a/]

Feed	1963 Concentrates	1973 Concentrates
	percent	
Grain		
Barley	33.5	33.5
Corn	1.0	1.0
Grain sorghum	50.0	50.0
Wheat	-- [b/]	--
Total	84.5	84.5
Other supplements		
Cottonseed meal	2.5	2.5
Fish meal	1.0	1.0
Meat scraps	2.5	2.5
Soybean meal	5.0	5.0
Alfalfa meal	3.0	3.0
Dried beet pulp	--	--
Millfeeds	--	--
Minerals and vitamins	1.0	1.0
Other	.5	.5
Total	15.5	15.5
Total	100.0	100.0

a/ An estimate of the amount of feed to produce one pound of liveweight is estimated at 5.0 pounds in 1963 and 4.5 pounds in 1973.

b/ Dashes indicate minimal amounts of feed in typical rations.

Source: Information on rations was provided by the Animal Science Department, University of California, Davis: 1963 rations, Dr. Harold Hintz; 1973 rations, Dr. David Robinson.

Appendix Table B-6

Poultry Rations: Estimated Percentage Composition, Statewide Average, 1963, 1973 and 1978

Feed	Laying hens[a]			Broiler-Fryers				
				Meat[b]			Eggs for Hatching[c]	
	1963	1973	1978	1963	1973	1978	1963	1973
	percent							
Grain								
Barley	4.00	4.0	--[d]	--	--	--	10.00	10.0
Corn	16.00	16.0	45.0	50.00	50.0	65.0	20.00	20.0
Grain sorghum	47.25	47.5	20.0	12.50	12.5	--	35.75	36.0
Oats	.50	--	--	--	--	--	2.00	--
Wheat	--	--	5.0	--	--	--	--	--
Total	67.76	67.5	70.0	62.50	62.5	65.0	67.75	66.0
Other supplements								
Cottonseed meal	3.00	5.0	5.0	5.00	5.0	--	2.50	4.5
Fish meal	3.70	1.0	--	5.00	3.0	3.0	--	--
Meat scraps and meal	6.50	6.5	6.0	8.00	8.0	5.0	6.00	6.0
Soybean meal	3.00	4.0	8.5	7.25	7.3	16.0	6.00	6.0
Alfalfa meal	5.00	5.0	1.0	3.00	1.0	--	5.00	5.0
Fat	1.25	.5	.5	3.00	7.0	4.0	1.25	1.0
Millfeeds	2.00	2.5	--	--	--	--	2.00	2.0
Minerals, vitamins	7.00	7.0	7.0	2.25	2.2	1.5	7.00	7.0
Other	.80	1.0	2.0	4.00	4.0	5.5	2.50	2.5
Total	32.25	32.5	30.0	37.50	37.5	35.0	32.25	34.00
Total	100.00	100.0	100.0	100.00	100.0	100.0	100.00	100.00

a/ This ration includes sufficient feed for replacement pullets. The amount of feed per dozen eggs is estimated to 6.2 pounds.

b/ An estimate of the amount of feed per pound of dressed weight is as follows: 1963, 3.38 pounds; 1973, 2.16 pounds; and 1978, 2.16 pounds.

c/ An estimate of the amount of feed for the broiler breeding flock is 8.8 pounds per dozen during the laying season plus about 2.7 pounds per dozen eggs for raising the breeding flock.

d/ Dashes indicate that this feed generally is not an important ingredient in the ration.

Source: Information on rations was provided by Extension Poultry Specialists W. F. Rooney (1963) and F. C. Price (1973 and 1978), University of California.

Appendix Table B-7

Turkey Rations: Estimated Percentage Composition, Statewide Average, 1963, 1973 and 1978

Feed	Meat production[a/]			Egg production[b/]		
	1963	1973	1978	1963	1973	1978
	percent					
Grain						
Barley	10.0	10.0	—[c/]	7.5	8.0	—
Corn	7.5	7.5	40.0	7.5	7.5	45.0
Grain sorghum	46.0	46.0	17.0	48.0	50.0	20.0
Oats	1.0	1.0	—	1.0	1.0	—
Wheat	—	—	5.0	—	—	5.0
Total	64.5	64.5	62.0	64.0	66.5	70.0
Other supplements						
Cottonseed meal	5.0	7.0	5.0	2.5	3.0	3.0
Fish meal	4.0	1.0	—	5.0	1.0	1.0
Meat scraps and meal	10.0	5.0	7.0	7.5	5.0	5.0
Soybean meal	4.0	6.0	18.0	7.5	8.5	10.5
Alfalfa meal	5.0	5.0	—	5.0	5.0	1.0
Fat	1.0	5.0	5.0	1.0	2.5	2.5
Millfeeds	3.0	3.0	—	1.5	2.5	—
Minerals, vitamins	2.5	2.5	2.0	5.0	5.0	5.0
Other	1.0	1.0	1.0	1.0	1.0	2.0
Total	35.5	35.5	38.0	36.0	33.5	30.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

a/ Estimated pounds of feed per pound of dressed weight is as follows: 1963, 5 pounds; 1973, 3 pounds; and 1978, 3 pounds.

b/ The additional feed required to maintain the breeding flock for egg production is estimated as follows: 1963, 2.5 pounds per egg; 1973, 2.0 pounds; and 1978, 2.0 pounds. The number of eggs per hen are estimated as follows: 1963, 71.5 eggs; 1973, 85 eggs; and 1978, 85 eggs.

c/ Dashes indicate that the feed generally is not an important ingredient in the ration.

Source: Price Schroeder, Extension Poultry Specialist, University of California, Agricultural Extension Service, Parlier CA.

APPENDIX C

TABLES OF LIVESTOCK AND POULTRY STATISTICS, 1961-1978

Table C-1: Dairy Cattle: Average Number of Milk Cows and Milk Production, California, 1961-1978.

Table C-2: Beef Cattle: Number of Head on Farms, January 1, Inshipments, and Marketings from Feedlots, California, 1961-1978.

Table C-3: Beef Cattle: Commercial Slaughter and Estimated Sources of California-Produced Beef and Veal, 1961-1978.

Table C-4: Sheep: Number of Head on Farms, January 1, Shipments and Estimated Lambs Fed, California, 1961-1978.

Table C-5: Hogs: Pigs Saved, Inshipments, Numbers Slaughtered and Estimated Numbers Fed Out, California, 1961-1978.

Table C-6: Layers: Average Numbers, Egg Production and Use for Broiler Production, California, 1961-1978.

Table C-7: Eggs: Estimated Production, Trade, and Consumption, United States and California, 1961-1978.

Table C-8: Broilers and Fryers: Production and Consumption, United States and California, 1961-1978.

Table C-9: Turkeys: Production and Consumption, United States and California, 1961-1978.

Appendix Table C-1

Dairy Cattle: Average Number of Milk Cows and Milk Production, California, 1961-1978

Year	Average number milk cows (1,000 head)	Milk production per cow (pounds)	Total production (million pounds)
1961	813	10 100	8 211
1962	805	10 320	8 308
1963	798	10 400	8 299
1964	790	10 810	8 540
1965	783	10 830	8 480
1961-1965 average	798	10 492	8 368
1966	774	11 112	8 601
1967	765	11 375	8 702
1968	754	11 869	8 949
1969	746	11 928	8 898
1970	755	12 526	9 457
1966-1970 average	759	11 762	8 921
1971	763	12 726	9 710
1972	778	13 368	10 400
1973	792	13 045	10 332
1974	797	13 295	10 596
1975	800	13 566	10 853
1971-1975 average	786	13 200	10 378
1976	811	14 282	11 583
1977	827	14 462	11 960
1978	846	14 027	11 867

Source: California Crop and Livestock Reporting Service (1979) (California Livestock Statistics, 1978).

Appendix Table C-2

Beef Cattle: Number of Head on Farms, January 1, Inshipments and Marketings from Feedlots, California, 1961-1978

Year	January 1 numbers							Shipments			Marketings
	Beef cows		Heifers		Calves						
	2 years +	That have calved	1-2 years old	Replacements	Heifers	Steer and bull	Bulls 1 year +	Stockers and feeders shipped into California	Cattle and calves shipped out of California	Cattle inshipped for immediate slaughter	Cattle and calves from feedlots
	1,000 head										
1961	851	-[a]	314	-	269	389	65	1,454	148	375	1,701
1962	858	-	273	-	296	430	66	1,829	206	458	1,844
1963	854	-	314	-	291	514	68	1,749	232	492	1,899
1964	927	-	299	-	309	527	71	1,539	196	544	2,061
1965	956	-	339	-	336	503	74	1,984	213	528	2,282
1961-1965 average	889	-	308	-	300	473	69	1,711	199	479	1,957
1966	1004	-	334	-	360	517	80	1,902	223	494	2,219
1967	1035	-	344	-	324	522	78	1,863	265	589	2,049
1968	1004	-	341	-	351	548	76	1,870	325	542	2,068
1969	995	-	345	-	346	588	77	1,851	336	614	2,057
1970	946	894	348	203	341	632	70	1,728	435	537	1,966
1966-1970 average	997	-	342	-	344	561	76	1,843	317	555	2,072
1971	-	916	-	208	-	-	-	1,803	404	587	1,990
1972	-	906	-	212	-	-	-	1,901	478	455	2,062
1973	-	915	-	211	-	-	-	1,823	463	454	1,942
1974	-	1054	-	252	-	-	-	1,465	436	377	2,002
1975	-	1097	-	286	-	-	-	1,809	353	429	1,650
1971-1975 average	-	978	-	234	-	-	-	1,760	427	460	1,929
1976	-	1010	-	240	-	-	-	1,323	470	406	1,844
1977	-	991	-	210	-	-	-	1,381	343	341	1,612
1978	-	966	-	190	-	-	-	1,915	467	323	1,415

a/ Dashes indicate data not available

Source: California Crop and Livestock Reporting Service, California Livestock Statistics, 1978, (various issues), Sacramento (processed).

Appendix Table C-3

Beef Cattle: Commercial Slaughter and Estimated Sources of California-Produced Beef and Veal, 1961-1978

Year	Commercial slaughter					Estimated sources of California-produced meat		
	Number		Carcass weight			Inshipments for immediate slaughter a/	Marketings from feedlots a/	Other (residual) b/
	Cattle	Calves	Cattle	Calves	Total			
	thousand head		million pounds					
1961	2514	443	1502	62	1564	c/	-	-
1962	2565	364	1525	49	1574	-	-	-
1963	2680	292	1607	43	1650	-	-	-
1964	2957	348	1769	48	1817	-	-	-
1965	3004	387	1779	55	1834	-	-	-
1961-1965 average	2744	367	1636	51	1688	286	1166	236
1966	3121	337	1865	51	1916	-	-	-
1967	3050	287	1839	47	1886	-	-	-
1968	2919	256	1756	50	1806	-	-	-
1969	2936	235	1765	48	1813	-	-	-
1970	2849	189	1742	39	1781	-	-	-
1966-1970 average	2975	261	1793	47	1840	335	1249	256
1971	2854	153	1733	31	1764	-	-	-
1972	2761	119	1678	27	1705	-	-	-
1973	2670	75	1633	20	1653	-	-	-
1974	2942	130	1830	33	1863	-	-	-
1975	2892	334	1788	80	1868	-	-	-
1971-1975 average	2824	162	1732	38	1770	283	1184	303
1976	2855	356	1769	83	1852	252	1143	457
1977	2621	362	1619	32	1651	-	-	-
1978	2292	257	1424	29	1453	-	-	-

a/ Estimated by multiplying numbers (see Appendix Table C-2) by average carcass weight for cattle which is as follows: 1961-1965, 596 pounds; 1966-1970, 603 pounds; 1971-1975, 614 pounds; 1976, 620 pounds.
b/ Total commercial slaughter less estimated quantities from inshipments and marketings. Includes veal and meat produced from cull animals.
c/ Dashes indicate data not calculated for individual years.

Source: California Crop and Livestock Reporting Service (1979) Annual Livestock Slaughter, 1978 (various issues), Sacramento (processed).

Appendix Table C-4

Sheep: Number of Head on Farms, January 1, Shipments, and Estimated Lambs Fed, California, 1961-1978

Year	Ewes 1 yr and older January 1	Wethers and rams 1 yr and older January 1	Lambs docked	Lambs weaned[a/]	Sheep and lambs shipped out (rail)	Stocker and feeder inshipments	Total lambs and replacement to feed in California[b/]	Replacements[c/]	Lambs fed total[d/]
	1000 head								
1961	1388	53	1263	1137	148	616	1605	278	1327
1962	1388	52	1263	1137	192	508	1453	278	1175
1963	1263	47	1162	1046	139	415	1322	253	1069
1964	1238	47	1139	1025	119	478	1384	248	1136
1965	1188	45	1081	973	52	396	1315	238	1079
1961-1965 average	1293	49	1181	1064	130	483	1416	259	1157
1966	1188	-[e/]	1081	973	68	379	1284	238	1046
1967	1216	-	1111	1000	33	287	1254	243	1011
1968	1155	44	1051	946	16	297	1227	231	996
1969	1074	41	967	870	10	294	1154	215	939
1970	1024	37	932	839	15	266	1090	205	885
1966-1970 average	1131	-	1028	926	28	305	1203	226	977
1971	992	33	913	822	4	197	1015	198	817
1972	935	32	935	774	-	204	978	187	791
1973	892	26	838	754	-	236	990	178	812
1974	909	34	809	728	-	162	890	182	708
1975	878	25	799	719	-	185	904	176	728
1971-1975 average	921	30	844	759	-	197	955	184	771
1976	811	29	738	664	-	233	897	162	735
1977	770	27	700	630	-	294	924	154	770
1978	780	27	694	-	-	266	-	-	-
1979	838	26	-	-	-	-	-	-	-

a/ Derived = 90 percent of lambs docked.
b/ Derived = Lambs weaned - sheep and lambs shipped out + stocker and feeder inshipments.
c/ Derived = 20 percent of ewes 1 year and older.
d/ Derived = Total lambs and replacements to feed in California - replacements.
e/ Dashes indicate data are not available.

Source: California Crop and Livestock Reporting Service, California Livestock Statistics (1979)(various issues), Sacramento (processed).

Appendix Table C-5

Hogs: Pigs Saved, Inshipments, Numbers Slaughtered, and Estimated Numbers Fed Out, California, 1961-1978

Year	Pigs saved	Number shipped into California	Number slaughtered in California	Implied number fed out in California[a/]
	1000 head			
1961	404	1303	1622	319
1962	361	1495	1757	262
1963	292	1445	1628	183
1964	238	1559	1730	171
1965	247	1418	1593	175
1961-1965 average	308	1444	1666	222
1966	264	1361	1520	159
1967	260	1488	1650	162
1968	209	1502	1628	126
1969	195	1418	1549	131
1970	222	1450	1596	146
1966-1970 average	230	1444	1589	145
1971	225	1428	1566	138
1972	245	1270	1503	233
1973	210	1132	1265	133
1974	174	1361	1486	125
1975	203	2396	1453	157
1971-1975 average	211	1297	1455	158
1976	206	1393	1555	162
1977	230	1300	1535	235
1978	284	1337	1629	292

a/ Derived as difference between number slaughtered and number shipped into California.

Source: California Crop and Livestock Reporting Service, California Livestock Statistics (1979)(various issues), Sacramento (processed).

Appendix Table C-6

Layers: Average Numbers, Egg Production, and Estimated Use for Broiler Production, California, 1961-1978

Year	Average number of layers	Eggs per bird	Total egg production	Estimated use for broiler production: Eggs[a/]	Estimated use for broiler production: Layers[b/]	Chicks hatched: Egg type	Chicks hatched: Broiler type
	thousand	number	million	million	thousand	million	million
1961	27 270	224	6 105	78	433	65	66
1962	29 376	224	6 581	80	444	67	68
1963	30 198	225	6 788	75	417	65	64
1964	32 409	225	7 304	73	406	67	62
1965	32 599	227	7 406	79	439	60	67
1961-1965 average	30 370	225	6 837	77	427	65	65
1966	34 231	224	7 663	88	489	69	75
1967	36 679	220	8 081	87	483	66	74
1968	38 037	219	8 332	88	489	64	75
1969	38 539	222	8 557	100	556	65	85
1970	40 060	216	8 657	113	628	73	96
1966-1970 average	37 509	220	8 258	95	528	67	81
1971	41 552	217	9 012	112	622	62	95
1972	39 201	221	8 652	107	594	58	91
1973	35 147	219	7 680	106	589	60	90
1974	38 276	222	8 485	113	628	47	96
1975	37 940	223	8 467	122	678	44	104
1971-1975 average	38 423	220	8 459	112	622	54	95
1976	37 557	230	8 635	133	739	46	113
1977	36 469	229	8 345	141	783	50	120
1978	35 767	235	8 412	154	856	51	131

a/ Derived = Broiler chicks hatched ÷ 85 percent (estimated percent hatched).
b/ Derived by taking estimated eggs for broiler production divided by estimated number of eggs per layer for hatching of 180 eggs.

Source: California Crop and Livestock Reporting Service (1979), Production and Marketing Eggs, Chickens and Turkeys, California - 1978, Sacramento.

Appendix Table C-7

Eggs: Estimated Production, Trade and Consumption, United States and California, 1961-1978

Year	Total egg production	Eggs used for chicks hatched[a]	Shipments into and out of California: Rail/truck into California	Shipments into and out of California: Outshipments through Arizona boarder stations	Estimated net outshipments as a percentage of total production	Estimated eggs available for consumption[b]	California population July 1	Apparent California consumption per capita	U.S. consumption per capita
	million				percent	million			
1961	6 105	154	57	-[c]	-	-	16.4	-	329
1962	6 581	159	50	-	-	-	16.9	-	327
1963	6 788	152	24	-	-	-	17.5	-	318
1964	7 304	152	36	-	-	-	18.0	-	318
1965	7 406	149	10	-	-	-	18.5	-	314
1961-1965 average	6 837	153	35	360	4.9	6 356	17.5	363	321
1966	7 663	169	20	426	-	-	18.8	-	313
1967	8 081	165	23	469	-	-	19.2	-	320
1968	8 332	164	-	410	-	-	19.5	-	316
1969	8 557	176	-	757	-	-	19.8	-	310
1970	8 657	199	-	822	-	-	20.0	-	311
1965-1970 average	8 258	175	-	577	7.1	7 509	19.5	385	314
1971	9 012	185	-	-	-	-	20.3	-	314
1972	8 652	175	-	682	8.0	-	20.5	-	308
1973	7 680	176	-	595	7.9	-	20.7	-	294
1974	8 485	168	-	610	7.3	-	20.9	-	283
1975	8 467	174	-	-	-	-	21.1	-	279
1971-1975 average	8 459	175	-	-	7.5	7 663	20.7	370	297
1976	8 635	187	-	-	-	-	21.5	-	276
1977	8 345	200	-	-	-	-	21.9	-	-
1978	8 412	214	-	-	-	-	22.3	-	-

a/ Derived from chicks hatched (Appendix Table C-6) divided by estimated percentage hatched (85 percent).
b/ Production less eggs for hatching adjusted for trade.
c/ Dashes indicate data not available.

Sources: Egg production and outshipments: California Crop and Livestock Reporting Service, 1979, Production and Marketing Eggs, Chickens and Turkeys, California - 1978, Sacramento. Rail and trade inshipments: California Crop and Livestock Reporting Service, California Egg and Poultry Summary - 1972, Sacramento (not reported since 1972). Population: California Department of Finance (1978), Provisional Projections of California Counties to 2000. U.S. Consumption: U.S. Economics Statistical and Cooperative Service, Food Consumption, Prices & Expenditures, Supplement for 1976 to Agricultural Economics Report No. 138, Washington, 1978.

Appendix Table C-8

Broilers and Fryers: Production and Consumption, United States and California, 1961-1978

Year	California			Total United States production liveweight	Ratio: California to United States production	United States chicken consumption per capita (RTC basis)	Ratio of commercial broilers to all chickens for United States	Truck receipts of fryers to San Francisco and Los Angeles markets (RTC basis)	California Production (RTC basis)[a]	Apparent California consumption per capita (RTC basis)[b]
	Broilers and fryers produced	Average weight liveweight	Total production liveweight							
	1000 birds	pounds	mil. lbs.	mil. lbs.	percent	pounds	percent	mil. lbs.	mil. lbs.	pounds
1961	62 673	3.6	226	6 832	3.3	29.9	85.0	210	162	-[c]
1962	60 400	3.6	217	6 907	3.2	29.9	85.4	191	157	-
1963	60 650	3.7	224	7 276	3.1	30.8	86.6	201	162	-
1964	57 002	3.7	211	7 521	2.8	31.2	87.0	222	152	-
1965	59 852	3.8	227	8 111	2.8	33.4	87.9	228	164	-
1961-1965 average	60 115	3.7	221	7 329	3.0	31.0	86.4	212	159	21.2
1966	67 034	3.7	248	8 989	2.8	35.6	88.6	250	178	-
1967	69 045	3.9	269	9 183	2.9	36.5	87.9	280	194	-
1968	67 664	3.8	257	9 326	2.8	36.7	88.6	308	185	-
1969	76 757	3.8	292	10 048	2.9	38.4	89.8	331	210	-
1970	85 927	3.9	335	10 819	3.1	40.5	90.0	347	241	-
1966-1970 average	73 285	3.8	280	9 673	2.9	37.5	89.0	303	202	25.9
1971	89 233	4.0	357	10 818	3.3	40.4	90.8	351	257	-
1972	86 022	4.2	361	11 480	3.2	42.0	91.7	356	260	-
1973	83 193	4.1	341	11 220	3.0	40.7	91.7	335	246	-
1974	90 377	4.2	380	11 320	3.4	41.1	91.1	351	273	-
1975	95 825	4.3	412	11 096	3.7	40.3	92.1	325	311	-
1971-1975 average	88 930	4.2	370	11 174	3.3	40.9	91.5	344	269	29.6
1976	104 950	4.3	451	12 517	3.6	43.3	93.0	340	325	31.5
1977	112 500	4.4	495	12 992	3.8	-[d]	93.0	320	356	30.9
1978	122 400	4.7	575	13 662	4.2	-	-	318	414	32.8

a/ Derived by multiplying production by the ready-to-cook conversion factor (72 percent).
b/ Derived = California production plus truck receipts divided by California population (see Appendix Table C-7).
c/ Not calculated for individual years.
d/ Dashes indicate data were not available when the report was prepared.
Sources: California production and truck receipts: California Crops and Livestock Reporting Service, Production and Marketing Eggs, Chickens and Turkeys, California - 1978, Sacramento. United States production: U.S. Department of Agriculture, Agricultural Statistics-1977, Washington. United States consumption: U.S. Economics, Statistics & Cooperatives Service, Food Consumption, Prices and Expenditures, Supplement for 1976 to Agricultural Economics Report No. 138, Washington, 1978.

Appendix Table C-9

Turkeys: Production and Consumption, United States and California, 1961-1978

Year	California			Estimated California production (RTC basis)[b]	Total United States production (RTC basis)	Ratio California to United States production (RTC Basis)	United States consumption (per capita RTC)	California breeder hens January 1	Number raised per breeder hen[c]
	Turkeys raised (heavy and light)	Average weight liveweight[a]	Total production liveweight						
	1000 birds	pounds	mil. lbs.	mil. lbs.	mil. lbs.	percent	pounds	1000 birds	number
1961	17 765	19.2	341 668	273	1 495	18.3	7.4	1 133	15.7
1962	17 963	19.4	348 686	279	1 294	21.6	7.0	1 022	17.6
1963	15 082	19.3	291 301	233	1 351	17.2	6.8	965	15.6
1964	15 773	19.3	304 561	244	1 453	16.8	7.4	843	18.7
1965	15 667	19.1	299 866	240	1 515	15.8	7.4	840	18.6
1961-1965 average	16 450	19.3	317 216	254	1 422	17.9	7.2	961	17.1
1966	16 972	19.5	331 509	265	1 674	15.8	7.8	915	18.5
1967	19 111	19.8	378 710	303	1 870	16.2	8.6	987	19.4
1968	14 353	19.7	283 373	227	1 611	14.1	7.9	740	19.4
1969	14 994	20.3	304 589	244	1 606	16.2	8.3	673	22.3
1970	15 585	19.5	303 908	243	1 732	14.0	8.0	720	21.6
1966-1970 average	16 203	19.8	320 418	256	1 699	15.1	8.1	807	20.1
1971	16 801	19.1	320 899	257	1 779	14.4	8.4	720[d]	23.3
1972	17 636	19.0	335 084	268	1 915	14.0	9.0	771	22.9
1973	17 584	18.4	322 883	258	1 933	13.3	8.5	802	21.9
1974	17 888	18.0	321 984	258	1 911	13.5	8.9	895	20.0
1975	15 771	19.0	299 649	240	1 804	13.3	8.6	716	22.0
1971-1975 average	17 136	18.7	320 099	256	1 868	13.7	8.7	781	21.9
1976	17 514	19.0	332 614	266	2 059	12.6	9.2	700	25.0
1977	17 365	- [e]	344 880	-	2 012	-	9.2	560	-
1978	16 780	-	-	-	-	-	-	500	-

a/ Derived: production divided by turkeys raised (heavy and light).
b/ Derived by multiplying production by the ready-to-cook conversion factor (80 percent).
c/ Derived by dividing numbers raised by numbers of breeder hens.
d/ Data for 1971 and subsequent years (refer to December 1 of previous year).
e/ Dashes indicate data were not available when the report was prepared.

Sources: California turkeys raised and number of breeder hens: California Crop and Livestock Reporting Service, Production and Marketing Eggs, Chickens and Turkeys, California-1978, Sacramento. United States and California production: U.S. Department of Agriculture, Agricultural Statistics (various years), Washington. United States Consumption: U.S. Economics, Statistics & Cooperatives Service, Food Consumption, Prices and Expenditures, Supplement for 1976 to Agricultural Economics Report No. 138, Washington.

Walte Memorial Book Collection
Division of Agricultural Economics