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Economic Factors in Cattle Feeding

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Agricultural Experiment Station

URBANA, ILLINOIS, JULY, 1912

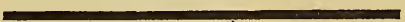




CIRCULAR NO. 163

ECONOMIC FACTORS IN CATTLE FEEDING

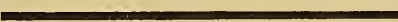




I. RELATION OF THE UNITED STATES TO THE WORLD'S BEEF SUPPLY

BY HERBERT W. MUMFORD AND LOUIS D. HALL

EXPORTS OF BEEF, 1910

<i>Argentina</i>		<i>\$25,480,000</i>
<i>United States</i>		<i>\$12,196,000</i>
<i>Australia</i>		<i>\$5,738,000</i>
<i>Uruguay</i>		<i>\$4,934,000</i>
<i>New Zealand</i>		<i>\$2,847,000</i>

EXPORTS OF LIVE CATTLE, 1910

<i>United States</i>		<i>\$12,200,000</i>
<i>Canada</i>		<i>\$10,800,000</i>
<i>Argentina</i>		<i>\$3,900,000</i>
<i>Mexico</i>		<i>\$2,500,000</i>
<i>Uruguay</i>		<i>\$1,400,000</i>

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SUMMARY

1. INTRODUCTION.—A knowledge of market conditions and of the world-wide influences that affect them is essential to a thoro understanding of the principles of profitable cattle feeding. Page 3

2. GEOGRAPHICAL DISTRIBUTION OF CATTLE.—Of approximately 450 million cattle in the entire world, the United States contains about 71 million (1910); but considering type and size of animals, it is estimated that this country produces about one-third of the world's beef supply. Page 4

3. RATIO OF CATTLE TO POPULATION.—The United States contains .77 cattle per capita, compared with extreme ratios of 4.27:1 in Argentina and .18:1 in Italy. An increase in population has, in most countries, been accompanied by a still greater rate of increase in number of cattle. Page 4

4. CATTLE IN PROPORTION TO AREA.—This country contains only 23 cattle per square mile, compared with 164 in Belgium and 2 in Canada. The relative number in Illinois is 56. Page 8

5. SURPLUS OF CATTLE AND BEEF.—In 1910 the leading live-cattle exporting countries were the United States, Canada, Argentina, Mexico, and Uruguay, in the order named. The leading beef-exporting countries were Argentina, United States, Uruguay, Australia, and New Zealand. Total exports of live cattle and beef in 1910 were approximately 29 million dollars from Argentina, 24 million from the United States, and 11 million from Canada. In 1905 the amounts aggregated 72 million dollars from the United States, 24 million from Argentina, and 15 million from Canada. Page 9

6. DISTRIBUTION OF EXPORTS.—About 85 percent of the value of cattle and beef exported from the United States in 1910 was shipped to Great Britain. Page 10

7. GROWTH AND DECLINE OF AMERICAN SURPLUS.—Exports of cattle and beef from the United States increased gradually up to 1900, continued comparatively constant during the next five years, and have shown a marked decrease since 1906. Unless a rapid increase in cattle raising occurs in this country, exports of cattle and beef must soon cease. Page 10

Note: In view of the rapid decline in production and the present serious shortage of beef cattle in this country, and recognizing the importance of economic factors in relation to the cattle-feeder's problems, an attempt has been made to analyze these economic factors from the standpoint of the beef producer and to state the results in such form as to assist him in solving his own problems. This circular, treating of the relation of the United States to the world's beef supply, is the first of a series which will deal with other aspects of the subject, including Argentina as a factor in international beef trade, beef production in the United States, cattle feeding conditions in the corn belt, and cattle feeding in its relations to farm management and soil fertility.

RELATION OF THE UNITED STATES TO THE WORLD'S BEEF SUPPLY.

BY HERBERT W. MUMFORD, Chief in Animal Husbandry, and
LOUIS D. HALL, Assistant Chief in Animal Husbandry

Market conditions have a peculiarly important bearing upon the cattle-feeding business. A knowledge of these conditions and of the factors which affect them is essential to a thoro understanding of the principles of profitable cattle feeding. A clear conception of the world-wide influences that govern supply and demand will aid materially in forming a correct estimate of present conditions and future tendencies in our own country. It is therefore appropriate to consider at the outset the world's supply of cattle and our relations thereto.

GEOGRAPHICAL DISTRIBUTION OF CATTLE

In the following table are given enumerations of cattle in the countries indicated, in round numbers.

Certain allowances must be made in considering these figures. The cattle of British India, for instance, are not commonly used for beef, but consist chiefly of water buffalo, which are kept as work animals. In some other countries cattle are used only for milk or work, and may therefore be largely disregarded in the present connection. It is estimated that the total number of cattle kept chiefly or largely for beef production is approximately

TABLE 1.—NUMBER OF CATTLE BY COUNTRIES

Country	Year	Total cattle ¹	Percent
British India.....	1909	108 000 000	24
United States.....	1910	71 000 000	16
Russia.....	1908	47 000 000	10
Argentina....	1908	29 000 000	6
Brazil.....	1908 ²	25 000 000	6
Germany.....	1907	21 000 000	5
Austria-Hungary....	1908	18 000 000	4
France.....	1909	14 000 000	3
United Kingdom.....	1910	12 000 000	3
Australia.....	1909	11 000 000	2
Canada.....	1910	7 000 000	2
Other Countries.....		85 000 000	19
Total.....		448 000 000	100

¹U. S. Dept. of Agr., Yearbook 1910, pp. 615—20.

²Estimated.

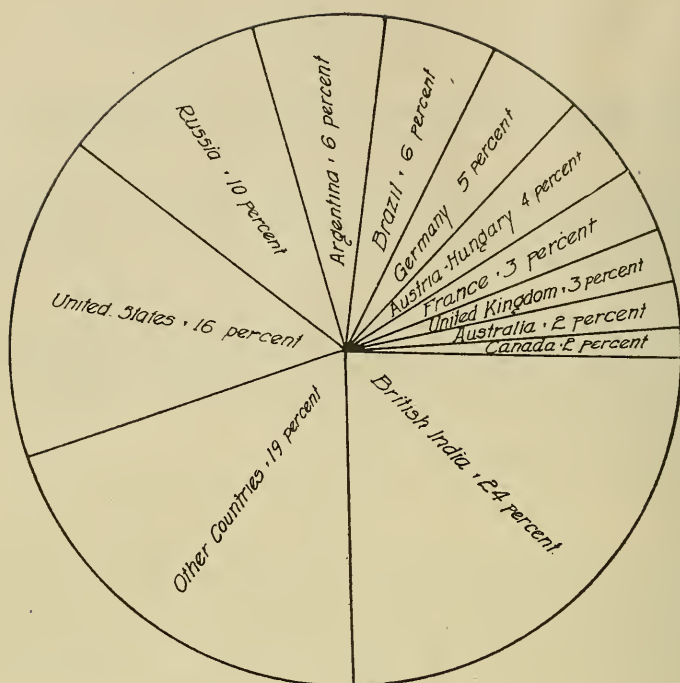


Fig. 1. GEOGRAPHICAL DISTRIBUTION OF CATTLE

300,000,000; hence the United States possesses nearly one-fourth the number of beef cattle in the entire world. Considering size and type of cattle it may be stated that this country produces approximately one-third of the world's supply of beef.

CATTLE AND POPULATION

The number of cattle in various countries in proportion to population is shown graphically in Fig. 2.

Both beef, milk, and draft cattle are represented in this diagram. It is impossible to differentiate sharply between special-purpose beef cattle and others, since milk and draft cattle are usually used ultimately as beef.

The large relative numbers of cattle in South American countries, Australia, and Canada, are explained by the small population of these countries in proportion to their vast areas. In Denmark, on the other hand, is found a large number of cattle per capita together with a dense population, due to the systematic development of intensive dairying. The supply of cattle

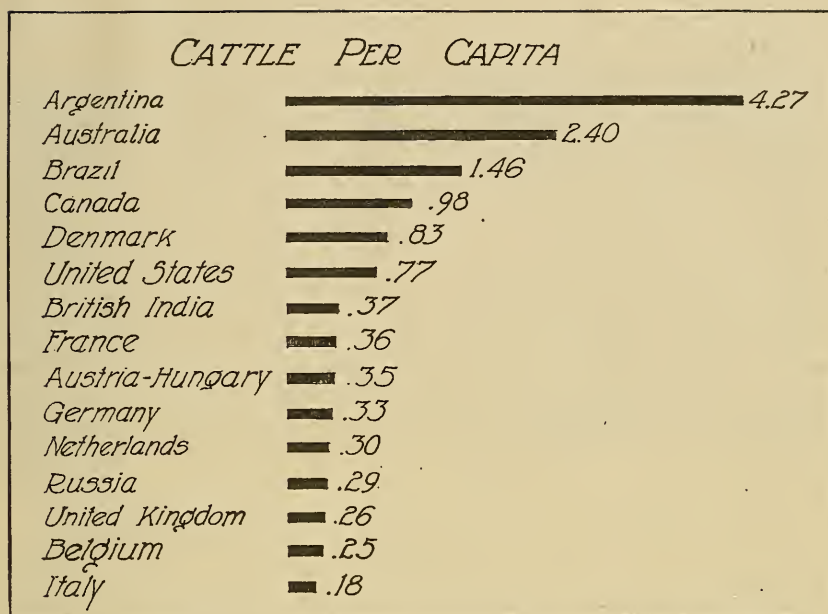


FIG. 2. RELATION OF CATTLE TO POPULATION¹

in the United States is greater in proportion to population than is that of most European countries in which agriculture is a leading industry. Excepting Denmark we have more than twice the number of cattle per capita found in any European country for which statistics are available. This in part explains the large export trade in beef cattle and beef which we maintained until recently, but which is now rapidly declining, as shown in a succeeding paragraph.

It has been asserted by some that as population becomes more dense live-stock production must gradually be abandoned in order to render a larger proportion of the grain and vegetable products directly available for human food. It is also believed by many farmers that it is impossible, under normal conditions, to raise or feed cattle on land worth \$100 to \$200 per acre. Whether these statements are warranted may be determined in a general way by observing the number of cattle in proportion

¹Computed from Statistical Abstract of the U. S., 1910, pp. 33, 42, 672, 732; Yearbook U. S. Dept. Agr., 1910, pp. 615—20; Hazell's Annual, 1911; Stateman's Yearbook, 1909, p. 238.

to population in various countries at different stages of their history.¹

Evidently a dense population and an intensive system of agriculture do not necessarily involve a decrease in the cattle-raising industry; but, on the other hand, it appears to increase. Only in Holland, where the cattle are chiefly of the dairy type, is a relative decrease noted, and this is so slight as to be considered insignificant. In general, the value of land increases more or less directly in proportion to the increase in population, from which it is apparent that cattle raising has not been found incompatible with high-priced land in the countries represented above. Had it not continued to be profitable as population and land values increased, it would long since have been discontinued. On this point we may quote from one of the highest agricultural authorities, Sir J. H. Gilbert of the Rothamsted Experiment

TABLE 2.—INFLUENCE OF INCREASING POPULATION UPON NUMBER OF CATTLE

Country	Date	No. of cattle per capita	Increase
Holland.....	1850	.36	
	1904	.30	-.06
Belgium	1856	.28	
	1906	.25	-.03
United Kingdom.....	1850	.28	
	1910	.26	[-.02
Italy.....	1852	.16	
	1908	.18	.02
Germany.....	1810	.25	
	1907	.33	.08
Denmark	1881	.74	
	1909	.83	.09
France	1852	.16	
	1909	.36	.20
Canada.....	1871	.72	
	1909	.98	.26
United States	1867	.51	
	1910	.77	.26

¹Computed from data in Statesman's Year-book, Statistical Abstract of the U. S., twelfth U. S. Census Report, Mulhall's Dictionary of Statistics, Annual Cyclopaedia, and Report of British Board of Agriculture and Fisheries.

Station, England, who said:¹

"As population increases in proportion to area, there arises the necessity for increased production over a given area. It has already been pointed out that, in our own country, gradually a greater variety of crops came to be grown; that first leguminous crops and then root crops were introduced, and finally the system of rotation became general. Thus a much greater variety and a much greater quantity of home-produced stock foods became available, and in time foods of various kinds were imported from other countries.

"Somewhat similar changes in their food resources occurred in various parts of the continent of Europe; and, with these, came the inducement, if not the necessity, to pay more attention to the subject of feeding.....With us, more special attention was paid to the improvement of the breeds of the farm animals themselves, not only to enhance the development of the most valuable characters in the final product, but to secure early maturity, and thus materially to economize the expenditure of food in the mere maintenance of the living meat-and-manure-making machine."

As has been stated elsewhere,² "there is a condition under which it is true that the number of cattle per capita sometimes decreases while population is on the increase; viz., in the early history of a country when the population is small and extensive systems of live-stock production largely constitute the agriculture of the country." In Argentina, for instance, population is increasing at a more rapid rate than the number of cattle, and will doubtless continue to do so until a ratio is reached which more nearly resembles that found in the older agricultural countries. In the United States, altho the ratio of cattle to population is at present apparently at a standstill or slightly on the decline it by no means follows that a continued decline is inevitable. On the contrary, considering the cattle per capita in Denmark, whose population per square mile is 173 as compared with 25 in the United States, the possibilities of cattle raising in America are evident. Altho it is true that most Danish cattle are of the dairy type, it is nevertheless true that Denmark also produces a surplus of beef cattle, as shown by the fact that in 1906 she exported 105,000 live cattle and 26,500,000 pounds of beef,³ and in 1910 her exports of beef to the United Kingdom alone were 4,737,000 pounds.⁴

¹U. S. Dept. of Agr., Office of Experiment Stations, Bul. 22, p. 232.

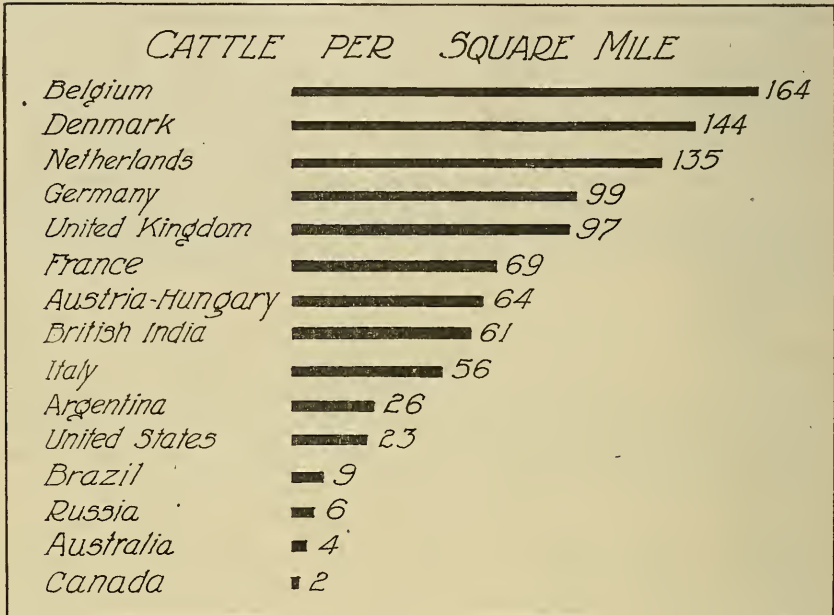
²Illinois Agr. Expt. Sta., Circ. 140, p. 5.

³U. S. Dept. Commerce and Labor, Statistical Abstract of Foreign Countries, p. 210.

⁴U. S. Consular and Trade Reports, 1911.

CATTLE IN PROPORTION TO AREA

The United States produces a small number of cattle in comparison with the great area of the country. The figures given below indicate clearly the undeveloped state of beef production which we have thus far reached.

FIG. 3. DENSITY OF THE CATTLE SUPPLY¹

It is seen, then, that there are less than one-sixth as many cattle on a given area in this country as in Belgium, and less than one-half the relative number found in Italy. Only two of the countries (Australia and Canada) in which beef production is susceptible of large expansion, rank below the United States in number of cattle per square mile. While it is true that vast areas of desert and mountainous lands partly account for the small number of cattle per square mile in this country, yet in Illinois, which contains but little waste land, are found only 56 cattle per square mile, or but one-third to one-half the relative number in various countries of Europe. These figures should furnish food for thought to those who consider the cattle business overdone in the United States and should lend encouragement to all who are engaged in the industry.

¹Computed from references cited on p. 3.

INTERNATIONAL TRADE IN BEEF CATTLE AND BEEF

The importance of the United States in the beef trade of the world may be determined by comparing the surplus or exports of live cattle and beef from various countries.

TABLE 3.—EXPORTS OF CATTLE¹

Country	1900		1905		1910	
	No.	Value	No.	Value	No.	Value
United States.	397 000	\$30 635 000	568 000	\$40 598,000	439 000	\$12 200 000
Canada.....	206 000	9 081 000	167 000	11 361,000	157 000	10 800 000
Argentina.....	151 000	3 549 000	263 000	4 979,000	90 000	3 900 000
Mexico.....	184 000	2 706 000	99 000	1 090,000	193 000	2 500 000
Uruguay.....	61 000	482 000	46 000	402,000	203 000	1 400 000

¹ Year books U. S. Dept. of Agr., 1900, 1905, 1910; U. S. Dept. Commerce and Labor, Statistical Abstract of Foreign Countries, Part III; and personal communications.

As an exporter of live cattle the United States stands pre-eminent, our only near rival being Canada. Exports from Argentina are sent principally into adjacent South American countries. The figures for Mexico represent, chiefly, stock cattle brought into the States to be matured, and are therefore scarcely comparable with the fat-cattle surplus of other countries. The marked decrease in live-cattle exports from the United States, as well as from other exporting nations, during the past five years, is clearly shown by these figures. It is due chiefly to the increased domestic demand for beef, and consequently a reduced margin between prices at Chicago and at British ports. (See cover illustration.)

TABLE 4.—EXPORTS OF BEEF¹

Country	1900		1905		1910	
	Pounds	Value	Pounds	Value	Pounds	Value
Argentina	93 492 000	\$4 418 000	398 223 000	\$18 598 000	580 142 000	\$25 480 000
United States	434 258 000	37 772 000	359 247 000	31 836 000	127 406 000	12 196 000
Uruguay	127 310 000	6 290 000	103 050 000	4 250 000	125 450 000	4 934 000
Australia	96 216 000	5 529 000	43 525 000	2 150 000	71 140 000	3 568 000
New Zealand	35 895 000	1 812 000	17 418 000	930 000	56 012 000	2 847 000
Canada	5 727 000	529 000	39 688 000	3 631,000	1 312 000	115 000

¹ U. S. Dept. of Commerce and Labor, Statistical Abstract of Foreign Countries, Part III; Statist. Abstr. of U. S., 1910, p. 443; U. S. Dept. of Agr., Bureau of Statistics, Bul. 39; personal communications.

DISTRIBUTION OF EXPORTS

The countries to which beef cattle and beef products are principally exported from the United States are shown in the following table, together with the relative importance of each.

TABLE 5.—EXPORTS OF CATTLE AND BEEF FROM THE UNITED STATES, 1910¹

Country	Cattle, number	Beef products, pounds	Total value	Percent
Great Britain.....	122 139	90 551 837	\$20 596 056	84.32
Canada.. .. .	10 283	1 676 773	453 147	1.86
Newfoundland & Labrador		5 213 053	364 264	1.48
Germany		4 150 754	299 927	1.23
South America	129	3 448 541	298 055	1.22
British West Indies.	79	3 146 318	277 998	1.14
Mexico.....	5 149	110 847	265 958	1.09
Belgium.....	270	2 550 879	250 925	1.03
Norway and Sweden.....		1 409 885	126 148	.52
Cuba	207	262 182	39 218	.16
All other countries.....	1 174	14 884 506	1 454 362	5.95
Total	139 430	127 405 575	\$24 426 058	100.00

¹ U. S. Dept. of Com. and Labor, Rept. on Commerce and Navigation, 1910.

The importance of Great Britain as a factor in our export beef trade is here made plain, that country taking about 85 percent of our total beef exports. Under their free-trade policy American live cattle and meats are received free of duty. Other European countries bar our cattle and fresh beef, and their duties on cured and canned meats are so heavy as to limit the trade to the comparatively small amounts noted above.

GROWTH AND DECLINE OF OUR BEEF SURPLUS

Altho the United States held first rank in respect to exports of cattle and second in exports of beef in 1910, the surplus is now diminishing at a rapid rate owing to the rapidly increasing population and inadequate supplies of beef cattle. The general tendency of our export beef trade may be judged from the following table, in which the decrease during the past five years should be especially noted.

The significance of the data given in Table 6 will be more readily seen by referring to the graphic illustration of the same data in Fig. 4.

TABLE 6.—EXPORTS OF LIVE CATTLE AND BEEF FROM THE UNITED STATES¹

Year	Cattle, number	Beef, pounds
1851	1 000	18 000 000
1861	9 000	26 000 000
1870	28 000	27 000 000
1880	183 000	130 000 000
1890	395 000	354 000 000
1900	397 000	435 000 000
1905	568 000	359 000 000
1906	584 000	414 000 000
1907	423 000	361 000 000
1908	349 000	272 000 000
1909	208 000	183 000 000
1910	139 000	127 000 000

¹U. S. Dept. of Agr., Yearbook 1909, pp. 608, 9; U. S. Report on Commerce and Navigation, 1910.

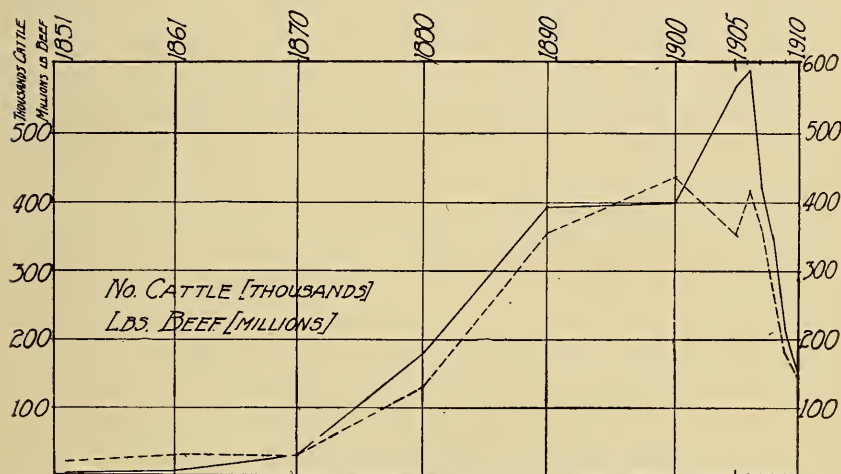


FIG. 4. EXPORTS OF LIVE CATTLE AND BEEF FROM THE UNITED STATES

From these figures it is evident that unless a rapid increase in cattle raising occurs in this country, we shall very soon cease to export beef cattle and beef. Indeed, unless ample encouragement is given beef producers, it is quite possible that we shall shortly become an importing nation, so far, at least, as the lower grades of beef are concerned. Small shipments of South American beef have already been brought to New York, and under certain market conditions this trade may now be carried on with profit.

UNIVERSITY OF ILLINOIS

Agricultural Experiment Station

URBANA, ILLINOIS, SEPTEMBER, 1912

CIRCULAR NO. 164

ECONOMIC FACTORS IN CATTLE FEEDING

II. ARGENTINA AS A FACTOR IN INTERNATIONAL BEEF TRADE

BY HERBERT W. MUMFORD



Large beef herds are seen which are practically pure bred Beef making is a pasture proposition. Alfalfa grows luxuriantly, and to anyone unacquainted with the possibilities of the country, the degree of fatness which cattle acquire without grain is a marvel.

SUMMARY

1. **INTRODUCTION.**—The Argentine Republic recently has superseded the United States of America in the amount of surplus beef produced and sold abroad. Recognizing the important bearing of the Argentine cattle industry upon foreign and domestic markets for beef cattle produced in the United States, the author, on behalf of this experiment station, made a thoro investigation and personal inspection of beef production in Argentina. Page 3

2. **NATURAL ADVANTAGES FOR CATTLE RAISING.**—Climatic conditions are such that cattle can be raised and fattened out of doors without shelter and generally without shade. Abundance of alfalfa and other nutritious legumes and grasses, together with cheap land and labor, makes it possible to produce beef cattle cheaply. They fatten readily without grain. Should corn-fed beef become profitable, an ample supply of corn can be produced. Page 4

3. **QUALITY OF CATTLE.**—Great improvement in the common stock of the country has been effected by importations of high-class pedigreed cattle from Great Britain during the last 25 years and particularly during more recent years. Several large beef herds were seen which were practically pure bred. Page 5

4. **DISTRIBUTION OF CATTLE.**—Five provinces, Buenos Aires, Corrientes, Entre Rios, Santa Fe and Cordoba, known as the pampa grass region, contain over 80 percent of the cattle in Argentina. 222,000 establishments occupying 288 million acres were engaged in the cattle business in 1908. Many individual land holders and land companies own very large tracts. Page 9

5. **SLAUGHTERING FACILITIES.**—A municipally controlled market and slaughtering establishment in Buenos Aires is creditable. Efficient government veterinary inspection is conducted. Convenient locations and sanitary conditions have been provided, with reference to both local and export beef trade. Page 10

6. **CONSUMPTION AND EXPORT.**—Approximately 5 million cattle were slaughtered in 1911, of which approximately one million were shipped abroad as dressed beef and a considerable proportion of the remainder were prepared for export in other forms. The per capita consumption of beef is about equal to that in the United States. Exports of beef have increased from 64 million pounds in 1885 to 193 million pounds in 1900 and 580 million pounds in 1910. Argentine grass-fed beef sells in the English market within two to five cents per pound of corn-fed beef from the United States. Page 11

7. **DIFFICULTIES SURROUNDING THE INDUSTRY.**—British ports have been closed against Argentine live cattle since 1900 (except a short time in 1903) owing to an outbreak of foot-and-mouth disease, altho there is little, if any, of this disease in Argentina at the present time. Texas fever ticks, anthrax or "carbuncle", and tuberculosis are prevalent. Droughts and locusts are plagues which are more or less localized. Nevertheless, cattle raising is a favored and favorite industry in the Republic. Page 13

8. **THE OUTLOOK.**—Argentina's natural advantages enable her profitably to compete with the grass cattle and lower grades of native beef produced in the United States. North American corn-fed beef, so long as the supply lasts, doubtless will continue to command a premium over Argentine grass beef in the markets of the world, but domestic demand in the United States will soon absorb practically the entire amount of beef produced here, thus rendering foreign competition abroad an unimportant factor in the industry.

The chief concern of beef producers in this country, so far as Argentine competition is concerned, should be the effect of possible importation of South American beef to the United States upon the production of beef cattle here. That corn and likewise corn-fed cattle can be produced in Argentina, Uruguay and some other South American countries is an assured fact. The extent to which it will be fed to cattle, however, is limited by the relatively small production of corn and further by the fact that it is a new industry and will not gain favor rapidly because it involves more cropping and labor and considerably more expense.

Expansion of the cattle-raising industry in Argentina has ceased, largely because grain growing is proving more profitable than cattle raising. The beef product will be much improved but the available supply for export doubtless will not increase more rapidly than the combined factors of increased population there and among nations consuming her surplus and the relative decrease of beef production elsewhere. Again, the cost of beef production will increase with increased cost of labor and land. On the whole it is not anticipated that the business of raising beef cattle in the United States will be permanently menaced by Argentine competition. Pages 14-16

BIBLIOGRAPHY.

Page 17

NOTE: This is the second of a series of circulars dealing with economic factors in cattle feeding. Following publications will treat of beef production in the United States, cattle-feeding conditions in the corn belt, and cattle feeding in its relation to farm management and soil fertility.

ARGENTINA AS A FACTOR IN INTERNATIONAL BEEF TRADE¹

BY HERBERT W. MUNIFORD, Chief in Animal Husbandry

Notice has been taken in a preceding discussion (Circular 163) of the fact that Argentina now outranks the United States with respect to the surplus of beef produced and that the change in relative positions of the two countries as beef-exporting nations has occurred since 1905. So marked has been the development of this trade that the attention of the entire world has been called to Argentina as a rapidly growing and exceedingly important factor in the world's supply of beef. For many years the United States of North America was the chief factor in the export trade of this commodity, and an especially important factor because supplying beef of high quality. Today the Argentine Republic must be looked upon as the most important factor in the world's market as regards the amount of surplus beef sold; and, furthermore, the quality of her beef product is fast improving.

Notwithstanding the embargo against importation of live cattle from Argentina into Great Britain which, on account of foot-and-mouth disease, has been in force since 1900², aggregate exports of cattle and beef from Argentina have risen from \$8,000,000 in 1900 to \$24,000,000 in 1905 and \$29,000,000 in 1910; while corresponding figures for the United States were \$68,000,000 in 1900, \$72,000,000 in 1905, and \$24,000,000 in 1910. (See Circular 163.)

With only twenty-nine million cattle, as compared with seventy-one million in the United States, (1910)³, Argentina is in a position to maintain her export trade in beef by reason of the small population (seven million) and consequently limited domestic consumption of beef in that country. Whether or not expansion of beef production in Argentina takes place in the fu-

1. In confining this discussion largely to the production of cattle in Argentina, the writer does not overlook other possible sources of beef in South America, such as Uruguay, Brazil, Bolivia, Paraguay, Venezuela, and possible others which, with the exception of Uruguay and parts of Brazil, are only partially exploited. Operations in Argentina may be taken as a type and indicative in a general way of the development which is likely to follow in other countries. Argentina is and will remain for some time to come the largest producer and most important single factor in the export trade in beef from South America.

2. Except a short period in 1903.

3. The U. S. Census Bureau estimates the number of cattle in the United States in round numbers at 64 million, April 15, 1910, and 67 to 69 million, June 1, 1910. The U. S. Dept. of Agriculture estimates 71 million, Jan. 1, 1910, and 60 million, Jan. 1, 1912.

ture will depend largely upon market conditions. In the United States, on the other hand, a rapidly growing population of 92 million renders it doubtful whether our production of beef will equal our demand unless a rapid expansion of the cattle-raising industry occurs in the near future, which is improbable.

It is evident, therefore, not only that the condition and possibilities of beef production in Argentina have a vital bearing upon our beef trade in foreign markets, but also that the Republic even may become a competing factor in the beef supply of our own country. Recognizing the importance of this factor, the author, on behalf of this experiment station, made a thorough investigation and personal inspection of the beef-cattle industry in Argentina, upon which the following statements are based.

NATURAL ADVANTAGES FOR CATTLE RAISING

Cattle raising for beef in Argentina, especially in the temperate zone, is a much more favored industry than in the United States. The climate makes it possible for the entire life of cattle to be spent out of doors without shelter and generally without shade of any kind. Alfalfa grows most luxuriantly, and the suitability of a very large acreage for the growth of that crop and of other nutritious indigenous and introduced legumes and grasses, together with cheap land and labor, makes it possible to

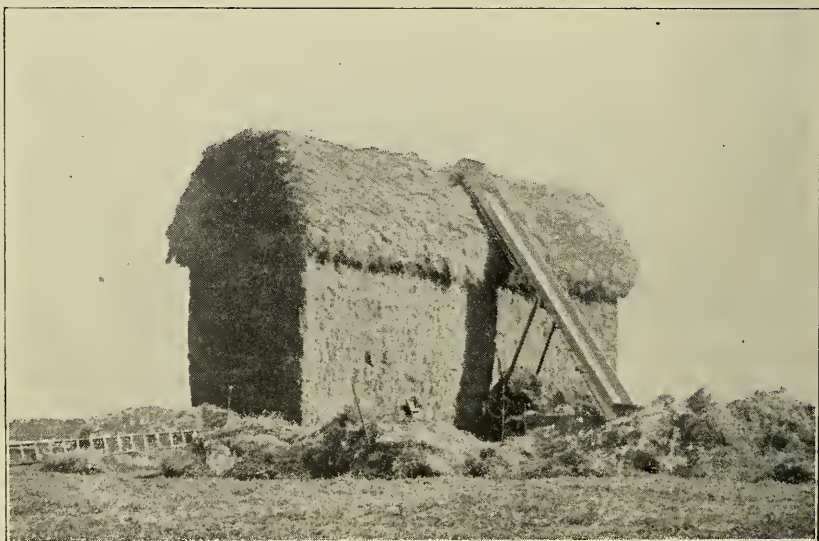


FIG. 1. BALED ALFALFA IN THE STACK

produce beef cheaply. To any one unacquainted with the possibilities of the country, the degree of fatness which the cattle acquire on grass or alfalfa alone is a marvel. Corn feeding as a supplement to pasture for beef production is extremely rare. Beef-making in Argentina at present therefore is practically a strict pasture proposition.

There is quite an extensive area well suited to, and at present partially used for, the growing of corn, but as yet, and probably for some years to come, this product will be either exported or used for horse, dairy cow, and pig feeding. Only the flint varieties are grown generally. If the time ever comes when slaughterers will pay a sufficiently high premium for corn-fed beef, it is believed the country can produce ample for this purpose.

QUALITY OF CATTLE

One of the most striking features of the recent development of beef production in Argentina is the great improvement in quality or breeding of the cattle. Many Argentine *estancieros* have spared no trouble nor expense in effecting improvement of the common stock of the country. This has been accomplished



FIG. 2. AN ARGENTINE-BRED SHORTHORN BULL THAT WOULD FIND FAVOR IN THE SHOW RINGS OF ANY COUNTRY

chiefly by importations of high class pedigreed beef and dairy cattle from Great Britain. It is an historical fact that the cattle breeders of Argentina, and more especially the breeders of registered beef cattle, have bought the best that Great Britain has produced, without much reference to their cost.

In the herdbook of the Argentine Rural Society in 1909 there had been registered about 50,000 pedigreed cattle of beef breeds, some 4,000 of which were imported; and not all pedigreed cattle are registered in the Rural Society's book. During the period from 1880 to 1907, 16,156 pedigreed cattle were imported into Argentina, 14,624 of which were brought from the United Kingdom; and in the two years 1907 to 1909 over 9000 head were imported from England alone.¹

The extension of fencing has been an important factor in making systematic, selective cattle raising possible. At present, in place of the old native cattle, *estancias* are stocked with *mestizo* (half breeds), and in many cases more highly improved stock. In several instances large beef herds were seen which were practically pure bred. Shorthorns (more frequent-



FIG. 3. AN IMPORTED SHORTHORN BULL DOING SERVICE IN THE ARGENTINE. ESTANCIEROS HAVE BOUGHT THE BEST THAT GREAT BRITAIN HAS PRODUCED, WITHOUT MUCH REFERENCE TO THEIR COST

1. Census of the Nation: Stock Breeding and Agriculture in 1908, Vol. 3, pp. 97, 371.

ly called "Durhams" in the Republic) are by far the most numerous and popular, altho some fine herds of Herefords and Aberdeen Angus exist. Of the 50,000 registered cattle mentioned above, about 37,000 were Shorthorns, 10,000 Herefords, and 2500 Aberdeen-Angus. A still larger proportion of the grade cattle of the country than of registered animals are Shorthorns. There is considerable rivalry among the leading breeders of pedigreed beef cattle in their attempts to bring out prize winners at the live-stock shows, the chief one of which is an annual exposition at Palermo, Buenos Aires.

Of the cattle produced for slaughter the best are sold to the *frigorificos*, where they are either chilled or frozen for export. There is no absolute standard set by these establishments as to the quality and condition necessary for their trade, as considerable variation in the quality and degree of fatness occurs, depending upon available supplies and foreign demand.

Demands in the way of breeding and finish in cattle for consumption in the Argentine Republic are not exacting, and a



FIG. 4. GOOD HERDS OF HEREFORDS ARE OCCASIONALLY SEEN

cheaper, less improved, half-fat class of cattle is slaughtered to supply local butchers. Discarded cows, young stock, and work oxen in many instances are important factors in this trade.



FIG. 5. MAP OF ARGENTINE REPUBLIC, SHOWING DISTRIBUTION OF CATTLE

DISTRIBUTION OF CATTLE

A statement of the distribution of cattle thruout the various provinces of the Republic will serve to show what parts are considered best adapted for cattle raising. In some instances these statistics might be misleading; for example, in the province of Buenos Aires and other favored sections of the country still more cattle might be kept, but agriculture is more profitable.

TABLE 1.—NUMBER OF CATTLE BY PROVINCES AND TERRITORIES, ACCORDING TO THE LAST LIVE-STOCK CENSUS IN ARGENTINA (1908)¹

Buenos Aires.....	10 351 000	Mendoza.....	330 000
Corrientes.....	4 276 000	Rio Negro.....	279 000
Santa Fe.....	3 413 000	Catamarca.....	268 000
Entre Rios.....	3 146 000	Chaco.....	265 000
Cordoba.....	2 639 000	Formosa.....	234 000
S. del Estero.....	629 000	Neuquen.....	194 000
San Luis.....	579 000	JuJuy.....	113 000
Salta.....	560 000	Misiones.....	94 000
La Pampa.....	465 000	San Juan.....	82 000
La Rioja.....	417 000	Santa Cruz.....	25 000
Tucuman.....	404 000	Tierra del Fuego.....	12 000
Chubut.....	335 000	Los Andes.....	4 000
		Total.....	29 111 000

1. Agricultural and Pastoral Census of the Nation (Argentina): Stock Breeding and Agriculture in 1908, Vol. 1, p. vii.

From the above statement and the accompanying map (Fig. 5) it will be seen that the five provinces of Buenos Aires, Corrientes, Entre Rios, Santa Fe and Cordoba were the leading cattle sections, containing upward of 80 percent of the cattle in the Argentine Republic. This portion of the country, known as the pampa grass region, is naturally the most favored section for grazing, and with the introduction of improved beef cattle and of foreign grasses and legumes, chief among which is alfalfa, the industry has advanced rapidly. Cattle growing has radiated from the pampa grass region with the more extensive cultivation of alfalfa.

The number of establishments engaged in the cattle business in 1908 was estimated at about 222,000, and these occupied more than 288 million acres, or an average of about 1,300 acres. Many individual landholders and companies own very large tracts, a number of which range in size from 10 to 50 square leagues (about 75,000 to 385,000 acres). Some of the smaller *estancias* are set largely to alfalfa. These extensive areas are stocked with literally thousands of cattle. Besides 29 million cattle in Argen-



FIG. 6. SOME PROMINENT BREEDERS MAINTAIN GOOD HERDS OF
ABERDEEN-ANGUS CATTLE

tina. there were in 1908 about 67 million sheep, 7 million horses 1½ million hogs, 4 million goats, a half million mules and 285 donkeys. The total length of wire on grazing lands amounted to 1,015,500 kilometers (631,000 miles).¹ It has been estimated that the inclosing of rural properties in Argentina during the last 25 years has cost 100 million dollars for wire alone.²

SLAUGHTERING FACILITIES

The municipally controlled *mataderos* or market and slaughtering establishment in Buenos Aires is creditable. The government veterinary inspection at this plant, as well as that at the *frigoríficos* and *fabricas*, is to be commended as contrasted with the slovenly methods in common use in isolated sections where competent government inspection is unknown. Ample provision has been made for slaughtering cattle for domestic consumption and for export, and these establishments are located conveniently both to care for the bulk of the city and export trade and to provide sanitary conditions. The number of packing houses owned and operated by North American companies is on the increase.

1. Report on "Cattle Breeding in the Argentine Republic", Pan American Union, Washington, D. C.

2. U. S. Consular and Trade Report, Nov. 16, 1910, p. 621.

CONSUMPTION AND EXPORT

With its relatively large production of beef and its small population, Argentina has a very considerable beef product for export. It is estimated¹ that in 1911 five million head of cattle were slaughtered, of which approximately one million were



FIG. 7. FOUR-YEAR-OLD STEERS BRED IN NORTHERN SANTA FE,
AND BEING FINISHED ON ALFALFA PASTURE IN SOUTHERN SANTA FE

shipped as dressed beef to markets abroad, and a considerable proportion of the remainder were prepared for export in the form of canned meat, jerked beef, beef extract, and other products. Statisticians differ as to the per capita consumption of meat in the Argentine Republic. The amount annually consumed per capita is estimated at about 140 pounds.² The per capita consumption in the United States is estimated at 185 pounds. One would think from casual observation that the per capita consumption of meat in the Argentine Republic is much larger than in the States, and it is quite possible that the available statistics on the subject are not very reliable. At any rate, of the total meat consumed in Argentina a much larger percentage consists of beef than in the United States. The same statement would be true if for no other reason than the scarcity of swine products. Relatively speaking, but a very

1. U. S. Consular and Trade Rept., May 18, 1912, p. 669.

2. Mulhall's Dictionary of Statistics, 1890.

small percentage of the meat consumed by the better classes is pork or bacon. Mutton is used extensively.

As seen from some points of view, it would seem that the Argentine Republic is not favorably located for developing an extensive and profitable export trade in beef. Closer study shows that their slaughtering establishments can be and are located within easy access to the most favored cattle-producing sections, and also at or near seaports having direct and frequent communication with British and European ports. That exports of beef have increased rapidly is shown by Table 2 and the accompanying graphic illustration (Fig. 8). The decrease shown in exports of live cattle is due, as already stated, chiefly to the closing of English ports against them.

TABLE 2.—EXPORTS OF BEEF AND OF LIVE CATTLE¹

Year	Beef ² , lb.	Cattle, No.
1885	64 280 000	
1890	88 288 000	312 150 ³
1895	113 352 000	408 126
1900	193 492 000	150 550
1905	398 223 000	262 681
1910	580 142 000	90 000

1. From Census of the Nation (Argentina) 1908; U. S. Dept. of Com. and Labor, Statist. Abstr. of Foreign Countries, Part 3; U. S. Dept. of Agr., Bureau of Statist., Bul. 39; U. S. Consular Rept., Nov., 15, 1910.

2. Including chilled, frozen, jerked, and canned beef.

3. 1889.

Great Britain being by far the leading buyer of dressed beef, the amounts shipped to that country from Argentina and from this country during recent years are significant of the trend of trade conditions. The following table includes chilled and frozen beef:

TABLE 3.—DRESSED BEEF IMPORTED INTO GREAT BRITAIN FROM ARGENTINA AND UNITED STATES⁴

Year	From United States, cwts. ⁵	From Argentina, cwts.
1905	2 232 000	2 582 000
1906	2 427 000	2 796 000
1907	2 418 000	2 692 000
1908	1 432 000	3 571 000
1909	857 000	4 208 000
1910	477 000	4 899 000
1911	174 000	6 411 000

4. Annual Statement of Trade of the United Kingdom with Foreign Countries.

5. 112 lb.

These figures show how rapidly Argentina has practically monopolized the British beef market. Of the total dressed beef imported by Great Britain in 1914, 84 percent was shipped by Argentina and but 2 percent by the United States.



FIG. 8. EXPORTS OF BEEF AND OF LIVE CATTLE FROM ARGENTINA, 1855 to 1910

It should not be expected that the beef produced in the Argentine Republic on grass alone will grade in the market as high as English, Scotch or corn-fed beef from the United States of North America. Notwithstanding this, beef is being produced, and in the manner spoken of, that sells in the English market within two cents per pound of the corn-fed beef from the United States. The bulk of the Argentine product sells at three to five cents per pound below North American dressed beef.

DIFFICULTIES SURROUNDING THE INDUSTRY

Some discouragements confront the Argentine beef producer, altho they may be of quite a different character from those elsewhere experienced. For example, since 1900, owing to an outbreak of foot-and-mouth disease and the consequent supposed prevalence of this disease in the Argentine Republic, the ports of Great Britain have been closed against the importation of Argentine live cattle, except a few months in 1903. There is very little, if any, of this disease in Argentina at the present

time. In fact, it does not seem to be a serious handicap to cattle raising there, except as mentioned. Argentine cattle raisers have even gone so far as to suggest the possibility of its being prevalent in a herd without its presence or effect being especially manifest. Other discouragements are found in the way of Texas fever ticks, a form of anthrax commonly spoken of as carbuncle, and tuberculosis. Added to these diseases, other obstacles to be reckoned with are droughts and locusts, which seem to be more



FIG. 9. NOT INFREQUENTLY, TWO-YEAR-OLD STEERS THAT HAVE BEEN LARGELY DEVELOPED ON ALFALFA PASTURE MAKE ACCEPTABLE KILLERS FOR EXPORT CHILLED BEEF

or less localized. But notwithstanding all that may be said with reference to the difficulties encountered in cattle raising, it is still a favored and favorite industry in the Argentine Republic, as indicated by the number of men engaged in it and their prosperous condition.

THE OUTLOOK

On the whole, it appears evident that the natural advantages of Argentina enable her cattle products profitably to compete, as they are already doing, with the grass cattle and lower grades of native beef produced in this country. North American corn-fed beef, so long as the supply lasts, doubtless will continue to command a premium over Argentine grass cattle in the markets of the world. Altho Argentina eventually may develop the pro-

duction of corn-fed cattle, which her soil and climate render quite possible, it is probable that the domestic demand in the United States by that time will absorb, and indeed already absorbs, practically the entire amount of beef produced here, thus rendering our export trade, and consequently foreign competition abroad, an unimportant factor in the industry.

The chief concern of beef producers in this country should be, not what effect will South American competition have upon



FIG. 10. A FORMER CALIFORNIAN'S ATTRACTIVE HOME IN THE ARGENTINE

our export trade, but what effect will the possible importation of South American beef to the United States have upon the production of beef cattle here.

That corn, and likewise corn-fed cattle, can be produced in Argentina, Uruguay, and some other South American countries is an assured fact. The extent to which it will be fed to cattle, however, is limited by the relatively small production of corn and further by the fact that it is a new industry and will not gain favor rapidly because it involves more cropping and labor and considerably more expense.

It is significant that the expansion of cattle raising in Argentina has ceased, and largely because grain growing is proving more profitable than cattle raising. The beef product will be much improved but the supply available for export doubtless

will not increase more rapidly than the combined factors of increased population there and among nations consuming her surplus, and the relative decrease of beef production elsewhere. South American beef surplus will be in strong demand; obviously countries willing to pay the highest premium for it will secure it. Again, the cost of production is sure to increase with increased cost of labor and land. Under such conditions it is not anticipated that the business of raising beef cattle in the United States will be menaced permanently by Argentine competition.

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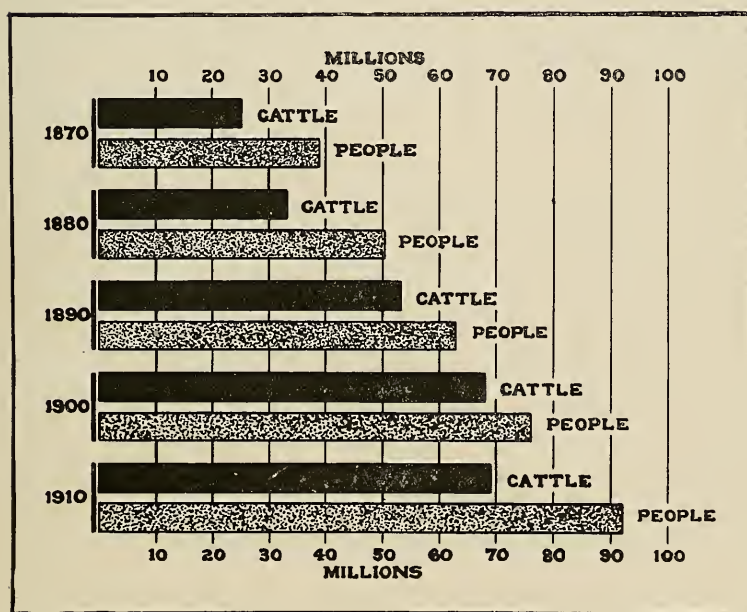
URBANA, ILLINOIS, SEPTEMBER, 1913

CIRCULAR No. 169

ECONOMIC FACTORS IN CATTLE FEEDING

III. A REVIEW OF BEEF PRODUCTION IN THE UNITED STATES

BY HERBERT W. MUMFORD AND LOUIS D. HALL



RATIO OF CATTLE TO POPULATION, 1870 TO 1910

SUMMARY

1. **INTRODUCTION.**—American beef production naturally divides into two epochs, which may be termed "Early History" and "Recent Development." This division is marked by the adoption of refrigeration in shipping dressed meat. Page 3

2. **EARLY HISTORY.**—Corn-fed cattle were first produced near the beginning of the 19th century in southern Ohio and were driven overland to be marketed in Baltimore. Increased eastern demand led to a gradual extension of the industry thruout the Mississippi valley until checked by the Civil War. Page 3

3. **RECENT DEVELOPMENT.**—The extension of railroads and the invention of the refrigerator car in 1868, followed by the use of the tin can in packing meat, extended the beef production industry to remote western states and made it possible to slaughter cattle in the West and to market the salable product considerably cheaper. Page 5

4. **NUMERICAL INCREASE OF CATTLE.**—Statistics show that the number of cattle on farms and ranges in the United States increased from 20,000,000 in 1867 to 68,000,000 in 1900, but that during the last ten years the rate of increase has diminished rapidly, and the last part of the decade shows an actual decrease in numbers. Page 8

5. **RATIO OF CATTLE TO POPULATION.**—The number of cattle has decreased but little; however, the proportion of cattle to population was only 75 percent in 1910 compared to 84 percent in 1890. This decrease has been accentuated by the rapid increase in population. Page 9

6. **RATIO OF BEEF PRODUCTION TO SURPLUS.**—The value of the cattle in the United States has increased \$129,000,000 in seven years. On the other hand, the decline in the number of cattle in proportion to population has reduced the export of meat products from \$72,435,000 to an almost negligible amount during the same period. Page 9

7. **CATTLE CLASSIFIED BY AGE AND SEX.**—A census of the cattle by age, sex, and value indicates among other facts that approximately 60 percent of the cows of breeding age are considered dairy cows. Page 10

8. **GEOGRAPHICAL DISTRIBUTION OF CATTLE IN THE UNITED STATES.**—A comparison of the distribution of the cattle (other than milch cows) and the population shows that while more than two-thirds of the cattle are west, more than two-thirds of the population is located east of the Mississippi river. Page 11

9. **DEVELOPMENT OF THE GREAT CATTLE MARKETS.**—Cattle markets develop in the wake of the producing areas. This is indicated by the growth of Chicago and cities west of Chicago, as cattle markets, while eastern cities have declined as cattle markets. Page 13

10. **LOCAL SALE AND SLAUGHTER OF CATTLE.**—The large central markets are of primary interest to the feeder. Reliable statistics gathered in 1903 indicate that only half the 13,000,000 cattle marketed for slaughter that year were slaughtered in large central markets. Page 16

11. **THE PASSING OF THE RANGE.**—The range country is undergoing a transition during which the number of cattle is decreasing, but an increased production is promised in the future. Page 17

12. **MEXICAN AND CANADIAN CATTLE RANGES.**—Mexico offers opportunities for great development, but a decade or more will be required to reconstruct the country and develop its latent possibilities. Western Canada is rapidly being taken up by homesteaders who give little attention to stock raising at present. Eventually Canada and Mexico should become important factors in the world's beef supply. Page 23

13. **BEEF PRODUCTION IN THE SOUTH.**—Various handicaps have prevented the southern states from exerting much influence upon the beef industry, but better conditions, the need of crop rotation, and the many natural advantages for stock raising are now tending to promote the southern cattle industry. Page 26

NOTE.—This is the third of a series of circulars dealing with economic factors in cattle feeding. (I. Relation of the United States to the World's Beef Supply. II. Argentina as a factor in International Beef Trade.) Following publications will treat of cattle-feeding conditions in the corn belt, and cattle feeding in its relation to farm management and soil fertility.

A REVIEW OF BEEF PRODUCTION IN THE UNITED STATES

BY HERBERT W. MUMFORD, Chief in Animal Husbandry, and
LOUIS D. HALL, Assistant Chief in Animal Husbandry

One hundred years have elapsed since beef-cattle production became a prominent feature of American agriculture. A study of the tendencies that have marked the development of the industry during that period throws much light upon present and prospective conditions with which the cattle feeder has to deal. In this brief sketch, general developments only can be considered, and the more recent decades will receive chief attention.

Two comparatively distinct periods constitute the history of beef production in this country. Up to the Civil War, cattle feeding accompanied general agriculture in its gradual extension westward thru the Ohio and Mississippi valleys. At the same time, the grazing industry spread from Texas over the great western plains. Immediately after the war an enlarged beef demand in the East, together with improved facilities for the transportation of cattle and distribution of beef, stimulated the production and marketing of beef cattle and marked the beginning of modern conditions. The general divisions of this review, therefore, may be designated as the "Early History" and the "Recent Development" of the beef industry.

EARLY HISTORY

Pioneers from the Allegheny region, and especially from the Virginias, introduced the grazing and corn feeding of beef cattle into the valleys of southern Ohio and northwestern Kentucky near the beginning of the 19th century. In 1805 the first fat cattle were driven by Felix Renick from the then new country of the Scioto valley, Ohio, 350 miles eastward across the Alleghenies to Baltimore, where they found a profitable market. During the next decade the trailing of cattle was extended to Philadelphia and New York. The establishment of an outlet and the growth of the eastern demand for beef stimulated the cattle business in the Ohio valley region and gradually extended it westward over Kentucky, Indiana, and Illinois. Until the early fifties, it was customary to take cattle to market on foot. In many instances, this meant a drive of a thousand miles, requiring ten to twelve weeks. Indeed it was not uncommon for cattle to be driven to the large eastern cities from points as far west as Iowa and as far south as Texas.

One of the first shipments of cattle by rail from Kentucky to eastern markets, made in 1852, is described by the shipper as follows: "One week was consumed in driving the cattle, 100 in number, from the neighborhood of Lexington, Kentucky, to Cincinnati. Here they were loaded in box cars and shipped by rail to Cleveland, whence they were taken by steamboat to Buffalo. After a stay of several days at Buffalo, the animals were driven to Canandaigua, New York; thence were hauled in immigrant cars to Albany, where they were unloaded in the freight house. After spending two days in a feed yard near Albany, the stock was taken by boat to New York. The freight on these cattle from Cincinnati to Buffalo was at the rate of \$120 per car and the total expense from Kentucky to New York was \$14 per head." About 1855 shipments by rail were made from Indiana to New York, and in the same year began the shipment of cattle from Chicago. The westward extension of railroads during the next decade resulted in a proportionate increase in rail shipments of cattle eastward and gave rise to various slaughtering and shipping centers in the Middle West.

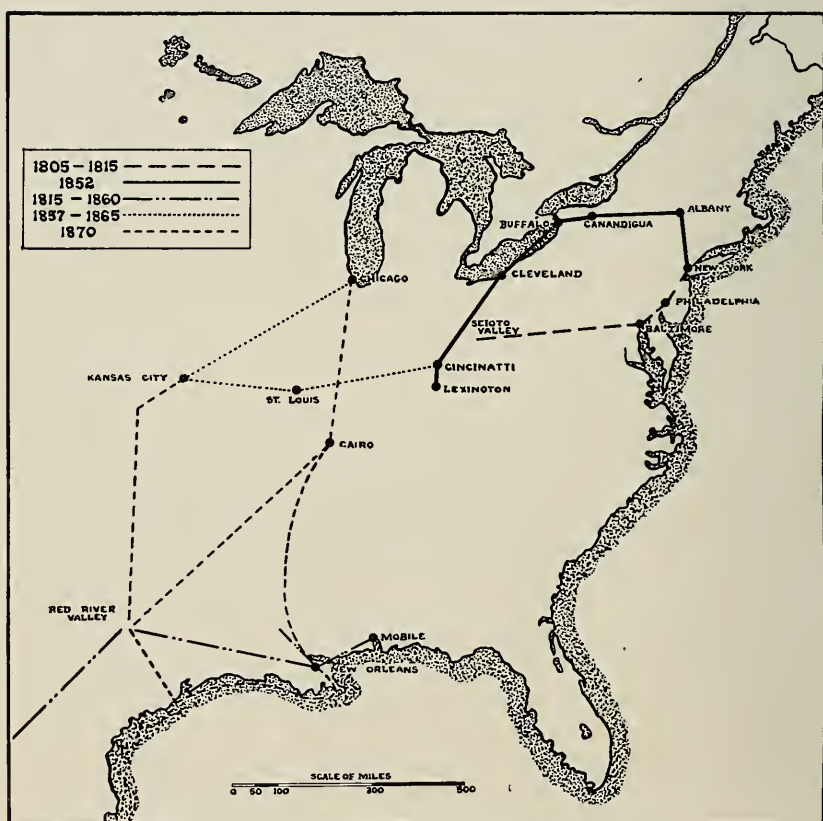


FIG. 1.—ROUTES OF EARLY SHIPMENTS OF CATTLE

Coincident with the extension of beef production from east to west was the expansion of the industry from the Mexican border thru Texas and northward. Mexicans settling in Texas brought with them large numbers of Mexican or Spanish cattle and made ranching their leading occupation. The peculiar adaptation of the vast prairies of western and northern Texas to cattle raising, because of their luxuriant mesquite and buffalo grass, abundant streams, and mild climate, soon attracted large numbers of stockmen from all parts of the United States; and by 1815 these early stockmen were the leading ranchmen of this section. During the next few decades and until the Civil War, the herds increased with great rapidity; but the outlet for cattle was restricted by the distance from market and the lack of railroads. At this time they were marketed principally in New Orleans, Mobile, and Mexico, while smaller numbers were carried by boats to cities along the Mississippi river. The latter trade was cut off by the Civil War, and this, together with the impoverished condition of the South, virtually destroyed the market for Texas cattle. The industry was abandoned to a large extent, and cattle became almost worthless, some changing hands at \$1 to \$2 per head. There was no demand for many that were offered, and some herds were abandoned on the range. "As an evidence of the low value of cattle in Texas at this period, it is recorded that a buyer went into a herd of 3500 steers and cut out \$600 at \$6 a head, and 600 more at \$3 a head."¹

Statistics of cattle in the United States during the first two-thirds of the century are almost entirely lacking, and such as are available must be regarded as rough estimates. Consequently, it is difficult to record the development of beef production during that period further than to outline its general tendencies.

RECENT DEVELOPMENT

During the five-year period following the Civil War, several significant factors combined to revolutionize the beef-cattle business in the United States. Rapid increase in population and the development of manufacturing industries in the East and North brought about a new demand and a larger outlet for beef. Railroad extension thruout the Middle West made possible the establishment of central markets which became accessible to beef-cattle producers at long distances.

In 1857 the Ohio and Mississippi Railroad was extended from Cincinnati to St. Louis. Here it connected with the Missouri Pacific, which was then under construction from St. Louis to Kansas City. Altho this latter road was started soon after 1850, it was not finished until 1865. At the same time the completion of the Hannibal and St. Joseph between the Mississippi and Missouri rivers

¹B. O. Cowan, *Breeder's Gazette*, Jan. 22, 1913, p. 193.

established rail service between Kansas City and Chicago. Consequently, when it was planned to extend the Kansas Pacific still farther westward, the southwestern cattlemen, with access to both the Chicago and the St. Louis markets in sight, saw a bright future for their industry.

In Texas and the western states, the effect of improved conditions and better marketing facilities was marked. The wide difference in the market price of cattle in the North and in the South opened a profitable outlet for the southwestern herds, and a strong movement of Texas cattle to northern markets soon developed. By 1870 three principal routes to eastern markets had become established. "One way led by coastwise steamer to New Orleans, whence the animals were taken northward on river boats. At Cairo, Illinois, the railroad journey was begun northward to Chicago, thence to the East. A second route from Texas was over a trail to shipping points on the Red river, whence the cattle were forwarded on steamboats to Cairo, thence to be shipped by rail northward. A third route followed the trails from Texas to feeding grounds along the railroads in Kansas and in regions farther north. From stations along these railroads the animals were forwarded to eastern markets."¹

The northern demand for these southwestern cattle, due to improved methods of slaughtering animals, the use of refrigeration in shipping dressed beef, and the utilization of packing-house by-products, increased enormously about 1870. Accordingly, the opening of a railroad shipping station at Abilene, Kansas, in 1867, marked the beginning of heavy shipments of southwestern cattle to St. Louis, Chicago, and the East. About 35,000 head were shipped from Abilene in 1867, 75,000 in 1868, 150,000 in 1869, 300,000 in 1870, and 600,000 in 1871.² Some of the cattle enumerated above were grazed and wintered on the ranges of western Kansas ready to take advantage of a favorable market. The severe winter of 1871 put a check on this movement. "This was the flood year of cattle drives from Texas, and it is estimated that 600,000 cattle arrived in western Kansas that season. Many of them were young stock cattle, and a large number of the steers intended for market were in thin flesh and could not be made fat that summer and fall because of excessive rains and the washy condition of the grass. The supply brought forward was greatly in excess of the demand, and in consequence, prices dropped. Many herds were held on the prairies until late autumn, waiting for buyers. It is thought that 300,000 of that season's drive had to be wintered in Kansas. As this had not

¹U. S. Dept. of Agr., Yearbook 1908, p. 231.

²Cattle Trade of the West. J. G. McCoy. Pp. 106, 179, 225, 226.

been foreseen, no preparation for it had been made."¹ It was estimated that 250,000 cattle died from exposure on the range during that winter. During the following season only about 300,000 head were driven north; but in 1873 the trade revived because of increased demand, and approximately 450,000 Texas cattle were driven into Kansas. Gradually the practice of taking southwestern cattle to the northern ranges of Colorado, Wyoming, and Montana increased, and continued during the 70's and 80's. In 1884 it was estimated that 415,000 head were trailed over this route. Following that date, railroads developed more rapidly and carried a large proportion of the cattle to northern pastures, and by 1890 the old trails were abandoned.

Along with better facilities for shipping live cattle came improved methods for transporting dressed beef and beef products. The invention of the refrigerator car in 1868 made it possible to slaughter cattle in the West and ship the dressed beef to the large eastern cities and to Europe. Thus the fresh-meat trade extended over the summer season as well as the four cold months to which it had been previously confined. This invention greatly reduced the cost of transportation besides making it possible for the packers to operate thruout the entire year. For example, from Chicago to New York in 1908 the freight and other expenses of the road on an export steer of average weight (1250 pounds) varied from \$4 to \$4.40, while the freight on the carcass of the same animal (700 pounds) was only \$3.15, not including the expense of icing. From Kansas City to New York the difference between live and dead freight was still greater, amounting possibly to \$2.25 or \$2.50 per head. The total cost of shipping a live steer from Chicago to Liverpool, including freight, feed, and attendance is estimated to have been \$13.60 to \$16.70, or considerably more than double the cost of shipping the average weight of fresh beef yielded by the animal.²

Fresh beef was first shipped in a refrigerator car from Chicago to Boston in September, 1869, but it was not until 1875 that this system became well developed. About the same time, the tin car was introduced into the meat-packing industry and it contributed still further to the successful shipment of beef products to markets in distant parts of the world. The utilization of previously wasted by-products for the manufacture of valuable products also began to receive close attention. These factors, together with the settlement and extension of the cattle-producing regions of the West, the building of railroads, and the development of agriculture and industry in general, combined to mark the most important turning point in the annals of American beef production.

¹B. O. Cowan, *Breeder's Gazette*, Jan. 22, 1913, p. 193.

²U. S. Dept. of Agr., *Yearbook* 1908, p. 243.

NUMERICAL INCREASE OF CATTLE

Statistics indicate that the number of cattle rapidly increased from decade to decade up to 1900. Since that time, it shows evidence of having declined, altho the figures obtainable for this later period are hardly comparable with those of the previous decade. These facts are illustrated by Table 1. It will be observed that the number of cattle other than milch cows is approximately 60 percent of the total number of cattle.

TABLE 1.—CATTLE ON FARMS AND RANGES, 1867 TO 1912¹

Year	Total cattle, number	Cattle other than milch cows, number	Increase in total cattle by decades, percent
1867	20 000 000	12 000 000	
1870	25 000 000	15 000 000	25
1880	33 000 000	21 000 000	32
1890	53 000 000	37 000 000	38
1900 ²	68 000 000	45 000 000 ³	28
1910	69 000 000 ¹	47 000 000	2
	62 000 000 ⁴	41 000 000	- 8.7
1912 ⁵	58 000 000	37 000 000	

¹U. S. Dept. of Agr., Yearbook 1910, p. 630.

²Abstract of the 12th Census, p. 238.

³Estimated.

⁴Abstract of 13th Census, "Live Stock on Farms," p. 316.

⁵Statistical Abstract of U. S., 1911, p. 155.

Before passing this table, an explanation should be given for the two sets of data for 1910. The Bureau of Animal Industry estimates the number of animals in the country on January 1 of each year, and in 1910 this estimate was 69,000,000. While this number is quite accurate, it is approximate, and so is not comparable with the more carefully gathered census figures. The census report of 62,000,000 cattle, while accurate, is not comparable to previous census reports, due to the time of year that the data were gathered. In 1900, the census was taken June 1, while in 1910 it was taken April 15—a difference of six weeks at the season of the year when the largest numbers of farm animals are born. The inaccuracy of directly comparing the 1910 census report with previous census figures is shown by the following statement made in an abstract from the 1910 census report. After estimating that from five to six million calves would have been born from April 15 to June 1, 1910, and that probably one or two million of the older cattle would have been slaughtered or otherwise disposed of, the report continues: "Instead, therefore, of a decrease in the total number of cattle from 67,719,000 on June 1, 1900, to 61,804,000 on April 15, 1910, a decrease of not more than three million, and possibly not over one million, would have resulted had the enumeration of 1910

been made as of June 1." This statement indicates only a small decrease in the actual number of cattle during the past ten years, but this decrease is significant when the present demand is taken into consideration.

RATIO OF CATTLE TO POPULATION

Altho the cattle of the United States have increased numerically by decades up to the present time (with the probable exception of the last few years), their number has not kept pace with the growing population during the last two ten-year periods (see Table 2). In 1890 the number of cattle was equal to 84 percent of the population, while in 1910 it was at most no higher than 75 percent, and indications are that the ratio is rapidly diminishing at the present time. The number of cattle as compared with population is more striking when it is considered that while the number of cattle in 1910 at best may have been on a par with the number in 1900, the population between those same years increased 21 percent and there is little tendency toward an abatement in this rate of increase. However, the most recent reports indicate that the number of beef animals is on an actual decrease at present.

TABLE 2.—RATIO OF CATTLE TO POPULATION, 1870 TO 1910¹

Year	Total cattle per capita	Cattle other than milch cows, per capita
1870	.64	.39
1880	.66	.42
1890	.84	.59
1900 ²	.89	.66
1910 ²	.67	.45

¹Based upon Abstract of the 13th Census, pp. 24, 316; U. S. Dept. of Agr., Yearbook 1910, p. 630; Abstract of 12th Census, p. 32.

²Based upon Bureau of Animal Industry figures. Total cattle per capita for 1900 was .58, for 1910, .75; cattle other than milch cows per capita in 1900 was .36, in 1910, .51.

RATIO OF BEEF PRODUCTION TO SURPLUS

A natural consequence of the decline in the relative number of cattle as compared with population has been a diminution in both the relative and the actual surplus of beef cattle and beef products. Comparing the annual value of cattle other than milch cows with the annual value of exports of beef cattle and beef products at ten-year intervals, we find a marked decline in the percentage value of the surplus, and it is evident from the following table that in this country the consumption of beef has practically overtaken its production.

TABLE 3.—VALUE OF CATTLE ON FARMS AND OF EXPORTS OF BEEF CATTLE AND BEEF, 1867 to 1912

Year	Farm value of cattle other than milch cows ¹	Value of beef cattle and beef exports ²	Percent of value exported
1867	\$185 254 000	\$2 143 000	1.2
1870	290 401 000	2 693 000	.9
1880	341 761 000	31 544 000	9.2
1890	560 625 000	56 170 000	10.0
1900	689 486 000	68 407 000	9.9
1905	661 571 000	72 435 000	10.9
1908	845 938 000	55 466 000	6.6
1910 ³	917 453 000	24 400 000	2.7
1912 ⁴	790 064 000	14 602 000	1.8

¹U. S. Dept. of Agr., Yearbook 1909, p. 571.

²Calculated from U. S. Dept. of Agr., Bur. of Statistics, Bul. 75, pp. 23-29.

³U. S. Dept. of Agr., Yearbook 1911, p. 629.

⁴U. S. Dept. of Agr., Yearbook 1912, pp. 681, 726.

CATTLE CLASSIFIED BY AGE AND SEX

In Table 4 are given the numbers and percentages of the various classes of cattle on farms and ranges in the United States, April 15, 1910, and also a comparison of the average value of the cattle of the different classes.

TABLE 4.—CATTLE IN UNITED STATES, APRIL 15, 1910¹

	On farms and ranges, number	Percent of all cattle	Value	Value per head
Calves born after Jan 1, 1910 (under 3½ mo.). . .	7 806 539	12.6	\$ 52 000 133	\$ 6.66
Steers and bulls born in 1909 (3½-15½ mo.).....	5 450 289	8.8	347 901 174	26.66
Steers and bulls born before 1909	7 598 258	12.3		
Heifers born in 1909 (3½-15½ mo.)	7 295 880	11.8	103 194 026	14.14
Cows and heifers not kept for milk, born before 1909	12 023 682	19.5	269 160 193	22.39
Cows and heifers kept for milk, born before 1909..	20 625 432	33.4	706 236 307	34.24
Unclassified	1 003 786	1.6	21 031 774	20.95
Total.	61 803 866	100.0	\$1 499 823 607	Av.\$24.27

¹Abstract of 13th Census, "Live Stock on Farms," pp. 313, 314.

Several interesting facts are revealed by the above figures. Almost two-thirds of the cows of breeding age are designated as dairy cows, the remainder being kept primarily for raising beef calves. The ratio of bulls and steers to cows and heifers is 1 to 1.46. An explanation of the small number of calves as compared with the number of breeding cows is given on page 8. Unfortunately, the data are such that no comparison can be made between the values of cattle of the same sex at different ages nor between the values of steers and heifers of the same age. However, a comparison can be made between the values of dairy and beef cows, the former being worth almost \$12 per head more than the latter.

GEOGRAPHICAL DISTRIBUTION OF CATTLE IN THE UNITED STATES

The accompanying map shows graphically the relative importance of each group of states in numbers and money value in the production of cattle other than milch cows, in 1910. In addition to the data brought out upon the map, Table 5 gives the total number and value of cattle other than milch cows for the entire United States at the time of the last census and the average value per head.

In the north central states, from Ohio to Nebraska, and in the region including Oklahoma and Texas are found the greatest relative numbers of cattle. However, owing to wide variation in type and quality, numbers are only a partial indication of the importance of cattle raising in the various sections; the value per animal must also be taken into consideration.

TABLE 5.—NUMBER AND VALUE OF CATTLE OTHER THAN MILCH COWS
IN THE UNITED STATES, APRIL 15, 1910¹

Section	Number	Average price	Total value
North Atlantic	2 130 000	\$16.54	\$35 234 000
South Atlantic	3 029 000	13.79	41 760 000
North Central west of the Mississipi..	12 320 000	22.12	272 538 000
North Central east of the Mississipi..	4 990 000	18.57	92 669 000
Southern and Gulf..	10 786 000	16.28	175 574 000
Far Western.....	7 925 000	22.15	175 512 000
Total.....	41 180 000	(Av.\$19.28)	\$793 287 000

¹Calculated from Abstract of 13th Census, "Live Stock on Farms," p. 316.

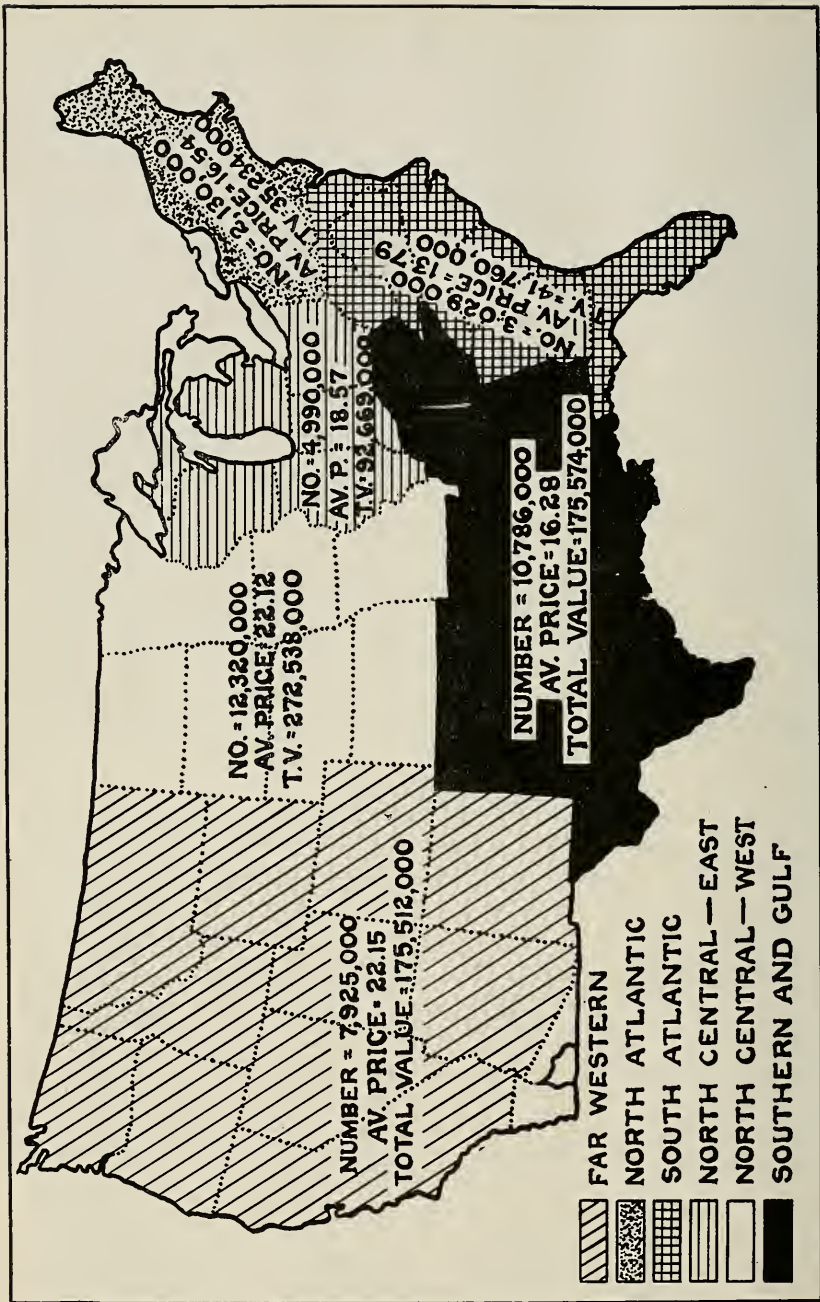


FIG. 2.—NUMBER AND VALUE OF CATTLE OTHER THAN MILCH COWS IN THE UNITED STATES, APRIL 15, 1910

The average value of beef cattle in the Atlantic and south central states is shown to be comparatively low. Altho the north central states have only 41 percent of the cattle of the country (other than milch cows) numerically, the aggregate value of such cattle in these states is more than 46 percent of the total value.

The so-called "corn-belt" states—Ohio, Indiana, Illinois, Iowa, Missouri, Nebraska, and Kansas—have about one-third of the cattle other than milch cows in the United States, but they represent more than one-third the value of such cattle in the country. In addition to the cattle regularly enumerated, upon which the preceding statement is based, we must consider the hundreds of thousands of feeding cattle that are annually brought into the corn belt to be fattened. Including this supply of cattle, and considering their quality and value, perhaps one-half the beef-producing industry of the country is centered in the seven states mentioned.

It is interesting to note that while more than two-thirds of the cattle represented on the accompanying map are west of the Mississippi river, more than two-thirds of the population of the United States is in states east of the Mississippi. In 1880, 78 percent of the population¹ was east and more than one-half (about 55 percent) of the cattle² west of the Mississippi.

Another striking comparison is that of the manufacturing and the non-manufacturing sections of the United States. At the time of the last census, more than one-half of the population was found in less than one-seventh of the area of the country, viz., the states east of the Mississippi and north of the Ohio and Potomac rivers. This portion of the country produces more than three-fourths of our manufactured products, pays more than four-fifths of all salaries and wages, and contains more than two-thirds of the assessed value of all real and personal property. It is therefore the great consuming area of the country; but (east of Chicago) it has less than one-eighth of the beef cattle and less than one-fifth of all cattle of the United States. In other words, seven-eighths of the beef cattle and four-fifths of all cattle are produced west and south (principally west) of the manufacturing district. Consequently, there has been an enormous movement of cattle from west to east to supply the demand for beef in the more densely populated sections. This has brought about the establishment of the great cattle markets at Chicago, the "Missouri river points"—Kansas City, St. Louis, Omaha, St. Joseph, Sioux City and South St. Paul.

DEVELOPMENT OF THE GREAT CATTLE MARKETS

A study of the growth of the important market centers sheds much light on the development of the cattle-raising industry of the

¹Abstract of the 12th Census, pp. 32, 33.

²U. S. Dept. of Agr., Bureau of Statistics, Bul. 64, p. 57.

country. Comparing the annual receipts, in round numbers, at ten-year intervals since 1870, we have the summary given in Table 6. (The markets are arranged in the order of receipts for 1910.)

A study of these market records shows clearly the extent to which western slaughtering has replaced the shipment of live cattle to eastern cities. The markets at Chicago, Missouri river points, St. Paul, Ft. Worth, and Denver have grown rapidly, while a number of eastern markets (e.g., Buffalo and Pittsburg) show a marked falling off.

The recent development of the far-western markets Denver and Ft. Worth is especially noteworthy. Large markets are also being developed at Seattle, Portland (Oregon), and San Francisco which will contribute still further toward local slaughter in the

TABLE 6.—NUMBER OF CATTLE RECEIVED AT LARGE MARKETS,
1870 TO 1910¹

Market	1870 ²	1880 ²	1890 ²	1900 ³	1910 ⁴
Chicago.....	533 000	1 382 000	3 484 000	2 729 000	3 053 000
Kansas City..	121 000 ⁵	245 000	1 472 000	1 970 000	2 230 000
Omaha.....		87 000 ^{6 7}	607 000 ⁷	828 000	1 223 000 ⁷
St. Louis...	234 000 ^{7 8}	346 000 ⁷	511 000 ⁷	698 000 ⁴	1 207 000 ⁷
Ft. Worth...				90 000	785 000
New York...		683 000 ⁴	674 000 ⁴	630 000 ⁴	615 000
St. Joseph..			28 000 ^{7 9}	380 000	510 000
St. Paul.....		32 000 ¹⁰	93 000	176 000	482 000
Sioux City..		55 000 ^{7 10}	167 000 ⁷	300 000	411 000
Denver.....		54 000 ^{7 11}	114 000 ⁷	240 000	383 000
Indianapolis.	119 000 ^{7 12}	133 000 ⁷	120 000 ⁷	140 000	309 000
Cincinnati...	128 000 ^{4 8}	189 000 ⁴	172 000 ⁴	177 000	257 000
Buffalo.....				654 000	220 000
Pittsburg...				251 000	150 000
Baltimore...				163 000	142 000
Philadelphia				165 000	
Jersey City..				228 000	
Boston.....		227 000 ⁴	168 000 ⁴	178 000 ⁴	128 000
Louisville...				94 000 ⁴	126 000
Portland, Or.					90 000
Seattle.....			10 000 ¹³	19 000 ¹³	55 000 ¹³

NOTE.—Omissions in this table are due to the fact that statistics were not obtainable, either because a market had not been established or because no records were kept.

¹Calves not included.

²Bureau An. Indus. Rept., 1897, pp. 209-239.

³Bureau An. Indus. Rept., 1900, pp. 569-583.

⁴Chicago Drover's Journal Yearbook, 1911. Stock Yards Co. reports.

⁵1871.

⁶1884.

⁷Includes calves.

⁸1874.

⁹Statistical Abstract of U. S., 1910, p. 495.

¹⁰1888.

¹¹1886.

¹²1878.

¹³Estimated.

West and thereby diminish the relative number of live cattle shipped eastward. The factors that have brought about this great movement, chief of which are railroad development, the refrigerator car, and the tin can, have been discussed in a preceding paragraph (page 7).

In order to comprehend the relative importance of the markets included in the foregoing table and the relation of each market to the cattle trade of the country, we should know, not only the number of cattle received, but also the number shipped out and the proportion of stockers and feeders in the shipments. Table 7 is therefore presented to give these facts, so far as they are available, regarding the various markets.

Comparing the large markets as slaughtering centers, according to the number of cattle actually utilized, as shown in the first column, we find that they rank in approximately the same order as when compared on the basis of gross receipts, with a few marked exceptions. Chicago ranks first and is followed by the five Missouri river points, together with Ft. Worth and St. Paul, after which come Cincinnati, Denver, and Indianapolis.

St. Paul shows the largest proportion of shipments to receipts. This is due to the fact that many range cattle enroute to Chicago

TABLE 7.—RECEIPTS AT AND SHIPMENTS FROM LARGE MARKETS IN 1910

Market	Net receipts ¹	Proportion of shipments to gross receipts, percent	Stockers and feeders shipped	Proportion of stockers and feeders to shipments, percent
Chicago	1 741 000	43	406 000	31
Kansas City	1 286 000	42	631 000	66
St. Louis	897 000	31	101 000	27
Omaha	799 000	35	432 000 ²	102
Ft. Worth	529 000	33		
St. Joseph	355 000	30	59 000	38
Sioux City	200 000	51	178 000	84
Cincinnati	188 000	27		
Indianapolis	169 000	45		
St. Paul	146 000	70	251 000	71
Denver ³				
Buffalo	130 000			
Pittsburg ³				
Louisville	63 000	50	42 000 ⁴	66
New York ³				
Jersey City ³				
Baltimore	63 000	55		
Boston	61 000	52		
Portland, Ore....	51 000	43		
Seattle ³				
San Francisco ³ ..				

¹Receipts minus shipments.

²Includes feeders driven out.

³Statistics not obtainable.

⁴Estimated.

are fed in transit at that market. Sioux City and Denver likewise are feeding points for cattle enroute to northern ranges, and thus record large percentages of cattle shipped. Of the larger markets Chicago shows the greatest proportion of shipments to receipts, due to the number of feeding cattle handled and the extensive movement of fat cattle from that market to eastern cities that formerly included many export cattle. Kansas City also ships over two-fifths of the cattle it receives. In general, the proportion of shipments to receipts at the different markets varies from one-third to two-thirds.

Referring to the last two columns, it is observed that Kansas City outrivals all other centers as a feeder market, both as to the actual number shipped out and the proportion of feeders to total shipments. Omaha occupies second place and is regarded by corn-belt cattlemen as a rapidly growing feeder point. The excess of feeders over total shipments at Omaha is due to the large number of feeding cattle driven out of the yards and not counted in shipments. As to the actual number of feeders shipped, Chicago ranks close to Omaha, altho less than one-third of the cattle shipped from Chicago are feeders. The high percentage of feeders in shipments from Sioux City, Denver, and St. Paul consists largely of cattle fed in transit, as explained above.

The source of receipts and the destination of shipments are recorded at the Kansas City market. In 1907, 59 percent of the cattle were consigned from Kansas, 15 percent from Oklahoma, 11 percent from Missouri, 6 percent from Texas, and the remainder principally from Colorado, New Mexico, and Nebraska. Of the cattle shipped in the same year, 12 percent went to Missouri (besides St. Louis), 10 percent to Kansas, 5 percent to Illinois (besides Chicago), 4 percent to Iowa, 15 percent to various large markets, and the remainder to various other states.¹

Export trade accounts for the comparatively small net receipts of some of the eastern markets whose gross receipts are large. The importance of these markets as points of export is illustrated by the figures for the year ending June 30, 1908, when the cities of Boston, New York, Philadelphia, Baltimore, Portland (Maine), and Detroit, named in order of their importance, exported 299,000 cattle.² In 1910 the export trade from these same cities was much lighter, totaling 122,000 cattle, or only 40 percent of the export trade in 1908.³

LOCAL SALE AND SLAUGHTER OF CATTLE

Altho cattle feeders are primarily interested in and affected by the large central markets, it should be borne in mind that a com-

¹U. S. Dept. of Agr., Yearbook 1908, p. 234.

²U. S. Dept. of Agr., Yearbook 1908, p. 236.

³Commerce and Navigation of the U. S., 1910, p. 776.

paratively large number of cattle are converted into beef by local butchers, and the influence of this factor in the aggregate is considerable. It was estimated by the United States Bureau of Corporations¹ that the cattle slaughtered in 1903 were divided thus:

	No. of cattle slaughtered
At large central markets	6,570,000
In other cities over 50,000 population	930,000
In cities and villages under 50,000 population	3,500,000
On farms and ranges	1,500,000
Total slaughtered	12,500,000
Exported alive	520,000
Total	13,020,000

Nearly 6,000,000 cattle, or about 45 percent of those marketed for slaughter (which includes those exported alive), were therefore slaughtered at points other than the large stockyard centers; and of this number 5,000,000, or 40 percent of the total number slaughtered, were slaughtered in small cities and villages and in the country. In other words, about two-fifths of all cattle killed for beef in 1903 were handled by local butchers and farmers. The Bureau of Corporations also ascertained that about 5,500,000, or 45 percent, of the cattle killed for beef were slaughtered by six companies known as the "big packers."

THE PASSING OF THE RANGE

A large part of the agricultural progress of the past has meant the extension of soil cultivation at the expense of the grazing industry that preceded it. Home-seeking emigrants, leaving behind farms that have been devastated by poor management, have pushed forward continually toward the most fertile western grazing areas, absorbing or driving the cattle and sheep to new territory, until now the limits of the United States have been reached. Large ranches which formerly sent train loads of fat and feeding cattle to the central markets and to corn-belt feeders have been completely absorbed by settlers. Formerly, such a condition meant the establishment of ranches in new, unclaimed lands, but further extension of this kind is impossible.

The effect of western emigration upon future beef production is a disputed question. Some regard a marked shortage of cattle as the inevitable result; others claim that the cultivation of new lands will ultimately increase the production of cattle in such sections. However, a gradual increase in cattle will not necessarily mean a greater shipment of beef animals from these regions eastward, for the meat consumption of these newer western states will increase along with the increase of population. Neither will

¹Report of the Commissioner of Corporations on the Beef Industry, 1905, pp. 55-57.

an increase of cattle mean a larger beef production, for the dairy cow soon makes her appearance in large numbers in the thickly-populated sections.

From the foregoing statements it will be seen that beef production has a very uncertain future. The free grazing lands that remain are in an unsatisfactory condition because of indiscriminate grazing and a scramble to secure what is left of the already depleted ranges. No business is so full of annoying difficulties as the handling of cattle on the remaining free ranges; and it is little wonder that stockmen have grasped the opportunity to quit business as quickly as prices warranted such a change. It would seem that adequate laws have not yet been provided for the control of public range lands.

The setting aside of large areas of the public domain as national forest reserves, in the opinion of some men has been beneficial to the grazing industry. Thru the issuing of grazing permits and the collection of fees, the Forest Service seeks to show that "regulated grazing and fewer numbers spell more actual profit than over-grazing and hungry cattle."¹ In the effort to prevent over-stocking, fewer cattle are permitted on some sections of the forest reserves than those ranges are capable of carrying.

The section known as the range country is included principally in the states of Texas, Oklahoma, New Mexico, Colorado, Wyoming, Montana, Idaho, Utah, Arizona, the Dakotas, and the western portions of Kansas and Nebraska, as shown on the accompanying map. In order to observe the course of development of the cattle industry in different sections of the West, the following statistics are given, representing the number of cattle other than dairy cows in the various states of the range country.

TABLE 8.—NUMBER OF CATTLE IN VARIOUS WESTERN STATES, 1870 TO 1910

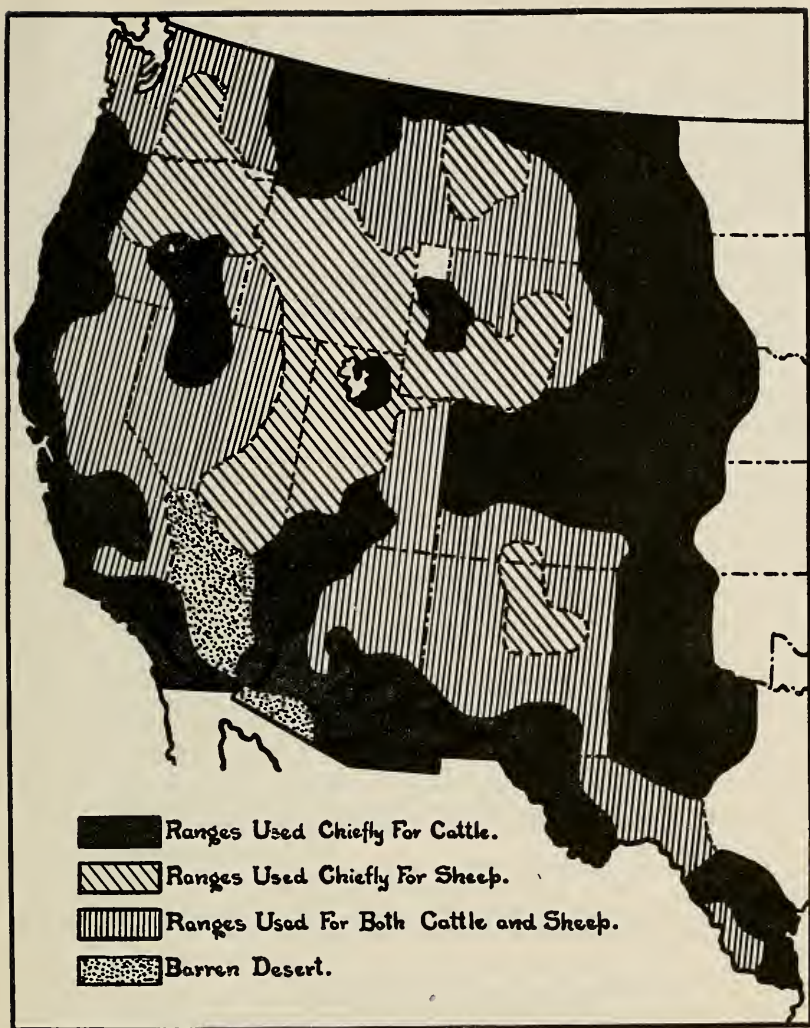
State	1870	1890	1900	1910
Texas.....	3 220 000	7 024 000	8 567 000	7 131 000
Oklahoma...		121 000 ¹	1 544 000	1 637 000
New Mexico.	375 000 ²	1 341 000	975 000	901 000
Colorado ...	365 000 ²	1 017 000	1 333 000	1 425 000
Wyoming...	780 000 ²	1 096 000	669 000	959 000
Montana....	590 000 ²	933 000	923 000	842 000
Idaho	195 000 ²	382 000	312 000	340 000
Utah	103 000 ²	384 000	278 000	327 000
Arizona.....	145 000 ²	725 000	725 000	626 000
Dakotas.....	220 000 ²	740 000	1 808 000	1 957 000
Total.....	5 993 000	13 763 000	17 134 000	16 145 000

¹1893.

²1882.

³1877.

¹John H. Hatton, Breeder's Gazette, Aug. 30, 1911, p. 329.

FIG. 3.—LOCATION OF THE RANGE COUNTRY¹

Notwithstanding the fact that the above figures are partly estimates and were made at different times of the year, they are sufficiently accurate to represent the general trend of conditions.

A marked increase in cattle is shown in each state from 1870 to 1890. This was the period that saw the establishment and growth of the big bonanza cattle ranches thruout the entire West; when beef cattle "kings" were at the height of their prosperity. During the next decade further increases are to be noted in Texas,

¹U. S. Dept. of Agr., Yearbook 1908, p. 232.

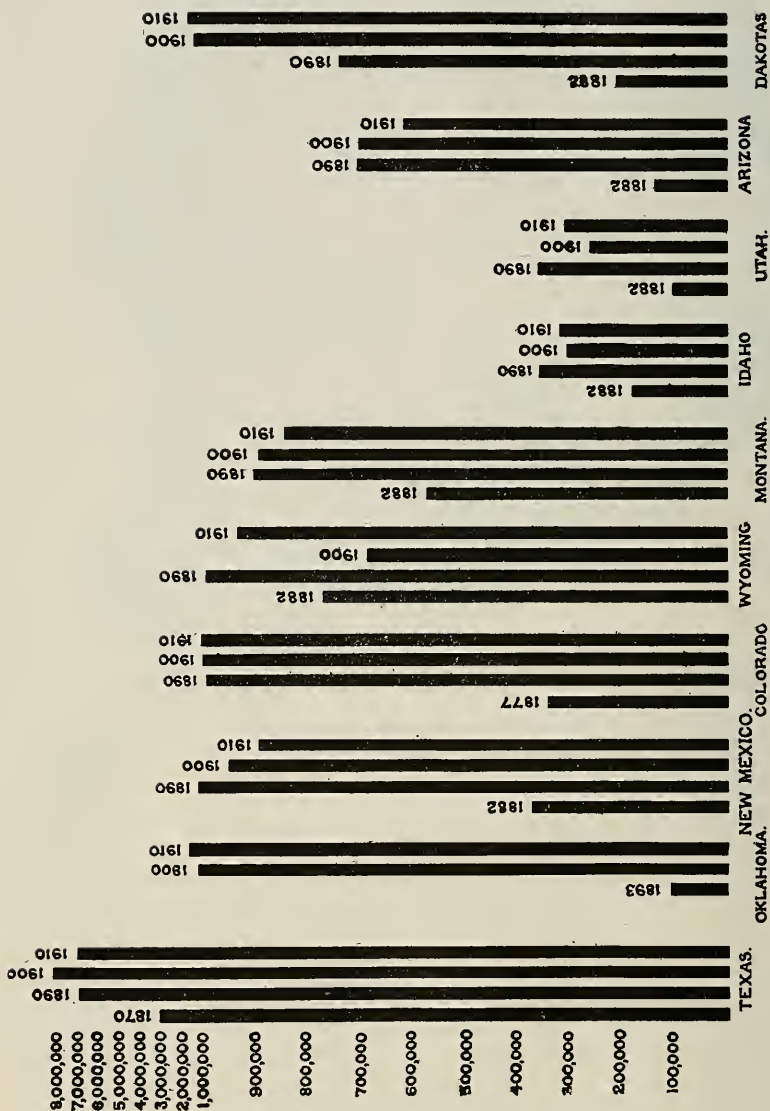


FIG. 4.—NUMBER OF CATTLE IN VARIOUS WESTERN STATES, 1870 TO 1910

Oklahoma, Colorado, and the Dakotas, while the remaining range states show a decrease or remain practically unchanged.

From 1900 to 1910 a marked decrease occurred in Texas, and smaller declines in New Mexico, Arizona, and Montana; all other states mentioned, particularly Wyoming and the Dakotas, show an increase. These decreases, first in the northern range states, then in the southern, were due, in large part at least, to the passing of the four-year-old steer. By marketing stock at three years of age, instead of four, an entire generation of cattle was eliminated from the western country. This fact alone is enough to account for a considerable falling off in the number of cattle even tho the yearly calf crops were increasing in size. It should also be kept in mind that considerable shifting of stock from one state to another was constantly taking place in the range country. Consequently, a decrease in one state would be practically balanced by an increase in another. However, it appears from these figures that the recent tendency has been toward liquidation of cattle on the southwestern ranges, while in the Northwest as a whole the number of cattle has remained practically at a standstill. This decrease is made more evident when it is considered that the maximum number of cattle in these western states was reached in 1906, when the total number was estimated at 18,057,000. Since that date, there has

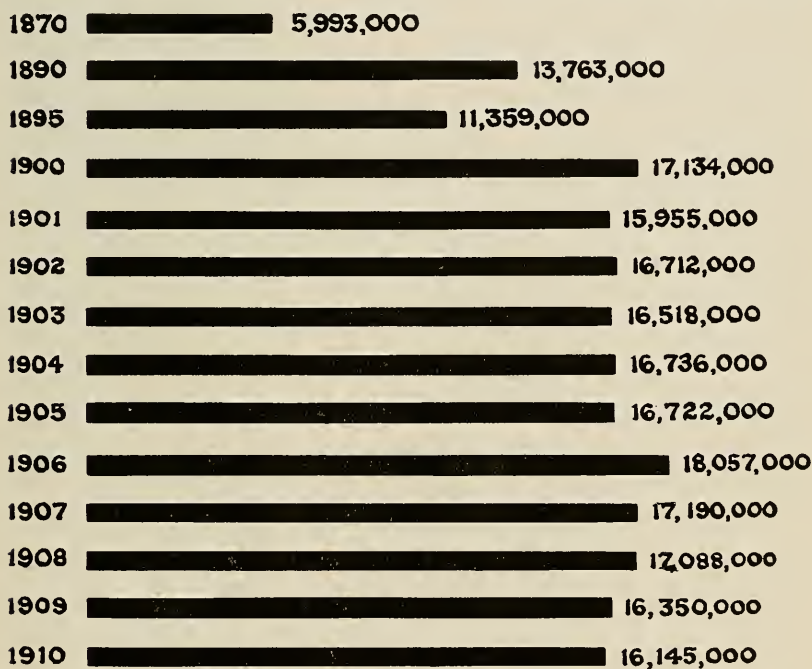


FIG. 5.—AGGREGATE NUMBER OF CATTLE IN VARIOUS WESTERN STATES, 1870 TO 1910

been a gradual decrease in numbers, but not a corresponding decrease in the amount of beef produced.

It is a prevalent belief of those who are in a position to judge, that the number of range-breeding cattle has recently, and is now, diminishing. Opinions as to future developments differ widely and are influenced largely by local conditions. Homesteaders who begin operations under adverse conditions in some sections of the range country will require a number of years before they will be enabled to produce enough cattle to equal the number they displace. In some localities farming is restricted to valleys and other limited areas capable of irrigation or the growing of special crops, leaving large areas of open range lands of the poorer grade. Under proper management, these remaining range lands are capable of a larger production than they are at present yielding. In still other sections, extensive areas unsuited to any purpose but grazing await more efficient management. Speaking of the western range as a whole, the writers believe that within a few years, if not in the more immediate future, the failure of farming ventures in many range districts, the value to be derived from a small drove of cattle on a well-established farm by the utilization of otherwise wasted roughage, the enclosure, conservation, and more efficient management of private and public ranges, the demand for milk and beef in growing western cities, and the demand for feeding cattle in the corn-belt will result in an expansion of cattle raising in the range district; provided, of course, present market prices continue, and judging from the present demand this seems probable.

Altho the receipts of range cattle at large markets have been quoted to depict range conditions, they are not a correct criterion of present conditions. Quite naturally the increase in the western population and the growth of such markets as Omaha, Ft. Worth, Denver, and Portland, have reduced the number of range cattle annually received at Chicago and other older markets. It is readily seen that the somewhat gradual decrease in range-cattle receipts at Chicago from 886,000 in 1890 to 376,000 in 1910 has been, in large part, the result of the increase of population and the growth of slaughtering centers thruout the range country. Figures which might be quoted from various western markets in no way take into account the cattle which are slaughtered in small outlying towns and are used locally to supply the rapidly-increasing population in many of the newer sections of the western country. With the settlement of the western range lands by the small grain farmers, there is a growing tendency to utilize a part of the crop in fattening cattle for local markets. This may seem a small factor in any one section of the West, but taken in the aggregate for many states, it becomes a large factor in the disposal of western cattle. It is not argued that there has been no reduction in the number of cattle in the United States, or even in the West. However, "the passing of the range" is many times used with too much

emphasis,—and well might it continue to be so used if it would encourage a larger production of cattle. Might it not better be said that the rapid increase in population, rather than the decrease in cattle, has been the chief factor in bringing about the present demand for meat, and that because of this condition the demand will continue to grow, and this should stimulate a larger beef production.

MEXICAN AND CANADIAN CATTLE RANGES

In attempting to forecast the future cattle supply of the West, the regions beyond our southwestern and northwestern boundaries must be taken into consideration. Defining the range country, Mr. Frank Hastings has said: "The great bulk of the American continent lying west of the 98th meridian, with large tracts in Canada for its northern portion and greater still in Mexico for its southern areas, may properly be called the range."¹

Mexico has as yet developed the production of cattle only to a small extent, and her significance as a factor in cattle raising lies in her latent possibilities. The following is quoted from Mr. Frank J. Hagenbarth of Utah, who developed the great Palomas ranch in Chihuahua.² "The greater part of the area of Mexico is above the tick line and all the plateaus leading to the Sierra Madre mountains are ideal for cattle-breeding purposes. Only the river bottoms and the coast country produce the bane of the cattle industry, the tick. The whole country grows Para grass in profusion. It is a marvelous feed, equal to the bunch grass of Montana, succulent and highly nutritious. The states of Sonora, Coahuila, Durango, Sinaloa, and Chihuahua not only produce this feed in great quantities, but boast of an excellent climate. Calves may come at any season of the year and encounter no vicissitude. It must not be presumed that no handicap exists, however. The northwest range country has a severe winter, while Mexico's greatest obstacle to cattle raising is drouth. But this can be obviated by constructing dams and storing water that falls during the rainy season. The present practice, even on such properties as the Terrazas ranches, is to let cattle wander anywhere from ten to fifteen miles for water, if they find it then. I have met few people in Mexico who had even grasped the beef-raising possibilities of the country. A few Polled Durham and Hereford bulls have been taken in, but little effective effort can be detected, and any impression that northern Mexico is in a position to flood the United States markets with cattle of any kind is erroneous."

Packers report that cattle purchased in Mexico compare well with the northern United States range cattle that reach the Chicago market. However, Mexico has not yet realized the possibilities for the production of either cattle or sheep, and there can

¹American Breeder's Association, Annual Rept., Vol. I, p. 208.

²Breeders Gazette, June 21, 1911, p. 1453.

be no great immediate improvement. At least ten years will be required to restore the damage done by the insurrection.

That Mexico is a growing factor affecting our own range-cattle industry is shown by the number of cattle brought across the Mexican line into the United States during recent years. For example, the number of cattle imported from Mexico in 1905 was 22,000; in 1906, 24,000; in 1907, 27,000; in 1908, 64,000; in 1909, 126,000; in 1910, 188,000.¹ These cattle are grazed on ranges thruout the West. They have been taken as far north as Montana and even Canada but are held principally in the Southwest until marketable as killers or feeders.

Conditions in the Canadian range country are well described in a recent report by Hon. J. G. Rutherford, Veterinary Director General and Live Stock Commissioner of Canada, from which the following extracts are quoted:

"As is well known, the Canadian west is now experiencing the same change in cattle-raising methods as has already taken place in much of the country south of the line, formerly devoted to ranching purposes.

"The ranching industry in Canada is rapidly passing. In Saskatchewan and Alberta the handwriting is already on the wall, and in these provinces it is only a matter of time until even the districts still regarded as unfit for general agriculture will, thru modern methods of dry farming or by means of irrigation, be brought under cultivation. In the Peace River country ranching may persist for a time, but there, as elsewhere on the continent, the settler will soon be its undoing and the cowboy will disappear.

"The incoming of settlers, many of them from the dry belt, has transformed large areas of land, formerly considered only fit for ranching, into fertile farms growing great crops of grain and fodder. While there is yet much territory untouched by the settler and on which the cattle still range as formerly, its area is being yearly curtailed, and, as a natural consequence, the free, easy and somewhat wasteful methods of the rancher are gradually giving place to those of the farmer and feeder. That this change will, instead of lessening the output, eventually result in a large increase in the cattle production of the transformed districts, needs no demonstration. Under ranching conditions, twenty acres is the usual allowance for each head of cattle, while the losses from exposure, from lack of food and from wild animals constitute a heavy drain on the herd.

"The close farmers are, as yet, in the minority in the less thickly settled portions of Alberta and Saskatchewan. There is still much open grazing land available and many settlers let their cattle run at large during the summer, thus, for the present as it were, combining ranching with farming. As time goes on and the land becomes more generally taken up, this condition will dissappear, as it has already done in many districts in Manitoba, as well as in the newer west, and the farmer will have to depend for his feed on the output of his own acres.

"At the present date, while many of the larger ranches have closed out, the cattle industry is by no means at an end. It is true that many cattlemen, seeing the inevitable end of ranching, have been rapidly 'beefing' out their herds by selling cows, spaying heifers and disposing of bulls, but this is only a link in the chain connecting the old with the new and better condition of the industry. The determination to 'beef out' has temporarily increased the output of cattle of range quality, but, while this is going on, the incoming settlers are stocking up, not to return to the old system of selling their cattle off the grass in the fall, but to follow the more profitable method of finishing beef thruout the year for the good markets, as is done in other progressive countries, where beef raising is recognized as a legitimate and useful adjunct to mixed farming."

¹Commerce and Navigation of the U. S., 1910, p. 161. (Years ending June 30.)

Thus the history of the United States range country is being repeated or even carried to a greater extreme in Canada. The large ranges are giving way to the grain farmer, who eventually may and probably will adopt a system of mixed farming. At present the country is short of breeding cattle, but the people are awakening to the opportunity for cattle raising. The serious side of the settlement of western Canada by grain farmers is shown by the following report of the Winnipeg cattle market:

Year	Total cattle received	Shipped to Ontario	
		Feeding cattle	Butcher cattle
1909	170,000	unknown	unknown
1910	191,000	39,750	40,000
1911	102,700	16,875	unknown
1912	95,000	825	5,500

During this same period the export trade dropped from 90,000 in 1908 to 1,500 in 1912. While a part of the decrease in cattle marketed may be due to a shifting of demand to western centers, it seems evident that the liquidation of western Canadian cattle has assumed large proportions.

The condition of the range industry was described in striking terms by a representative western cattleman at the National Live Stock Convention in February, 1908, when he said: "No one at all familiar with the ranching industry will hesitate to state that it is in a condition of rapid decline, dying as decently and as quickly as it is financially able to do. It is not yet dead, however; there were still in force in the four western provinces, on April 1, 1908, 939 grazing leases, involving 3,259,271 acres divided as follows: Manitoba, 12,642 acres; Saskatchewan, 632,493 acres; Alberta, 2,132,718 acres; British Columbia, 281,418 acres. The average area under lease is 3,481 acres. It would therefore appear that there are still a good many cattle kept under the old conditions, even when the sheep and horse leases are taken into consideration."

In the past, Canada has been a large producer of grain, the bulk of which was shipped from the country. The older farming areas are already reaping the sin of such practice—that of decreased soil fertility. Canada cannot grow such a large variety of crops, and especially legumes, as are found in the United States, and consequently the up-keep of the soil is much more dependable upon stock raising than it is in the United States. Upon the realization of the above facts and of the scarcity of feeding cattle, many eastern Canadian farmers are turning to stock raising. This should result in a steadily increasing production of meat animals. As with Mexico and other countries, no immediate result can be expected in so far as beef production is concerned. A check in the slaughter of calves, about which so much is said, would require from eighteen to thirty months in which to finish these same animals as high-grade beef or to increase the size of the breeding

herd, so that by this method it would require at least from five to ten years of concerted effort to bring about a marked and permanent increase in the number of cattle marketed.

BEEF PRODUCTION IN THE SOUTH

The early extensive beef production followed the lines of least resistance or of greatest profit with least expense of labor and capital. It remains for the present stockmen to develop to the fullest the latent possibilities of land once passed by for greater opportunity elsewhere in so far as beef production was concerned. Some sections of the country have not raised large numbers of cattle because other farming pursuits offered greater temporary inducements. This is especially true of the South, meaning those states regarded as the cotton states.

Formerly, cotton offered such enormous profit that it was continually produced upon the same land without rotating with other crops, but of late years, the invasion of the boll-weevil has demanded a system of diversified farming. The boll-weevil cannot withstand intelligent systems of crop rotation. To meet the present needs, therefore, it is necessary to find crops that will fit into the rotation and yet be utilized. With the natural climatic conditions and the thriving forage crops which will furnish feed the entire year, many advocates of stock raising have arisen. A few years past all argument in behalf of cattle raising was balked by the question, What about the tick?

The Texas fever tick has been the ban to cattle raising in the South. In 1906 the United States Department of Agriculture inaugurated a movement to stamp out this pest. Strict quarantine of cattle was established over fifteen states or parts of states where tick infection was prevalent. During the seven years that the fight has been in progress, 190,000 square miles of the original 740,000 square miles of infected area, or about 25 percent, have been freed of tick infestation.

Just what this war on the tick has meant to southern stockmen is shown in the following digest of over one hundred replies received to questions addressed to farmers and stockmen in Mississippi:¹

1. What were the approximate annual losses of cattle from tick fever in your county from 1900 to 1909 inclusive? Answer: 18.5 percent.
2. What was the approximate value of all cattle that died annually? Answer: \$2,132,370.
3. What has been the annual loss of cattle from tick fever since the tick eradication began? Answer: 1.1 percent.
4. What was the average value of three-year old steers in your county from 1900 to 1909 inclusive? Answer: 2¼ cents per pound.
5. What is the average price now? Answer: 3½ cents per pound. (An increase of 35 percent.)

¹J. A. Kiernan, Breeder's Gazette, Feb. 7, 1912, p. 318.

6. Is there any difference in the average weight of cattle now and before tick eradication began? Answer: Yes, 19.7 percent.

7. Is there any improvement in the grades of cattle in your county since the work of tick eradication began? Answer: Yes.

8. Do you use cow manure as fertilizer? If so, state the relative productivity of land on which it is used as compared with land on which it is not used. Answer: 83 percent.

The loss expressed in money terms may give a clearer conception of the havoc played by the fever tick. It is estimated that for several years previous to the eradication of the tick in any of the infested areas of Mississippi, 18.5 percent, or 161,000 cattle in the entire state, representing a value of \$2,132,370, died annually from tick fever.

These statements regarding the benefit brought to the southern states by eradicating the fever tick are sufficient to assure a greater future for stock raising in these sections. The success with which the eradication has been effected should stimulate many more farmers to engage in beef production. The secret of the success is the dipping tank. The cow acts as a carrier for the ticks, which are found in the pasture upon grass and weeds. When dipping is regularly practiced, the cow fills the role of conveyor of the ticks from the pasture to the dipping tank until at last the crop is exhausted. A second method of eradication is starvation. Altho it requires nine months to starve the ticks which are in the pasture awaiting the coming of the host animal, this method can be used with success.

The control of the tick has opened a new vista for the southern farmer. Not only is diversified farming required to control the boll-weevil, but also to build up the once fertile soil that has become depleted by continual cropping and the removal of the entire crop from the farm. Consequently successful stock raising offers a means of bringing the soil back to its normal productivity. However, the southern farmers lack experience in handling stock, and since they are dependent upon negro labor, it will require some time to establish stock raising on a solid foundation.

Many sections of the South surpass the corn belt in being able to produce a greater variety of crops well suited to live-stock production. Cowpeas, velvet beans, alfalfa, vetches, and clovers are deep-rooting legumes which will materially aid in putting the soil in good physical condition. Shallow cultivation has depleted the surface soil, but good cultivation and the growing of deep-rooting crops should place the land on a productive basis within a few years. The legumes and grasses will furnish forage the entire year where properly managed, whereas at present the number of cattle as well as other animals is kept reduced below the carrying capacity of the land because the winter season is not provided for. At present the number of cattle per square mile in the South is far below what

it is in the corn belt, while in reality much of the southern land, due to the long growing season and the heavy production of crops, is capable of carrying much more stock than could be carried upon an equal northern area.

Not only can stock be grown in this section of the country, but there is every opportunity to finish steers for the market. Corn properly tended does quite as well as it does further north. Cottonseed meal of course is cheap and readily available. Consequently, with corn, cottonseed meal, and a variety of legumes available, the southern cattle feeder has all the feeds that the corn-belt cattle feeder could desire for finishing cattle. There seems to be no logical excuse for the South not to furnish meat for the people within its limits, altho at present large amounts of high-priced meat products are received from the northern states.

UNIVERSITY OF ILLINOIS

Agricultural Experiment Station

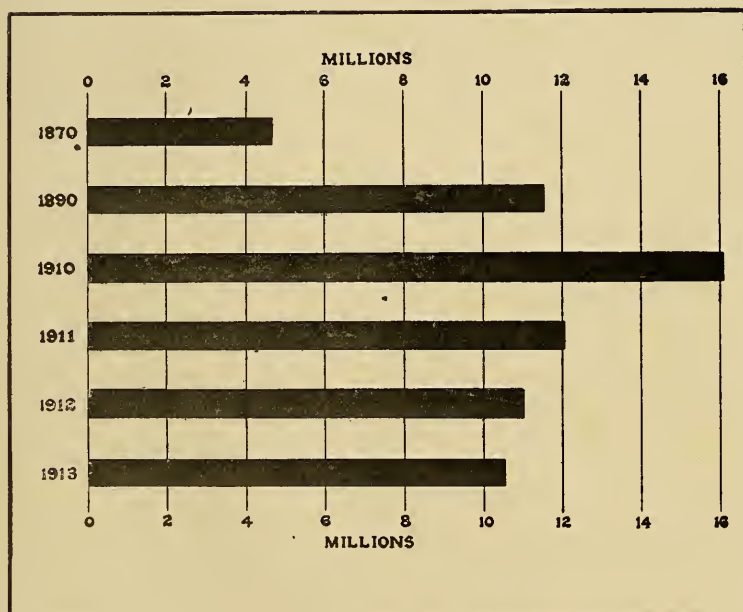
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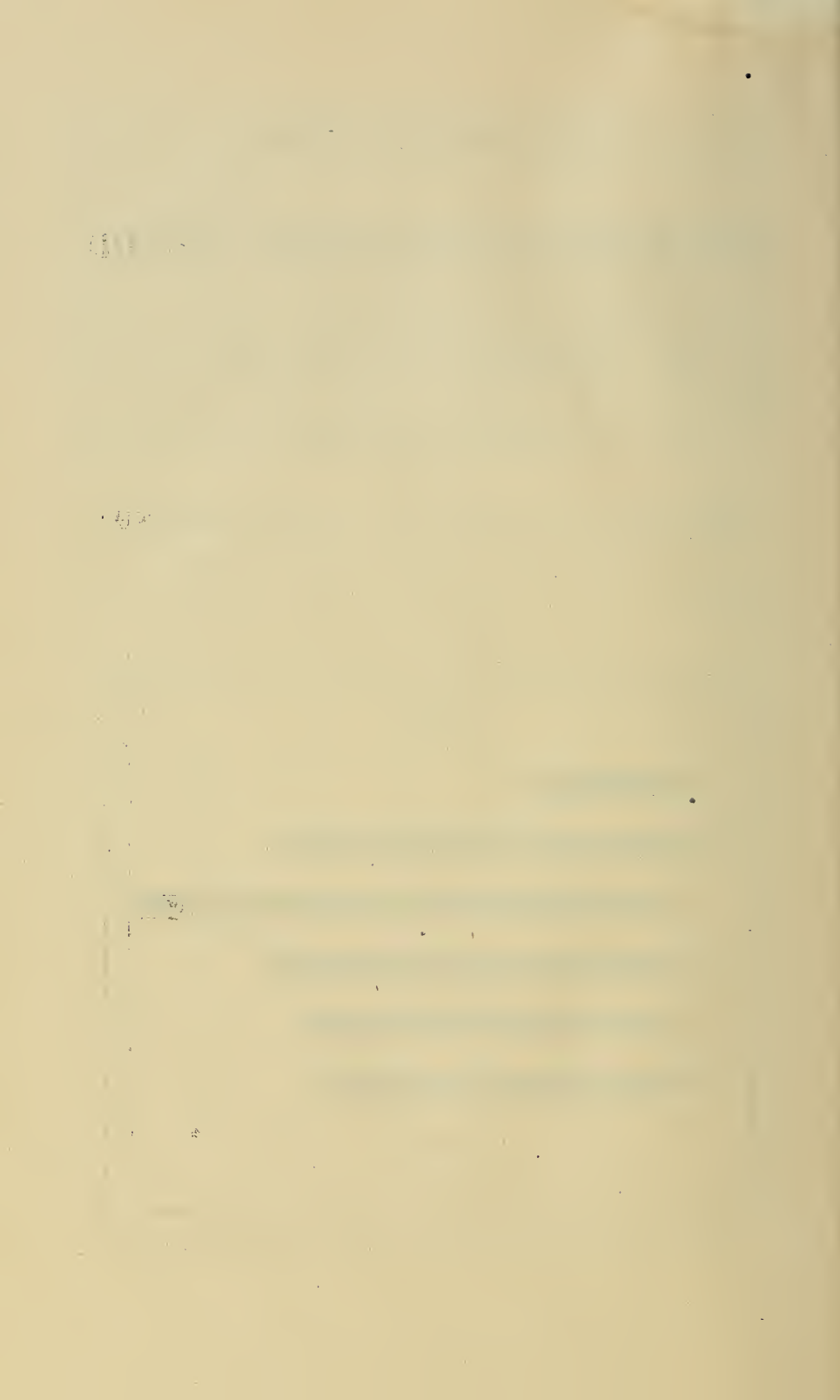
ECONOMIC FACTORS IN CATTLE FEEDING

IV. CATTLE FEEDING CONDITIONS IN THE CORN BELT

BY HERBERT W. MUMFORD AND LOUIS D. HALL



TOTAL CATTLE OTHER THAN MILCH COWS IN CORN-BELT STATES



SUMMARY

1. INTRODUCTION.—Seven corn-surplus states—Ohio, Indiana, Illinois, Missouri, Kansas, and Nebraska—embrace the corn belt, which is the natural center of beef production. About one-third of the cattle of the country other than milch cows are contained in the states named, and their value is equal to about two-fifths of the total value of such cattle in the United States. Page 5

2. RAPID EVOLUTION OF THE INDUSTRY.—Twenty to fifty years ago, the corn belt as a whole was a combined breeding, grazing and fattening ground for beef cattle, but now it is so generally devoted to corn raising that little grazing land—consequently few breeding cattle—remain; and a large proportion of the cattle fattened for market are purchased as feeders from the West or elsewhere. The number of cattle other than milch cows appears to be diminishing thruout the corn belt, and in some typical districts is now no greater than it was forty years ago. Page 5

3. INFLUENCE OF DAIRYING.—Statistics of cattle in corn-belt states indicate a proportion of milch cows amounting to about one-half of the total cattle in the eastern section, one-fourth in Kansas and Nebraska, and corresponding proportions in intervening states. Dairying has increased enormously as a factor in the cattle industry. The introduction of dairy cattle and indiscriminate breeding has deteriorated the quality of beef cattle, and at the same time the actual number of cattle worthy of the name of milch cows has increased but little. Relatively more steers are found in the western than in the eastern portion of the corn belt. Page 10

4. FATTENING STEERS.—Four-fifths to nine-tenths of the beef cattle marketed from typical corn-belt localities are cattle that have been purchased as stockers or feeders. The number of stockers and feeders shipped to the country from Chicago and Missouri river markets shows a considerable increase by decades. The fattening of cattle has passed largely from the hands of general farmers to those of professional cattle feeders, and in some sections has been abandoned to a considerable extent by the latter. Among the chief factors responsible for this tendency are relatively high prices for grain compared with those for fat cattle, increase in land values, extension of cattle feeding operations in the West, increase in farm tenancy, and neglect of soil fertility. Page 12

5. THE OUTLOOK.—The undeveloped state of beef-cattle production in proportion to population and area justifies the expectation of an ultimate extension and development of cattle raising and feeding. Corn-fed beef cattle doubtless will continue in demand by a class of trade in which the grass beef of the West can not compete. The grazing lands of the West may be expected to furnish a partial supply of stockers and feeders to the corn belt for many years to come; however, an increasing

proportion, and eventually a large proportion, of the cattle matured in the corn belt must be reared there. Page 15

Improved and intensified farming methods, the introduction of corn silage, alfalfa and other forage crops, the more complete utilization of waste roughage, and increased attention to manure as a means of maintaining fertility will tend to render cattle production more practicable. Nevertheless, those upon whom the cattle feeder is dependent for his market must consider the increasing cost of producing cattle and pay prices commensurate therewith; the resumption and extension of beef production will come only as a result of higher relative prices for fat cattle. Page 17

Note.—This is the fourth of a series of circulars dealing with economic factors in cattle feeding. The circulars that have been published are: No. 163, Relation of the United States to the World's Beef Supply; No. 164, Argentina as a Factor in International Beef Trade; No. 169, A Review of Beef Production in the United States. The next circular in the series will treat of cattle feeding in its relation to farm management and soil fertility.

CATTLE FEEDING CONDITIONS IN THE CORN BELT

BY HERBERT W. MUMFORD, Chief in Animal Husbandry, and
LOUIS D. HALL, Assistant Chief in Animal Husbandry

Seven "corn-surplus states"—Ohio, Indiana, Illinois, Iowa, Missouri, Kansas, and Nebraska—embrace the great corn-producing area and constitute the natural center of beef production in the United States. As shown in Circular No. 169, about one-third of the cattle of the country other than milch cows are contained in the states mentioned, and their value is equal to about two-fifths of the total value of such cattle in the United States. Furthermore, large numbers of cattle are shipped into these states to be fattened and forwarded to market, and are not included in the estimates of annual cattle population. Corn-fed cattle are the distinctive feature of the cattle industry of the United States, and this circular deals primarily with problems and methods of cattle feeding in the corn belt. It is therefore proper to consider somewhat fully the trend of general conditions surrounding the industry in that section and the fundamental economic factors that affect it.

RAPID EVOLUTION OF THE CATTLE FEEDING INDUSTRY

During the period of settlement and the earlier years of cultivation of corn-belt lands—a period extending from the fifties to the nineties inclusive, of the last century,—these lands generally were stocked with cows of beef type; and while the country was being brought into cultivation, they became a combined breeding, grazing, and fattening ground for cattle. Such localities were admirably suited to beef production because of the abundance of cheap grass and cheap corn they afforded. A most vivid and concise illustration of cattle-feeding conditions and methods in Illinois about 1880 is contained in the following statement quoted from one of the most widely known stockmen of that day, Mr. John D. Gillette:¹

¹ Feeds and Feeding, W. A. Henry, 1st ed., p. 389.

COST OF STEER TWELVE MONTHS OLD

Value of calf at birth	\$3.00
Expenses of dam of calf, chargeable to calf for one year as follows:	
8 percent interest on \$50, value of cow	4.00
Keep of yearling and feed of cow 12 months	12.25
Insurance on cow	1.00
Risk of failure of cow to breed	1.75
Loss of calves by death, etc.	1.00
No corn fed up to 12 months.	
Value of pasture and keep up to 12 months	6.00
Total	<u>29.00</u>
Weight of calf at 12 months, 700 pounds, at 5 cents.....	35.00
Profit at 12 months of age.....	6.00

COST FROM TWELVE TO TWENTY-FOUR MONTHS OF AGE

Value of steer at 12 months of age.....	35.00
Value of shock corn, 110 bushels, at 35 cents.....	38.50
Pasture 12 to 24 months	3.00
Interest and risk	<u>2.80</u>
Total	79.30
Less 500 pounds of pork made on droppings of steer, at 5 cents..	<u>25.00</u>
Net cost 12 to 24 months..	54.30
Weight of steer at 24 months, 1,600 pounds, at 6½ cents.....	104.00
Profit at 24 months of age.....	49.70

COST FROM TWENTY-FOUR TO THIRTY-SIX MONTHS OF AGE

Value of steer at 24 months of age.....	104.00
Value of shock corn consumed in entire year, 125 bu., at 35 cents.	43.75
Pasture, May 1 to Nov. 1	4.00
Interest and risk	<u>8.32</u>
Total	160.07
Less 500 pounds pork at 5 cents, made on droppings of steer....	<u>25.00</u>
Cost at 36 months of age..	135.07
Weight at 36 months of age, 2,200 pounds, at 7 cents.....	154.00
Profit at 36 months of age	18.93

As the remarkable corn-growing possibilities of the soil and climate in the corn belt became more and more evident and the demand for corn grew greater, the westward movement of agriculture naturally stimulated the growing of corn and, to a corresponding degree, diminished the area of grazing land. Gradually, but surely, the plow drove out the cow until in the heart of the corn country but few females of the beef type remained. For thirty years or more in some such sections, it has been a proverb that "it does not pay to keep a cow a year for the chance of a calf."

At the same time that conditions within the corn belt were tending to reduce the rearing of beef cattle there, the industry was extending on the great breeding ground of the Southwest and the grazing lands of the West (see Circular No. 169). Thus an increasing supply of cheap stockers and feeders from the range was a further large factor in causing the abandonment of cattle raising by many farmers, who reasoned—and logically so—that calves could be produced and grown more economically on the cheap grass lands of the West than on corn-belt farms. Moreover, the attractive opportunities which the range country offered the cattleman induced many live-stock farmers of the Mississippi valley to migrate west, thus diminishing still further the proportion of cattle feeders to grain growers in the central states.

The extent to which this change in conditions has affected beef production is indicated somewhat accurately by the results of inquiries that have been made on an extensive scale among cattle feeders of Illinois and Indiana. In 1902 this experiment station secured reports of methods used by 509 cattle feeders in Illinois, and found that only 12 percent raised their entire supply of feeding cattle.¹ It was estimated that only about 15 percent of the native steers marketed in Chicago from Illinois were carried from birth to maturity without changing hands.²

The Indiana Experiment Station in 1906 investigated the methods of 929 cattle feeders in Indiana, and reported that "only 6 percent are really beef producers, that is, breeding their own

¹ Ill. Agr. Exp. Sta., Circ. No. 88, p. 1.

² Ill. Agr. Exp. Sta. Circ. No. 79, p. 6.

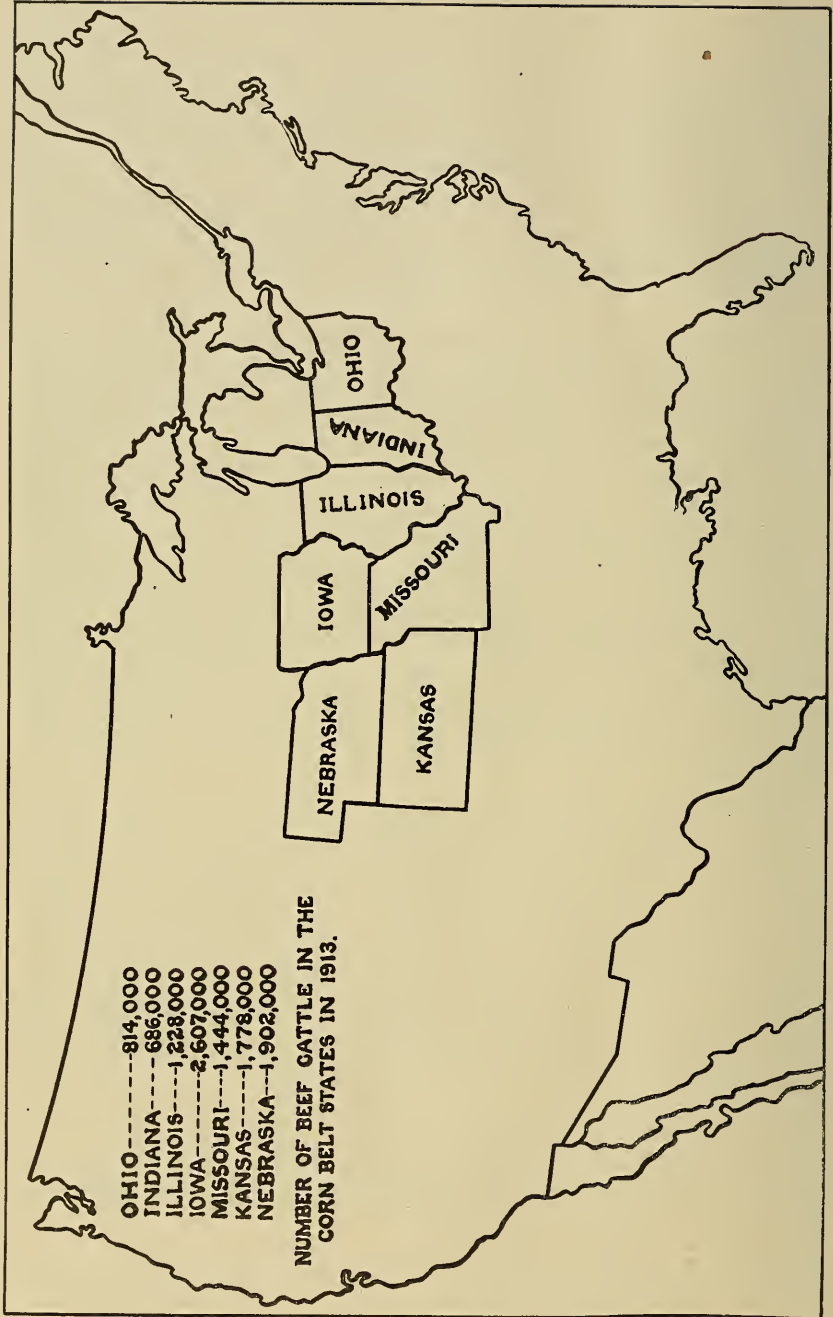


FIG. 1. CORN-BELT STATES, SHOWING NUMBER OF BEEF CATTLE IN EACH IN 1913

cattle and feeding them out." About one-half of the total number raised a part of their feeding cattle, and 42 percent made a practice of purchasing all their feeders.¹

It is significant that a considerably smaller proportion of breeders was found in Indiana than in Illinois. Altho the data are not strictly comparable, owing to possible differences in the class of cattle feeders represented and an interval of four years between the two investigations, it is undoubtedly true that the decrease in the proportion of breeders to feeders of beef cattle has moved gradually from the eastern to the western border of the corn belt.

Notwithstanding the abandonment of cattle breeding by a majority of the more extensive beef producers, the aggregate number of cattle in the region under consideration shows an increase from 1870 to 1910, altho in but few instances did it keep pace with the population. This is due mainly to the large number of farmers who keep only a few cattle to furnish the family supply of milk and beef and to consume the waste roughage and forage of the farm. The statistics for the years 1911, 1912, and 1913 show an actual decrease in the number of cattle in the corn belt. In order to illustrate this point more fully, Table 1 is presented.

TABLE 1.—NUMBER OF CATTLE OTHER THAN MILCH COWS IN THE CORN-BELT STATES

States	1870 ¹	1890 ¹	1910 ²	1911 ³	1912 ³	1913 ⁴
Ohio.. . .	801 000	918 000	978 000	942 000	885 000	814 000
Indiana...	750 000	1 054 000	1 020 000	744 000	707 000	686 000
Illinois....	1 224 000	1 765 000	1 974 000	1 391 000	1 266 000	1 228 000
Iowa.. . .	815 000	2 680 000	3 611 000	2 919 000	2 773 000	2 607 000
Missouri..	731 000	1 819 000	2 165 000	1 671 000	1 504 000	1 444 000
Kansas...	346 000	1 921 000	3 260 000	2 202 000	1 872 000	1 778 000
Nebraska..	55 000	1 346 000	3 040 000	2 225 000	2 002 000	1 902 000
Total...	4 722 000	11 503 000	16 048 000	12 094 000	11 009 000	10 459 000

¹ U. S. Dept. of Agr., Bur. An. Indus., Ann. Rept. 1897, pp. 267-289.

² U. S. Dept. of Agr., Yearbook 1909, p. 572.

³ U. S. Dept. of Agr., Yearbook 1911, p. 630.

⁴ U. S. Dept. of Agr., Yearbook 1912, p. 682.

¹ Ind. Agr. Exp. Sta., Circ. No. 12, p. 11.

INFLUENCE OF DAIRYING

The remarkable growth of large and small cities thruout this fertile section resulted in a corresponding demand for milk and butter. This could be met only by the establishment of dairy farms within comparatively short distances from the cities and an increased production of dairy products on general farms; whereas the supply of beef could readily be secured from greater distances, especially in view of the increasing beef production of the range country at this time.

Table 2 shows the actual number of milch cows and also the proportion of milch cows to total cattle in the corn-belt states by twenty-year periods since 1870, including 1913.

TABLE 2.—NUMBER OF MILCH COWS IN THE CORN-BELT STATES

States	1870 ¹		1890 ¹		1910 ²		1913 ³	
	Number	Pct. of total cattle	Number	Pct. of total cattle	Number	Pct. of total cattle	Number	Pct. of total cattle
Ohio.....	734 000	48	783 000	46	947 000	49	869 000	52
Indiana...	435 000	37	608 000	36	687 000	40	634 000	48
Illinois...	683 000	36	1 094 000	38	1 232 000	38	1 007 000	45
Iowa..	465 000	36	1 279 000	32	1 570 ³ 000	30	1 337 000	34
Missouri..	371 000	34	813 000	31	925 000	30	789 000	35
Kansas...	162 000	32	758 000	28	737 000	18	698 000	28
Nebraska..	35 000	39	424 000	24	879 000	22	607 000	24

¹ U. S. Dept. of Agr., Bur. An. Indus., Ann. Rept. 1897, pp. 267-289.

² U. S. Dept. of Agr., Yearbook 1909, p. 572.

³ U. S. Dept. of Agr., Yearbook 1912, p. 682.

Passing from the eastern to the western states of the corn belt, the percentages in the right-hand column show a remarkably uniform decrease in the proportion of milch cows. Approximately one-half of the cattle of Ohio, Indiana, and Illinois are classified as milch cows, while only about one-fourth of those of Kansas and Nebraska are so classified.

As in the case of beef cattle, the increase in the number of milch cows has been much less marked during the last twenty years than in the previous period, owing to the less pronounced changes in population and industrial development. The slight increase in the proportion of milch cows to the total number of cattle in Ohio, Indiana, and Illinois during forty years does not

adequately represent the increased importance of dairying as a factor in the cattle industry, nor the extent to which the dairy type predominates in the cattle stock of the states mentioned. It is a result of the extension of general farming and the neglect of systematic beef-cattle breeding, together with a great tendency on the part of the average farmer to cross-breed cattle of the beef and dairy types, thereby deteriorating the quality of both. In this way the relative number of animals worthy of the name of milch cows has been limited, and at the same time in most corn-belt localities, the production of steers suitable for the feed lot has very nearly approached the vanishing point.

The marked decrease in the proportion of milch cows to the total number of cattle in the four states west of Illinois, in spite of a large increase in their actual numbers, is explained by the general movement of range cattle into those states from the Southwest and West. It is likely with increased population and the adoption of intensive systems of agriculture, the proportion of milch cows will approach more nearly that of the states farther east.

Further light may be thrown on the types and classes of cattle kept on corn-belt farms by summarizing the returns of the United States Census relating to age and sex of cattle. Figures from the Twelfth Census are presented because of the more minute classification it affords in this particular.

TABLE 3.—RELATIVE PROPORTION OF VARIOUS CLASSES OF CATTLE IN THE CORN-BELT STATES IN 1900¹

States	Calves under 1 year	Steers 1 and under 2 years	Steers 2 and under 3 years	Steers 3 years and over	Bulls 1 year and over	Heifers 1 and under 2 years	Dairy cows 2 years and over	Other cows 2 years and over	Total
	perct.	perct.	perct.	perct.	perct.	perct.	perct.	perct.	perct.
Ohio.....	23.6	10.6	6.9	1.4	1.9	10.4	41.0	4.2	100
Indiana.....	25.0	11.9	8.3	2.1	1.7	10.7	35.2	5.1	100
Illinois.....	22.8	11.4	9.5	3.7	1.9	10.4	33.1	7.2	100
Iowa.....	23.8	13.5	11.2	3.2	1.7	10.9	27.2	8.5	100
Missouri.....	21.1	12.7	12.0	5.2	1.4	10.3	26.6	10.7	100
Kansas.....	20.5	12.4	11.7	9.5	1.4	9.9	15.7	18.9	100
Nebraska ..	23.6	12.5	9.9	3.9	1.6	10.8	16.7	21.0	100
Average.....	22.7	12.4	10.4	4.6	1.6	10.5	26.1	11.7	100

¹ Calculated from Abstract of Twelfth Census, 1900, pp. 238, 240, 246, 247.

The smaller proportion of milch cows in the more westerly states, as previously shown, is here verified, and a correspondingly larger proportion of other cows is noted.

Relatively more steers are found in the western portion of the corn belt, and the difference is more marked in the case of the older than in that of the younger steers, thus showing the natural tendency to keep cattle longer in those sections of the country where pasture lands are both cheaper and more abundant. With respect to the proportion of calves under one year, heifers under two years, and bulls, the data show no striking differences; and likewise, with regard to the proportion of bulls to cows and the proportion of calves to cows, the various sections of the corn belt appear comparatively similar.

Table 4 gives available data from the Thirteenth Census. While these data are not in all respects comparable with similar data from the Twelfth Census, they show the same general tendencies.

TABLE 4.—RELATIVE PROPORTIONS OF VARIOUS CLASSES OF CATTLE IN THE CORN-BELT STATES IN 1910¹

States	Calves	Steers and bulls	Yearling heifers	Dairy cows	Other cows	Unclassified animals	Total
	<i>perct.</i>	<i>perct.</i>	<i>perct.</i>	<i>perct.</i>	<i>perct.</i>	<i>perct.</i>	<i>perct.</i>
Ohio.....	13.9	16.3	12.8	49.3	7.7	....	100
Indiana.....	13.5	16.9	13.3	46.5	9.8	....	100
Illinois.....	13.3	19.5	12.6	43.0	11.6	....	100
Iowa.....	12.8	29.1	12.7	31.6	13.8	....	100
Missouri....	11.6	31.0	12.0	33.4	12.0	....	100
Kansas ²	12.4	34.1	10.9	23.9	18.1	0.6	100
Nebraska ² ..	12.5	30.0	12.4	21.0	21.0	0.1	100
Average...	12.8	26.9	12.3	33.2	14.7	0.1	100

¹ Calculated from Abstract of Thirteenth Census, 1910, pp. 316, 317.

² Includes unclassified animals.

FATTENING STEERS IN THE CORN BELT

Notwithstanding the rapid extension of the acreage devoted to corn growing, and the great demand that has arisen for corn for other than feeding purposes, the crop is still fed chiefly to farm animals. As nearly as can be estimated, 80 percent of the corn produced in the United States is fed to live stock.¹ It is, of

¹Ill. Agr. Exp. Sta. Circ. No. 140, p. 9.

course, more largely sold off the farms of the corn-belt states than those of other sections of the country, but probably not far from one-half of the crop of Illinois is fed on the farm.¹ A temporary curtailment of one branch or another of the live-stock industry, especially cattle and hog feeding, is so promptly reflected in a reduced corn market that stock feeding is quickly resumed to a greater or less extent, tho with increasing reluctance and misgivings. This applies especially to fattening cattle, as this branch of live-stock production offers the most immediate and ready means of disposing of large quantities of corn, and at the same time utilizes much otherwise wasted roughage, such as stalk fields, corn stover, and straw.

That beef production in the corn belt has become largely a steer-fattening enterprise apart from breeding is clearly demonstrated by the investigations of the Illinois and Indiana Experiment Stations quoted in a preceding paragraph. In Illinois it was found that in 1902 more than one-half of the cattlemen from whom reports were obtained were feeders who purchased the cattle they finished for market; in addition, more than one-third were both feeders and breeders, but even the latter purchased most of their feeding cattle.² About 85 percent of the native beef steers marketed in Chicago were fattened after having been purchased as stockers and feeders.³ In Indiana in 1906, 929 reports were received from cattlemen in that state, of whom 42 percent were found to purchase all their feeding cattle and 52 percent grew only a part of them and bought the remainder.⁴

The extent and tendency of this important phase of the industry are also shown in a measure by the shipments of stockers and feeders from the large cattle markets during recent decades (see Table 5).

In the evolution, or transition, of corn-belt beef production from a cattle-raising to a steer-feeding proposition with a large proportion of the feeders purchased at the large markets, the business, to a considerable extent, has gravitated into the hands of men who handle comparatively large numbers of cattle—from a few carloads to several hundred head. Tho these professional cattle feeders in most cases are farmers, they usually buy all

¹Ill. Agr. Exp. Sta., Circ. No. 140, p. 8.

²Ill. Agr. Exp. Sta., Circ. No. 88, p. 1.

³Ill. Agr. Exp. Sta., Circ. No. 79, p. 6.

⁴Ind. Agr. Exp. Sta., Circ. No. 12, p. 12.

TABLE 5.—SHIPMENTS OF STOCKERS AND FEEDERS FROM VARIOUS MARKETS¹

Markets	1880	1890	1900	1910	1913
Chicago ²			300 000	406 000	380 000
Kansas City..	136 000 ³	647 000 ³	724 000 ⁴	631 000	914 000
Omaha ⁵		266 000 ⁶	294 000	431 000	405 000
St. Louis ⁷ ...			75 000 ⁸	102 000	159 000
St. Joseph ² ...			51 000 ⁹	60 000	67 000
St. Paul ⁵		130 000 ¹⁰	114 000	251 000	262 000
Sioux City ² ...			176 000 ⁴	178 000	220 000
Indianapolis ¹¹					
Louisville ⁷				42 000	
Ft. Worth ¹² ...					493 000
Denver ¹¹					
Buffalo ¹¹					

1 From reports of Stock Yards Companies.

2 Statistics for 1880 and 1890 not obtainable.

3 Estimated.

4 1905. Statistics for 1900 not obtainable.

5 Statistics for 1880 not obtainable.

6 1897. Statistics for 1890 not obtainable.

7 Statistics for 1880, 1890, and 1900 not obtainable.

8 1908. Statistics for 1900 not obtainable.

9 1901. Statistics for 1900 not obtainable.

10 1898. Statistics for 1890 not obtainable.

11 Cattle shipments not classified as to stockers and feeders.

12 Statistics for 1880, 1890, 1900, and 1910 not obtainable.

their feeding cattle and a large part of the corn they feed, use but little of the manure produced, and freely admit the large element of speculation incurred. The capital, risk, business skill, and distance from markets involved in cattle feeding necessarily deter many farmers from converting their corn into beef. The proper place and purpose of beef production in the corn belt, however, is to provide a profitable market for the crops grown on the farm and at the same time conserve the fertility of the soil. These considerations are of greater consequence to the small farmer than to the "big feeder." It is therefore essential to the welfare of agriculture that the business should be distributed more generally among farms of average size instead of being concentrated in the hands of a few farmers and capitalists whose farms, as well as their fortunes, are frequently enriched at the expense of the neighbors whose corn they buy. With a reasonable degree of skill in buying, feeding, and marketing, it is ordinarily safe and usually profitable for the general farmer to engage in the fattening of steers.

In some sections of the corn belt, cattle feeding has not only

passed largely from the hands of general farmers to the large feeders, but has also been abandoned to a considerable extent by the latter. This tendency may be assigned to several causes: (1) Prices of grain have been relatively higher than those of cattle, and inducements to sell corn for cash at the elevator instead of feeding have therefore been strong. (2) Land has increased rapidly in value, and it is a prevalent idea that high-priced land prohibits profitable cattle feeding. As a matter of fact, the actual influence of this factor is usually insignificant as compared with prices of corn and cattle in determining the profit in feeding cattle. Increased value of farm lands has made it possible for many cattlemen to retire or to relinquish active management of their farms to others less competent to engage profitably in the business. (3) Opportunities for cattle feeding in various portions of the West have attracted many successful cattle feeders from the older sections of the corn belt. The opportunities for exclusive grain growing in these newer regions have not been equally attractive; hence there has been a tendency for a large exodus of live-stock producers, while the grain growers more generally have remained. (4) The farms in many of the older, more prosperous communities have become occupied largely by tenants. The prevailing system of short-term leases and a lack of experience in feeding cattle on the part of tenants have resulted in a marked decrease not only in cattle feeding but in the production of live stock of all kinds. (5) The apparent continuation of satisfactory crop yields in a large part of the corn belt has resulted in a failure to appreciate the value and necessity of manure. This fact has blinded most farmers to an important factor in cattle feeding. (6) The fact that cattle, ready for the feed lot, could be produced cheaper in the West than in the corn belt has caused the general farmer, who produced his own feeders and did not use enough cattle to pay to buy them from the western country, to go out of the live-stock business. That is, at the prevailing prices he could not compete in the production of beef with the "big feeder," who was able to place his cattle in the feed lot at a lower cost than they could be produced in the corn belt.

THE OUTLOOK

In the light of conditions set forth in this and foregoing particulars, a few general deductions may safely be drawn relative to

the probable future trend of beef production in the corn-growing section of the United States.

The undeveloped state of cattle production in proportion to the population and the area of the United States as compared with the condition of the industry in older countries justifies the expectation of an ultimate extension and development of cattle raising and feeding in this country. The rapid increase of population and the slower rate of increase in the number of cattle have rendered the export beef trade a relatively insignificant factor; but with a large domestic demand in proportion to the supply, and limited competition from abroad, the industry should be practically independent of foreign trade. General market conditions are now and promise to remain favorable to the producer, for he has a domestic market as a regular outlet and a foreign market as an influential regulator of prices and as an elastic consumer of surplus.

The "passing of the range" has not diminished the number of western cattle entering the markets, but the growing population of the West and, consequently, the increased amount of beef slaughtered and consumed in that section have reduced the relative importance of western cattle as a factor in corn-belt markets. Further, corn-fed beef cattle, which can be properly and profitably finished only within a limited section of the country, doubtless will continue in demand by a class of trade in which the cheaper grass beef of the West cannot compete.

Notwithstanding the general subdivision of western ranges and ranches by settlers, the fact that large areas of the West and Southwest are adapted only to grazing indicates that these sections will continue to produce a considerable number of feeding cattle. As Ireland with her abundance of grass has grown "store" or feeding cattle for the farmers of England and Scotland for many years and continues to do so, similarly the grass lands of our great West and South may reasonably be expected to supply stockers and feeders to large markets of the corn belt for many years to come.

An increasing proportion, and eventually a large proportion, of the cattle matured in the corn belt, however, must be reared there; because, as explained in Circular 164, the quality of western cattle will be adversely affected by an increased proportion of

cattle of the dairy type, and at the same time the development of agriculture will facilitate the finishing of a larger proportion of feeding cattle on western farms. Certain sections of the corn belt, and some farms in all sections, are partially or wholly unsuited to grain growing, and these lands, in many instances, may be most profitably used for grazing purposes.

With the development of more intensive farming methods, the introduction of corn silage, alfalfa, and forage crops in general will tend to render both cattle raising and feeding more practicable and profitable. Also, regardless of the price of land or of grain, a considerable amount of roughage and aftermath remains to be either fed or wasted on every farm, and this factor will contribute largely toward maintaining beef production in the corn belt.

Eventually, manure will be regarded more highly by corn growers in the Middle West than it is now. Long continued cropping without adequate rotation and fertilization will ultimately compel such attention to manure as it now receives from cattle feeders, not only in Great Britain and Continental Europe, but also in certain parts of Virginia, Pennsylvania, and Ohio. Cattle feeding will be found to be one of the most convenient and satisfactory means of obtaining this valuable fertilizer. This factor is of sufficient importance to be treated at some length in a subsequent circular.

Over against what has been said in the foregoing paragraphs, it must also be clearly understood that a remunerative and reasonably stable market will be indispensable to the further development of the beef-cattle industry. Farming in general, and stock raising in particular, must henceforth be recognized as a capitalized business, the products of which must sell above the cost of production in order to render the enterprise profitable. Those upon whom the cattle feeder is dependent for his returns must consider the increasing cost of producing cattle under present and future conditions, and pay prices commensurate therewith. Unfortunately, the cattle feeder frequently has been compelled to accept very inadequate returns, and seldom has his profit been in full proportion to his outlay if all elements of cost be figured at their just value.

¹¹"The important fact connected with the cattle-raising industry is a marked shortage, the extent and far reaching effects

of which the public has by no means fully realized. The consuming public have complained of the high cost of meats. At times they have accused producers of securing too great profits from the business. There should be no mistake or misunderstanding. The present shortage is due primarily to the fact that farmers have found meat production, and primarily beef production, less profitable than other agricultural enterprises. Over-production and cheap meat, while possible, are extremely remote. An increased supply will come, not as a result of lower prices, but only as a result of higher prices. Consumers generally do not appreciate the fact that for a generation or more they have been able to buy meat products at a price which does not cover the cost of production under present-day conditions. It is obvious that the conditions which have brought about the increased cost of meat products will continue to operate even in greater force in the future than in the past.

"The public will ultimately come to understand that the producer must receive more rather than less for his product if an ample supply of meat is to be assured. In the past the price of cattle has been based, so far as it has been based upon anything, upon free or cheap range, cheap land and labor, and cheap corn. Even the cattle feeder of the corn belt has been guilty at times of relying for his profit upon sharp practice in buying feeding cattle for less than the cost of production when the producer, thru drouth or misfortune or possibly a lack of knowledge, has been forced to sell. Few, if any, of these conditions surround the industry today.

"All will readily agree that the producer is entitled to a modest profit in cattle production. No business which depends upon sharp practice, or upon depriving some necessary factor in the trade from its just proportion of the profits of the industry can long survive. It may well be asked, What is a modest profit? In the past, with rapidly changing conditions, it has been next to impossible to answer this question. Conditions are now likely to be more stable; that is, changes will be less frequent and less radical. A business-like beef production which extends over such a vast area of country where conditions surrounding it are so variable naturally presents a most difficult problem. One thing, however, is certain, and that is that if there is any con-

¹ Extract from an address by Professor Mumford before the Illinois State Farmers' Institute at Galesburg, February 18, 1914.

siderable increase in the production of beef cattle in the United States, it will come from the establishment of small herds on many farms rather than of large herds on extensive areas. This means, if it means anything, that the price will be fixed by the cost of producing cattle on improved farms, so that ultimately the producer will be by far the most important factor in fixing the price of beef. This does not mean that producers will be permitted to fix a price altogether out of proportion with the cost of production, but one entirely consistent with it.

"Obviously, beef will be most extensively produced where conditions favor its economical production. Can it be denied that any considerable area in this or in any other country offers more favorable conditions for beef production than the corn belt? If not, then the corn belt holds the key to the solution of the cattle situation. Conditions surrounding the industry and the cost of producing beef cattle in the corn belt, therefore, will likely be a large factor in determining the answer to the question of a price basis which will represent the cost of production and a modest profit. Fortunately, nowhere in the country has the cost of production been more carefully worked out or more accurately determined. The largest and most advantageous use of these data is one of the problems of the corn-belt cattlemen.

"No price basis can prevail which does not represent the greatest use of the best methods in cattle production. The cattle raiser who does not and will not avail himself of the most economical practice must be content to accept lessened or, in many instances, no profits. This means that ultimately he must change his ways or go out of business.

"The resumption of cattle raising on many of the smaller corn-belt farms will present problems of marketing which will need adjustment. The producer of less than a carload is now distinctly handicapped, and yet it has just been predicted that the bulk of the cattle in the future will be produced by men who have considerably less than a carload of cattle ready for market at any one time during the year. There will need to be developed, therefore, some method of marketing which gives to the smaller operator substantially the same advantages enjoyed by the larger operators."

