DEPARTMENT OF THE INTERIOR.

CENSUS OFFICE.

FRANCIS A. WALKER, Superintendent,
Appointed April 3, 1879; resigned December 7, 1881.

CHAS. W. SEATON, Superintendent,
Appointed November 8, 1881.

REPORT

ON THE

PRODUCTIONS OF AGRICULTURE

AS RETURNED AT THE

TENTH CENSUS

(JUNE 1, 1880.)

EMBRACING

GENERAL STATISTICS

AND MONOGRAPHS ON

CEREAL PRODUCTION. FLOUR MILLING. TOBACCO CULTURE.
MANUFACTURE AND MOVEMENT OF TOBACCO. MEAT PRODUCTION.

COMPILED AND PUBLISHED PURSUANT TO ACTS OF CONGRESS APPROVED MARCH 3, 1879, APRIL 20, 1880, AND AUGUST 7, 1882.

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DEPARTMENT OF THE INTERIOR,
CENSUS OFFICE,
Washington, D. C., October 1, 1883.

Hon. H. M. TELLER,
Secretary of the Interior.

SIR: I have the honor to transmit herewith the third volume of the final report upon the Tenth Census, viz: that comprising the General Statistics of Agriculture and special reports on (1) Cereal Production, by Professor William H. Brewer; (2) Flour-Milling, by Knight Neftel; (3) Culture and Curing of Tobacco, by J. B. Killebrew; (4) Manufacture and Movement of Tobacco, by J. R. Dodge; (5) Meat Production, Clarence W. Gordon, special agent in charge.

Especial acknowledgment is due to James H. Wardle, who, as chief of the division of agriculture, has from first to last conducted with marked ability the compilation of the general statistical tables.

I have the honor to be, very respectfully, your obedient servant,

C. W. SEATON,
Superintendent of Census.

REPORT

UPON THE

STATISTICS OF AGRICULTURE;

COMPILED FROM RETURNS RECEIVED AT THE

TENTH CENSUS.

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THE STATISTICS OF AGRICULTURE.

The statistics of agriculture, in a census of the United States, are obtained through the personal visitation, by the enumerators of population, of each and every farm, in succession, within their respective districts.

The schedule upon which the required information is obtained is distinctively a farm-schedule, just as the returns of population are made upon a distinctively family-schedule; and the statistics thus obtained do not embrace any operations connected with the soil which are not carried on through the occupation and cultivation of a farm in the usual sense of that term. The operations thus excluded relate mainly (*a*) to the production of meat, hides, and wool, through the grazing of cattle and sheep over extensive ranges of public or private lands, generally the former, upon the extreme frontier of settlement. Reference will hereafter be made to the measures taken at the present census to supply the deficiencies of the regular enumeration in the foregoing respects.

A canvass of the agricultural interests of a country through a farm-to-farm visitation has certain advantages and likewise certain disadvantages in comparison with a canvass of those interests conducted within small districts by selected agents who are not confined to the use of a farm-schedule, but who, after making the inquiries and pursuing the observations necessary to satisfy their own minds, report for their respective districts in gross.

Upon the whole, the advantages of the former method of enumeration greatly preponderate. It is true that by this method each farmer, whether intelligent or ignorant, is in turn made the census reporter; but at the same time the farmer has the benefit of the positive and negative suggestions of the official enumerator, who may generally be relied upon to check gross errors, whether of intention or of inadvertence. On the other hand, each farmer knows the main facts relating to his own land and the operations upon it far better than they can be conjectured in a general way by even the most accomplished agricultural statistician; and if the farmers of any region feel no indisposition to tell the truth, the aggregation of their individual statements will yield a result far more closely approaching the facts than any man's estimate. And in general it may be said that farmers entertain no objection to a full disclosure of the information called for by the census schedules, except, perhaps, in some cases, as to the value of farms, of live stock, of farming implements and machinery, and the total value of the farm productions of the year. As to crops, acreage, etc., no appreciable disadvantage is experienced in gathering the agricultural statistics of the census from any unwillingness to make answer on those points, or any disposition to misrepresent the truth. Against this must be set the consideration that a person reporting at large for any considerable district is almost always subject to a strong temptation, consciously or unconsciously, to exaggerate the facts of production, not to speak of the simple unfitness of most men, even most men of intelligence, to make statistical estimates or computations extending over any considerable field, even where no predisposition exists adverse to an impartial judgment.

SCOPE OF THE AGRICULTURAL INQUIRY OF 1880, AS COMPARED WITH THAT OF 1870.

By the seventeenth section of the census law [approved March 3, 1879] it was provided that to the agricultural schedule of 1850, 1860, and 1870 the Superintendent of Census might, with the approval of the Secretary of the Interior, add inquiries relating to the acreage of the several crops reported, and might, with a like approval, drop from the schedule such of the minor crops as it might be deemed expedient to omit from the enumeration.

a The production of tar and turpentine from the pine forests of the south, the stripping off of bark for tanning purposes, the lumbering industry, the gathering of sumac and of wild nuts and fruits, so far as these operations, though in a high sense pertaining to agriculture, are carried on by persons who are not professionally farmers, fall outside the scope of the following tables.

Under this provision of the law the agricultural schedule was wholly recast and greatly enlarged. The subdivision of interrogatories previously in use, such as those relating to farm lands, and the addition of new interrogatories relating to the acreage of the several crops, involved a great extension of the agricultural schedule. The statistical detail collected in the census of 1880 is more than double that of 1870, and the labor of compilation has been even more than proportionately increased.

The value of the new classes of information, now obtained for the first time, is believed to be not less than that of those heretofore obtained. Indeed, were an intelligent statistician to be asked to make his choice between the statistics of the acreage of the several crops and the statistics of their yield for a given year, he would prefer the former, since the acreage tells the real story as to the extension of a given crop, while the yield in any one year is largely influenced by accident or by conditions peculiar to that year, which might not be found repeated in the year or years succeeding. It might, for instance, easily happen that, although the cultivation of a certain crop should be steadily on the increase through a term of years, the yield in one year of that term would be 20 or 30 per cent. less than in the year preceding.

It is not, however, desirable that the statistician should be compelled to make his choice between these two classes of facts. Each is important to any right view of the agricultural interests of the country. The two in conjunction exhibit those interests in their true dimensions and proportions.

THE LIMITATIONS OF AGRICULTURAL STATISTICS.

In a canvass of the agricultural interests of any section, through a farm-to-farm visitation, it is inevitable that the returns made should, as regards minor crops, be often inadequate, and sometimes inadequate in a considerable degree, to the actual production.

When a crop is of small importance anywhere, or is rarely cultivated, the enumerator will naturally and almost inevitably fail at some houses to put the question relating to it. The farmer, on the other hand, will not infrequently forget, on his part, to mention it in his volunteered statements.

Thus, for example, there is no danger that an enumerator in South Carolina or Mississippi, or any other of the great cotton-planting states, will fail to seek and obtain the acreage and yield of cotton for each and every plantation; but in a state like Virginia or Missouri, where, outside of a few counties, cotton is only raised here and there, and that in comparatively small amounts, there is always the possibility that, in taking account of the great staple crops, the enumerator may omit to make a note in every case where a few acres are planted in cotton. The whole range of the effect of this cause might not exceed a few thousand bales throughout the United States, perhaps not a half or a quarter of one per cent. of the total production; yet the omissions would, from the very nature of the case, occur just at those points where they would attract most attention and be most readily proved against the census. Thus, in a county raising only 20 bales of cotton, there would perhaps be an even chance that this crop would escape enumeration. Such an omission would naturally be detected through the publication of the census figures and their extensive circulation through that county, and it would be easy to establish the fact that the census was in error in this instance; yet any inference therefrom which should be unfavorable to the substantial accuracy of the enumeration of that crop throughout the regions where it is largely cultivated would be unjustifiable. Wherever a crop fringes off, so to speak, there begins the liability to the omission of small quantities.

We have already indicated the possible cause of another class of errors in the census statistics of agriculture, viz, the indisposition of some farmers to state fully the value of their farms, implements, stock, etc. Of this we shall speak hereafter, in connection with the figures relating to the total value of farm products. There is no reason whatever known to this office for supposing that this cause has affected in the smallest appreciable degree the validity of the statistics relating to the acreage and amount of the several crops.

STATISTICS OF THE NUMBER OF FARMS.

It is, of course, imperative, in a census of the agricultural interests of any region, to impose some definition, which will necessarily be arbitrary, upon the word farm. If every bit of land owned by any one were enumerated, however small, and whether cultivated or not, the figures would lose all significance whatsoever. In reaching out to cover the potato patch, tilled at odd hours by the factory hand, or the vegetable garden of the village shopkeeper, lawyer, or blacksmith, the census would lose far more than it gained.

The necessity for an official delimitation of this term being accepted, the definition adopted at the census of 1870 was as follows:

Farms, for the purposes of the agricultural schedule, include all considerable nurseries, orchards, and market-gardens, which are owned by separate parties, which are cultivated for pecuniary profit, and employ as much as the labor of one able-bodied workman during the year. Mere cabbage and potato patches, family vegetable-gardens, and ornamental lawns, not constituting a portion of a farm for general agricultural purposes, will be excluded. No farm will be reported of less than three acres, *unless* five hundred dollars' worth of produce has actually been sold off from it during the year. The latter proviso will allow the inclusion of many market-gardens in the neighborhood of large cities, where, although the area is small, a high state of cultivation is maintained and considerable values are produced. A farm is what is owned or leased by one man and cultivated under his care. A distant wood-lot or sheep-pasture, even if in another subdivision, is to be treated as a part of the farm; but wherever there is a resident overseer, or a manager, there a farm is to be reported.

Similar instructions were issued to the enumerators of 1880.

The number of farms reported in 1880, in each state and territory, was as follows, in comparison with the figures of 1870:

States and Territories.	TOTAL NUMBER OF FARMS.		Percentage of increase.
	1880.	1870.	
The United States	4,008,907	2,659,985	50.7
North Atlantic group:			
Maine	64,369	59,804	7.5
New Hampshire	32,181	29,642	8.6
Vermont	35,522	33,827	5.0
Massachusetts	38,406	26,500	44.9
Rhode Island	6,216	5,368	15.8
Connecticut	30,598	25,508	20.0
New York	241,058	216,253	11.5
New Jersey	34,307	30,652	11.9
Pennsylvania	218,542	174,041	22.7
The group	690,130	601,595	15.7
South Atlantic group:			
Delaware	8,749	7,615	14.9
Maryland	40,517	27,000	50.1
District of Columbia	435	209	108.1
Virginia	118,517	73,849	60.5
West Virginia	62,674	39,778	57.6
North Carolina	157,609	93,565	68.4
South Carolina	93,804	51,889	80.9
Georgia	138,626	69,956	98.2
Florida	23,438	10,241	128.9
The group	644,429	374,102	72.3
Northern Central group:			
Ohio	247,189	195,959	26.1
Indiana	194,013	161,269	20.3
Illinois	255,741	202,803	26.1
Michigan	154,008	98,786	55.9
Wisconsin	134,322	102,904	30.5
Minnesota	92,386	46,500	98.7

States and Territories.	TOTAL NUMBER OF FARMS.		Percentage of increase.
	1880.	1870.	
Northern Central group—Continued.			
Iowa	185,351	116,202	59.4
Missouri	215,575	148,328	45.3
Dakota	17,435	1,720	913.7
Nebraska	63,387	12,301	415.3
Kansas	138,561	38,202	262.7
The group	1,097,968	1,125,078	50.9
Southern Central group:			
Kentucky	166,453	118,422	40.6
Tennessee	165,650	118,141	40.2
Alabama	135,804	67,382	101.6
Mississippi	101,772	68,023	49.6
Louisiana	48,292	28,481	69.6
Texas	174,184	61,125	185.0
Arkansas	94,433	40,424	91.1
The group	886,648	510,998	73.5
Western group:			
Montana	1,519	851	78.5
Wyoming	457	175	161.1
Colorado	4,500	1,738	159.3
New Mexico	5,053	4,480	12.8
Arizona	707	172	345.9
Utah	9,452	4,908	92.6
Nevada	1,404	1,036	35.5
Idaho	1,885	414	355.3
Washington	6,529	3,127	108.8
Oregon	16,217	7,587	113.7
California	35,934	23,724	51.5
The group	83,723	48,212	73.7

Two remarks require to be made regarding the foregoing table:

First. The number of farms reported in the territories is inadequate to represent the agricultural operations of those regions. This is owing to the fact that these operations are carried on, not generally upon farms, in the ordinary or in any proper sense of that term, but over vast ranges, consisting mainly of public lands, under what is known as the ranch system, the products being chiefly meat, hides, and wool. Allusion has already been made to the special canvass of this industry conducted at the Tenth Census. Some of the territories in question have almost no farms in the usual sense of that word. The arable land is, in some of them, confined strictly within the limits of artificial irrigation, and neither the engineering skill nor the moneyed capital required for extensive irrigation has as yet been drawn into the service of agriculture against the greater attractions of the mining or the grazing industry.

The extensive pursuit of sheep and cattle raising under the ranch system in certain portions of California, Oregon, Nevada, Colorado, Kansas, Nebraska, and Texas also requires a somewhat larger view to be taken of the agricultural capabilities and the agricultural operations of these states than would be implied in the figures of the number of farms alone.

Secondly. There appears little reason to doubt that the return of the number of farms in Massachusetts in 1870 was inadequate. That return became the subject of controversy at the time; but the Census Office was then disposed to hold that the marked falling off in the number of farms in this state might be due to certain general causes in operation during the preceding decade. The facts revealed by the census of 1880 seem, however, to establish conclusively that the return of 1870 was defective, probably, as was alleged in the controversy referred to, through a misunderstanding by the assistant marshals of the instructions issued by the marshal in charge of the enumeration in that state. The following are the numbers of farms returned in 1860, 1870, and 1880, respectively, for Massachusetts: 35,601, 26,500, and 38,406. The figures relating to no other state, in these tables, require any similar explanation, so far as this office is aware.

The vast increase in the number of farms in the United States, as a whole, between 1870 and 1880 is seen at a glance. Broadly speaking, this is due, not so much to the extension of agricultural settlement over new regions as to the subdivision of the farms of the older states, particularly at the south, where the great plantations of twenty and ten years ago have been steadily undergoing partition, in consequence of the social and industrial changes in progress since the civil war.

Of the total gain of 1,348,922 farms between 1870 and 1880, 712,998 have been added in the former slave states. Of these 502,308 were added in the nine large cotton-planting states of Alabama, Arkansas, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Texas.

In part, this increase of farms has been by the extension of the farming area to cover lands not heretofore embraced in the report; in part, it has been by the subdivision of farms previously existing. These two causes have operated with very different force in the different sections of the country. Thus, in the south Atlantic group there was between 1870 and 1880 an increase of but 12.4 per cent. in the aggregate acreage of farms, while the increase in the number of farms reached 72.3 per cent. On the other hand, the western group of states and territories, with almost exactly the same per cent. of increase in the number of farms, shows an increase in aggregate acreage of 61.5 per cent.

The following table shows the increase per cent. in the number of farms between 1870 and 1880 in comparison with the increase per cent. in the aggregate acreage:

States and Territories.	Per cent. of increase in number of farms.	Per cent. of increase in total farm acreage.	States and Territories.	Per cent. of increase in number of farms.	Per cent. of increase in total farm acreage.
The United States	50.7	31.5	Northern Central group—Continued.		
North Atlantic group:			Minnesota	98.7	106.7
Maine	7.5	12.2	Iowa	50.4	59.3
New Hampshire	8.0	3.2	Missouri	45.3	28.4
Vermont	5.0	7.8	Dakota	913.7	1,156.9
Massachusetts	44.9	23.0	Nebraska	415.3	379.6
Rhode Island	15.8	2.5	Kansas	262.7	278.6
Connecticut	20.0	3.8	The group	50.9	48.7
New York	11.5	7.2	Southern Central group:		
New Jersey	11.9	*2.0	Kentucky	40.6	15.2
Pennsylvania	22.7	10.0	Tennessee	40.2	5.5
The group	15.7	8.4	Alabama	101.6	26.0
South Atlantic group:			Mississippi	49.6	20.8
Delaware	14.9	3.6	Louisiana	69.6	17.8
Maryland	50.1	13.5	Texas	185.0	97.3
District of Columbia	108.1	55.4	Arkansas	91.1	58.8
Virginia	60.5	9.3	The group	73.5	34.4
West Virginia	57.6	19.5	Western group:		
North Carolina	68.4	12.7	Montana	78.5	190.7
South Carolina	80.9	11.2	Wyoming	161.1	2,760.5
Georgia	98.2	10.1	Colorado	159.3	261.8
Florida	128.9	38.9	New Mexico	12.8	*24.3
The group	72.3	12.4	Arizona	345.9	521.7
Northern Central group:			Utah	92.6	241.8
Ohio	26.1	13.0	Nevada	35.5	154.6
Indiana	20.3	12.7	Idaho	355.3	324.9
Illinois	26.1	22.4	Washington	108.8	117.1
Michigan	55.9	37.8	Oregon	113.7	70.4
Wisconsin	30.5	31.1	California	51.5	45.2
			The group	78.7	61.5

*Decrease.

LAND IN FARMS.

It will be understood that the total land in farms by no means equals, even in the most uniformly settled agricultural regions, the total area of the county or of the state. Thus in Indiana, a state exceptionally fertile over its entire surface, we have but about twenty and one-half million acres reported in farms out of about twenty-three millions of acres embraced within the limits of the state. In Illinois, another prairie state, the proportion is approximately thirty-one and one-half to thirty five and three-fourths.

This difference is made up of many items. There are the sites of buildings and the grounds connected with them, whether isolated or in villages or cities; there is the space covered by public highways, canals, and railroads; there are the tracts of land owned by non-residents or by persons who are not farmers. In this latter class of lands is often included a vast extent of pasturage and woodlands, especially the latter. In some states the great body of the forests is held by speculators or lumber-mill operators, who are not farmers in any sense of the term. In some states the difference between the total surface and the total area in farms is chiefly accounted for by the existence of swamps and overflowed lands, of mountains and rugged hills or other lands absolutely waste, of barren tracts along the coast, of tidal marshes, etc. In the so-called "land states", that is, states which contain portions of the public domain, the difference referred to is still further accounted for by the existence of lands not yet appropriated under the various acts of Congress, perhaps not yet surveyed and opened to settlement, and also by the maintenance of Indian and military reservations.

The total amount of land, improved and unimproved, reported as embraced in farms in 1880 was 536,081,835 acres, against 407,735,041 acres in 1870.

The following table shows the extent of farm lands in each state and territory, set against the total estimated surface thereof, with the proportion existing in each case:

States and Territories.	Land in farms.	Total land surface.	Proportion of land in farms to total land surface.	States and Territories.	Land in farms.	Total land surface.	Proportion of land in farms to total land surface.
	Acres.	*Acres.*			*Acres.*	*Acres.*	
The United States*	536, 081, 835	1, 856, 108, 800	0. 289	Mississippi	15, 855, 462	29, 057, 600	0. 535
				Missouri	27, 870, 276	43, 990, 400	0. 634
Alabama	18, 855, 334	32, 985, 600	0. 572	Montana	405, 683	92, 998, 400	0. 004
Arizona	135, 578	72, 208, 800	0. 002	Nebraska	9, 044, 826	48, 758, 400	0. 204
Arkansas	12, 001, 547	33, 948, 800	0. 355	Nevada	530, 862	70, 233, 600	0. 008
California	16, 503, 742	99, 827, 200	0. 166	New Hampshire	3, 721, 173	5, 763, 200	0. 646
Colorado	1, 105, 379	66, 392, 800	0. 018	New Jersey	2, 929, 773	4, 771, 200	0. 614
Connecticut	2, 453, 541	3, 100, 800	0. 791	New Mexico	631, 131	78, 374, 400	0. 008
Dakota	3, 800, 650	94, 528, 000	0. 040	New York	23, 780, 754	30, 476, 800	0. 780
Delaware	1, 000, 245	1, 254, 400	0. 869	North Carolina	22, 393, 558	31, 001, 200	0. 719
District of Columbia	18, 146	38, 400	0. 473	Ohio	24, 529, 226	26, 086, 400	0. 940
Florida	3, 207, 324	34, 713, 600	0. 095	Oregon	4, 214, 712	60, 518, 400	0. 070
Georgia	26, 043, 282	37, 747, 200	0. 690	Pennsylvania	19, 701, 341	28, 700, 400	0. 687
Idaho	327, 798	53, 945, 600	0. 006	Rhode Island	514, 813	694, 400	0. 741
Illinois	31, 673, 645	35, 840, 000	0. 884	South Carolina	13, 457, 613	19, 308, 800	0. 697
Indiana	20, 420, 983	22, 982, 400	0. 889	Tennessee	20, 666, 915	26, 720, 000	0. 773
Iowa	24, 752, 700	35, 504, 000	0. 697	Texas	36, 292, 219	167, 885, 600	0. 216
Kansas	21, 417, 468	52, 288, 000	0. 410	Utah	655, 524	52, 601, 600	0. 012
Kentucky	21, 495, 240	25, 600, 000	0. 840	Vermont	4, 882, 588	5, 846, 400	0. 835
Louisiana	8, 273, 506	29, 068, 800	0. 285	Virginia	19, 835, 785	25, 680, 000	0. 772
Maine	6, 552, 578	19, 132, 800	0. 342	Washington	1, 409, 421	42, 803, 200	0. 033
Maryland	5, 119, 831	6, 310, 400	0. 811	West Virginia	10, 193, 779	15, 772, 800	0. 646
Massachusetts	3, 359, 079	5, 145, 600	0. 653	Wisconsin	15, 353, 118	34, 848, 000	0. 441
Michigan	13, 807, 240	36, 755, 200	0. 376	Wyoming	124, 433	62, 448, 000	0. 002
Minnesota	13, 403, 019	50, 091, 200	0. 264				

* Exclusive of farm lands in the Indian territory, the amount of which is not known.

The following table exhibits the division of the lands in farms reported in 1860, 1870, and 1880, as improved and unimproved, with the percentage of unimproved land in farms to total land in farms in each state and territory:

States and Territories.	IMPROVED LAND IN FARMS.			UNIMPROVED LAND IN FARMS.			PERCENTAGE OF UNIMPROVED LAND IN FARMS TO TOTAL LAND IN FARMS.		
	1880.	1870.	1860.	1880.	1870.	1860.	1880.	1870.	1860.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*			
The United States	284,771,042	188,921,099	163,110,720	251,310,793	218,813,942	244,101,818	46.9	53.7	59.9
Alabama	6,375,706	5,062,204	6,385,724	12,479,028	9,898,974	12,718,821	66.2	66.2	66.6
Arizona	56,071	14,585	.....	79,502	7,222	.....	58.6	33.1	.....
Arkansas	3,595,603	1,859,821	1,983,313	8,465,944	5,737,475	7,590,393	70.2	75.5	79.3
California	10,669,698	6,218,133	2,408,034	5,924,044	5,208,972	6,262,000	35.7	45.6	71.7
Colorado	616,169	95,594	.....	549,204	224,752	.....	47.1	70.2	.....
Connecticut	1,642,188	1,646,752	1,830,807	811,353	717,664	673,457	33.1	30.4	26.9
Dakota	1,150,413	42,045	2,115	2,650,243	259,731	24,333	69.7	85.9	92.0
Delaware	746,958	698,115	687,005	343,287	354,207	367,230	31.5	33.7	36.6
District of Columbia	12,632	8,266	17,474	5,514	3,411	16,789	30.4	29.2	49.0
Florida	947,640	736,172	654,213	2,349,634	1,637,369	2,266,015	71.3	69.0	77.6
Georgia	8,204,720	6,831,856	8,062,758	17,838,562	16,816,085	18,587,732	68.5	71.1	69.7
Idaho	197,407	26,603	.....	130,391	50,536	.....	39.8	65.5	.....
Illinois	26,115,154	19,329,052	13,096,374	5,558,491	6,552,909	7,815,615	17.5	25.3	32.6
Indiana	13,933,738	10,104,279	8,242,183	6,487,245	8,015,369	8,146,109	31.8	44.2	49.7
Iowa	19,866,541	9,396,467	3,792,792	4,886,159	6,145,326	6,277,115	19.7	39.5	62.2
Kansas	19,736,566	1,971,003	405,468	10,677,902	3,685,876	1,372,932	49.9	65.2	77.2
Kentucky	10,781,683	8,103,850	7,044,208	10,706,557	10,556,256	11,519,053	50.1	56.6	60.1
Louisiana	2,739,972	2,045,040	2,707,108	5,533,534	4,980,177	6,591,468	66.9	70.9	70.9
Maine	3,484,008	2,917,703	2,704,133	3,067,670	2,920,265	3,023,538	46.8	50.0	52.8
Maryland	3,342,700	2,914,007	3,002,207	1,777,131	1,598,572	1,833,804	34.7	35.4	37.9
Massachusetts	2,128,311	1,730,221	2,155,512	1,230,768	994,062	1,183,212	36.6	36.4	35.4
Michigan	8,296,802	5,096,030	3,476,206	5,510,378	4,922,203	3,554,538	39.9	49.1	50.5
Minnesota	7,246,693	2,322,102	556,250	6,156,326	4,161,726	2,155,718	45.9	64.2	79.5
Mississippi	5,216,937	4,209,146	5,065,755	10,638,525	8,911,967	10,773,929	67.1	67.9	68.0
Missouri	18,745,031	9,130,615	6,240,871	11,134,245	12,576,605	13,737,939	39.9	57.9	68.7
Montana	262,611	84,674	.....	143,072	54,803	.....	35.3	39.3	.....
Nebraska	5,504,702	647,031	118,789	4,440,124	1,426,750	512,425	44.6	68.8	81.2
Nevada	344,423	92,644	14,152	186,439	115,866	41,986	35.1	55.5	74.8
New Hampshire	2,308,112	2,334,487	2,367,034	1,413,061	1,271,507	1,377,591	38.0	35.3	36.8
New Jersey	2,096,207	1,976,474	1,944,441	833,476	1,013,037	1,039,084	28.4	33.9	34.9
New Mexico	237,302	143,007	140,274	393,739	690,542	1,265,635	62.4	82.8	89.4
New York	17,717,362	15,027,206	14,358,403	6,062,892	6,563,004	6,616,555	25.5	29.6	31.5
North Carolina	6,481,191	5,258,742	6,517,284	15,882,967	14,576,068	17,245,685	71.0	73.5	72.6
Ohio	18,081,091	14,469,133	12,625,394	6,448,195	7,243,287	7,846,747	26.3	33.4	38.3
Oregon	2,198,645	1,116,200	896,414	2,016,067	1,272,962	1,164,125	47.8	53.3	56.5
Pennsylvania	13,423,007	11,515,965	10,463,296	6,368,334	6,478,235	6,548,844	32.2	36.0	38.5
Rhode Island	298,486	289,030	335,128	216,327	213,278	186,096	42.0	42.5	35.7
South Carolina	4,132,050	3,010,539	4,572,060	9,325,563	9,094,741	11,623,359	69.3	75.1	71.8
Tennessee	8,496,556	6,843,278	6,795,337	12,170,359	12,737,936	13,873,828	58.9	65.1	67.1
Texas	12,650,314	2,964,330	2,650,781	23,641,905	15,431,687	22,693,247	65.1	83.9	89.5
Utah	416,105	118,755	77,219	239,419	29,606	12,692	36.5	20.0	14.1
Vermont	3,286,401	3,073,257	2,823,157	1,596,127	1,455,547	1,451,257	32.7	32.1	34.0
Virginia	8,510,113	8,165,040	11,437,821	11,325,072	9,980,871	19,079,215	57.1	55.0	63.2
Washington	484,346	102,016	81,800	925,075	457,123	284,287	65.6	70.4	77.6
West Virginia	3,792,327	2,586,254	.....	6,401,452	5,948,140	.....	62.8	69.7	.....
Wisconsin	9,162,528	5,899,343	3,746,167	6,199,590	5,815,978	4,147,420	40.3	50.5	52.5
Wyoming	83,122	338	.....	41,311	4,003	.....	33.2	92.2	.....

In 1860 lands in farms were returned as improved and unimproved only. In 1870 the unimproved land was divided into woodland and other unimproved. In preparation for the census of 1880 a further subdivision of lands was provided for, the effect of which has been not only to yield additional detail of value, but, it is believed, to secure greater exactness in carrying out the traditional division between improved and unimproved lands.

The following is the summary for the United States:

LAND IN FARMS.

	Acres.	
Improved:		
Tilled, including fallow and grass in rotation (whether pasture or meadow)	223,067,144	
Permanent meadows, permanent pastures, orchards, and vineyards	61,703,898	
Total improved		284,771,042
Unimproved:		
Woodland and forest	190,255,744	
Other unimproved, including "old fields" not growing wood	61,055,049	
Total unimproved		251,310,793
Total land in farms		536,081,835

The detailed tables of this volume exhibit these classes by states and territories and by counties.

THE TENURE OF FARMS.

Enough has been popularly known regarding the tenure of land in the United States to enable one to say with assurance that, in general, land was with us very largely cultivated by its owners. No statistical information, however, has ever before been collected, within the knowledge of this office, which furnished the means of even approximating, throughout any considerable section of the country, the proportion between the lands cultivated by their owners and the lands cultivated by occupiers who were not owners.

At the census of 1880 an inquiry into the tenure of farms was inserted in the agricultural schedule, with results of the highest economical and sociological importance.

For the United States, as a whole, it appears that of the 4,008,907 farms returned, 2,984,306, or 74 per cent., were cultivated by their owners; 322,357, or 8 per cent., were cultivated by tenants, on the basis of a fixed money rental; 702,244, or 18 per cent., were cultivated by tenants paying a share of the product as rent.

The following table shows for each state and territory the proportions of the several classes of farms according to tenure:

[Basis of computation, 10,000.]

States and Territories.	Proportion of farms cultivated by owners.	Proportion of farms rented for fixed money rental.	Proportion of farms rented for share of product.
The United States	7,444	804	1,752
North Atlantic group:			
Maine	9,568	253	179
New Hampshire	9,188	384	428
Vermont	8,660	609	731
Massachusetts	9,182	597	221
Rhode Island	8,012	1,591	397
Connecticut	8,978	628	394
New York	8,346	752	902
New Jersey	7,540	1,052	1,408
Pennsylvania	7,878	798	1,324
The group	8,401	704	895
South Atlantic group:			
Delaware	5,762	584	3,654
Maryland	6,905	957	2,138
District of Columbia	6,184	3,448	368
Virginia	7,048	1,130	1,822
West Virginia	8,085	685	1,230
North Carolina	6,055	548	2,797
South Carolina	4,969	2,341	2,690
Georgia	5,515	1,339	3,146
Florida	6,911	1,514	1,575
The group	6,388	1,163	2,449
Northern Central group:			
Ohio	8,073	600	1,327
Indiana	7,627	442	1,931
Illinois	6,862	806	2,332
Michigan	8,999	326	675
Wisconsin	9,095	277	628
Minnesota	9,085	135	780
Northern Central group—Continued.			
Iowa	7,617	454	1,929
Missouri	7,269	921	1,810
Dakota	9,611	41	348
Nebraska	8,198	307	1,495
Kansas	8,985	320	1,315
The group	7,952	523	1,525
Southern Central group:			
Kentucky	7,355	1,011	1,634
Tennessee	6,547	1,163	2,290
Alabama	5,315	1,685	3,000
Mississippi	5,022	1,714	2,664
Louisiana	6,478	1,381	2,141
Texas	6,241	694	3,065
Arkansas	6,909	1,050	2,041
The group	6,379	1,185	2,436
Western group:			
Montana	9,473	112	415
Wyoming	9,716	109	175
Colorado	8,704	366	930
New Mexico	9,193	43	764
Arizona	8,688	548	769
Utah	9,542	63	395
Nevada	9,031	449	520
Idaho	9,528	170	302
Washington	9,279	320	401
Oregon	8,595	457	948
California	8,017	893	1,090
The group	8,601	545	854

Very striking contrasts will be observed as existing between the several geographical sections of the country in this matter of the tenure of farms.

The detailed tables of this volume carry the analysis of the tenure of farms throughout the several classes according to size.

CLASSIFICATION OF FARMS ACCORDING TO SIZE.

The following table shows for each of the censuses, 1860–1880, the total number of farms; the total land in farms and the average number of acres of land in farms; the total improved land and the average number of acres of improved land in farms; the total number of acres of unimproved land and the average number of acres of unimproved land in farms, taking the United States as a whole:

	1880.	1870.	1860.
Total number of farms	4,008,907	2,659,985	2,044,077
Total land in farms, acres	536,081,835	407,735,041	407,212,538
Average number of acres in farms	134	153	199
Total improved land in farms, acres	284,771,042	188,021,090	163,110,720
Average number of acres of improved land in farms	71	71	80
Total unimproved land in farms, acres	251,310,793	218,813,942	244,101,818
Average number of acres of unimproved land in farms	62.7	82	119

The following table shows the additional detail as to lands in farms obtained for the first time in 1880 on the average of the farms of that year:

Total number of farms in 1880	4,008,907
Average number of acres of tilled land, including fallow and grass in rotation (whether pasture or meadow)	56.0
Average number of acres of permanent meadows, permanent pastures, orchards, and vineyards	15.0
Average number of acres (in farms) of woodland and forest	47.5
Average number of acres of other unimproved land, including "old fields" not growing wood	15.2

In distributing the farms returned among various arbitrary classes according to size (3 to 10 acres, 10 to 20 acres, etc.) in the compilation of the censuses of 1860 and 1870 farms were treated according to the amount of improved land only contained therein. Something might be said in favor of this basis of classification; but in the present compilation the total amount of land in farms, whether improved or unimproved, has been adopted as the more logical and natural basis. It will therefore be understood, that while all the foregoing comparisons between farms in 1860, 1870, and 1880 can be made without any qualification, comparison cannot be instituted between the tables now referred to and the tables of the size of farms in 1870 or in 1860, without allowance being made for the fact that the figures for 1880 embrace the total land in farms, (*a*) while those for former years embrace only the improved land. The proportion existing in any state between unimproved land and total land in farms has been given on a preceding page.

The following table exhibits the number of farms of each specified class, with the further distinction of the kind of tenure under which they were cultivated, at the census of 1880:

	Cultivated by owners.	Rented for fixed money rental.	Rented for share of product.
Under 3 acres	2,601	875	876
3 and under 10 acres	85,456	22,904	20,529
10 and under 20 acres	122,411	41,522	90,816
20 and under 50 acres	460,486	97,390	223,089
50 and under 100 acres	804,522	69,663	158,625
100 and under 500 acres	1,416,618	84,645	194,720
500 and under 1,000 acres	66,447	3,956	5,569
1,000 acres and over	25,765	1,393	1,420

a The severe illness of the Superintendent of Census while the agricultural tables of the Compendium of the Tenth Census were passing through the press prevented this note, with others, from being prefixed to those tables.

THE STATISTICS OF LIVE STOCK.

The fact that the agricultural schedule is distinctively a farm schedule has peculiar importance in connection with the statistics of live stock. The animals reported in the census are those which are found on farms only. Two great classes are thus excluded, those which are kept beyond the frontier of close and continuous settlement, under the ranch system, grazing over extensive ranges, as in the territories and in portions of the states of California, Oregon, Nevada, Colorado, Nebraska, Kansas, and Texas; and secondly, those which are found in the settled regions, but are owned by persons not occupying or cultivating farms.

As regards the first class, an effort was made at the Tenth Census to ascertain the number of animals thus omitted from the enumeration. Mr. Clarence Gordon was appointed special agent of the Census Office to canvass the grazing states and territories in this interest. Several assistant special agents were appointed to work under Mr. Gordon's direction, and extensive field-work was done in every one of the states and territories where the ranch system prevails to any appreciable extent. The investigations of Mr. Gordon and his assistants were not confined to the determination of the number of animals so owned, but extended to all the details of meat production and export in those regions. His report will be found, at length, in the present volume. Acknowledgment of valuable assistance in editing this report is due to Professor W. H. Brewer, of Yale College, formerly botanist of the California survey, an eminent authority in the principles of stock breeding, and, indeed, in all departments of agricultural economy.

It should be said that large numbers of cattle and sheep, which perhaps belong logically with the ranch animals, are at times brought within the farm area, and thus become subject to enumeration by the regular officers of the census. Especially is this so in Kansas and Nebraska, in which states no inconsiderable proportion of the live stock might be returned indifferently under the one head or the other. Under these circumstances it has been the rule of the Census Office, in conducting its compilations for the purpose of the present publication, to accept the return of the regular enumerators, deducting a corresponding number from the returns of Mr. Gordon and his assistants where duplication existed. In this way the extent of the ranch industry of meat production appears to be considerably reduced.

As regards the animals found in the settled regions, owned by persons not occupying or cultivating farms, no attempt has been made to frame an estimate of numbers. Any one who is so disposed can undertake such an estimate equally well with the Census Office in the absence of statistical data. In general, it may be said that the number of sheep and working oxen thus omitted from enumeration is small, so small as to be insignificant. On the other hand, the number of milch cows is not inconsiderable; the number of horses employed in trade and transportation, or owned by men of leisure, professional men, or livery-stable keepers, who are not also farmers, is large, while the number of swine not on farms is much larger still.

THE STATISTICS OF WOOL.

It follows, from what has been said, that the returns of the wool crop made by the regular enumerators of the census are deficient to the full extent of the clip from the ranch sheep. There is also a large source of loss, to the extent of the wool on pelts, where sheep are sold off farms to be slaughtered. The farmer cannot properly include this wool in his returns, and the quantity thus added to the wool supply of the year can only be obtained by estimate based on the number of sheep slaughtered at the various butchering and meat-packing establishments which report their operations on the manufacturing schedule.

In view of the great intrinsic difficulties of this subject, the whole matter of wool production was placed in the hands of Mr. J. R. Dodge, whose qualifications for such a work are too well known to need mention here. Since that gentleman's reappointment to the post of statistician of the Department of Agriculture, so long and honorably held by him under past administrations, he has, with the courteous assent of the present Commissioner of Agriculture, continued his investigations of this subject for the benefit of the Census Office, and his report on the production of wool in the United States, with a full description of the conditions under which that industry is pursued in the various sections of the country, will be found among the most valuable publications of the Tenth Census.

The gross result regarding the wool crop of the United States may be stated as follows:

	Pounds.
Wool, spring clip of 1880, of sheep reported on farms by regular enumerators	155,681,751
Fall clip of sheep on farms in California and Texas (estimated)	13,000,000
Wool of other (ranch) sheep (estimated)	34,000,000
Pulled wool and fleece of slaughtered sheep (estimated)	38,000,000
Total	240,681,751

STATISTICS OF DAIRY PRODUCTS.

The returns of the dairy products of the country are but little affected by the existence of the ranch system of meat production in the grazing states and territories, inasmuch as the heifers and cows owned under that system are seldom, if ever, resorted to for milk. There is, however, a complication in the statistical returns of these products introduced by the existence of a great and growing system of cheese and butter factories and creameries throughout many of the northern states. The products of these factories, both logically and by a practical necessity, are reported on the manufacturing schedule. Hence the real extent of the dairy industry of the United States can only be reached through combining the statistics of agriculture with those of manufactures.

The following are the facts reported on the agricultural schedule:

Butter made on farms	pounds..	777,250,287
Cheese made on farms	pounds..	27,272,489
Milk sold or sent to butter and cheese factories	gallons..	530,129,755

The following are the facts reported on the manufacturing schedule:

	Pounds.
Cheese made in cheese factories	171,750,495
Cheese made in combined butter and skim-milk factories	44,134,866
Total cheese	215,885,361
Butter made in butter factories	16,471,163
Butter made in combined butter and skim-cheese factories	12,950,621
Total butter	29,421,784
Condensed milk produced	13,033,267
Value of buttermilk and skimmed milk sold—	
From butter factories	$41,393
From combined butter and skim-cheese factories	32,060
Total	73,453

Combining the figures from the two schedules, we have—

	Pounds.
Butter:	
On farms	777,250,287
In factories	29,421,784
Total butter	806,672,071
Cheese:	
On farms	27,272,489
In factories	215,885,361
Total cheese	243,157,850

The number of pounds of milk reported as consumed by the butter and cheese factories in twelve months was 2,747,427,449. The number of gallons of milk reported by the farmers of the country as sold or sent to butter and cheese factories in twelve months was 530,129,755. Allowing 8⅘ pounds of milk to a gallon, we should have 1,917,714,395 pounds, or 217,922,090⅘ gallons of milk sold otherwise than to butter and cheese factories.

STATISTICS OF THE CEREAL CROPS.

No special statistical difficulties beset the enumeration of the cereal crops of the United States, which is believed to have been as accurate in the Tenth Census as the nature of the subject-matter would permit. Of course, these crops, like all others, are subject to the conditions already mentioned regarding the return of agricultural productions wherever they become of minor consequence or are only rarely cultivated; but it is believed at this office that the great grain fields of the country have been reported with substantial exactness.

The following are the aggregate figures for the United States:

Crop.	Acres.	Bushels.
Barley	1,007,727	43,997,495
Buckwheat	848,389	11,817,327
Indian corn	62,368,504	1,754,591,676
Oats	16,144,593	407,858,999
Rye	1,842,233	19,831,595
Wheat	35,430,333	459,483,137

The following are the twenty states which produced over 20,000,000 bushels of Indian corn each:

	Bushels.		Bushels.
Illinois	325,792,481	Wisconsin	34,230,579
Iowa	275,014,247	Michigan	32,461,452
Missouri	202,414,413	Virginia	29,119,761
Indiana	115,482,300	Texas	29,065,172
Ohio	111,877,124	North Carolina	28,019,839
Kansas	105,729,325	New York	25,690,156
Kentucky	72,852,263	Alabama	25,451,278
Nebraska	65,450,135	Arkansas	24,156,417
Tennessee	62,764,429	Georgia	23,202,018
Pennsylvania	45,821,531	Mississippi	21,340,800

The following are the fourteen states which produced over 10,000,000 bushels of wheat each:

	Bushels.		Bushels.
Illinois	51,110,502	Missouri	24,966,627
Indiana	47,284,853	Wisconsin	24,884,689
Ohio	46,014,869	Pennsylvania	19,462,405
Michigan	35,532,543	Kansas	17,324,141
Minnesota	34,601,030	Nebraska	13,847,007
Iowa	31,154,205	New York	11,587,766
California	29,017,707	Kentucky	11,356,113

The following are the ten states which produced over 10,000,000 bushels of oats each:

	Bushels.		Bushels.
Illinois	63,189,200	Ohio	28,664,505
Iowa	50,610,591	Minnesota	23,382,158
New York	37,575,506	Missouri	20,670,958
Pennsylvania	33,841,439	Michigan	18,190,793
Wisconsin	32,905,320	Indiana	15,509,518

The following are the five states which produced over 2,000,000 bushels of barley each:

	Bushels.		Bushels.
California	12,463,561	Iowa	4,022,588
New York	7,792,062	Minnesota	2,972,965
Wisconsin	5,043,118		

The following are the four states which produced over 2,000,000 bushels of rye each:

	Bushels.		Bushels.
Pennsylvania	3,683,621	New York	2,634,690
Illinois	3,121,785	Wisconsin	2,298,513

The following are the two states which produced over 500,000 bushels of buckwheat each:

	Bushels.		Bushels.
New York	4,461,200	Pennsylvania	3,593,326

While the collection of the facts regarding the cereal crops presented no distinct statistical difficulties, it was thought that the transcendent importance of these crops to the food supply, not of this country only, but of the world, justified a special investigation of their economic relations, under the provisions of the eighteenth section of the act of March 3, 1879. (*a*) Accordingly Professor William H. Brewer, of New Haven, was appointed a special agent with reference to this branch of the national production. His report, which is a mine of valuable information, obtained by travel and by correspondence, and sifted, analyzed, and arranged by one of the best minds of the age, will be found in the present volume.

a "And the said Superintendent may employ experts and special agents to investigate in their economic relations the manufacturing, railroad, fishing, mining, and other industries of the country."

THE STATISTICS OF COTTON PRODUCTION.

In one respect the census possesses a decided advantage in obtaining the yield and acreage of cotton over that which it finds in collecting the statistics of any other great crop. Cotton is largely cultivated as a sole crop; and even when others are also cultivated it always remains, throughout the whole extent of the cotton region proper, the predominant interest, so much so that the attention of enumerators and of planters alike is certain to be directed and fixed upon this crop in a degree which constitutes an important advantage toward a successful enumeration. It is only in a few outlying counties that the cultivation of cotton "fringes off", as already described in these remarks, so as to make its due return a matter of uncertainty, so far as this cause is concerned.

On the other hand, the collection of the statistics of cotton production suffers two disadvantages: First, in the greater comparative difficulty of securing as enumerators men, not of general intelligence merely, but also of clerical habits and of familiarity with accounts, at the south than at the north, where extensive commercial and manufacturing interests, and the prevalence of the township as contrasted with the county system of transacting public business, have accustomed greater numbers to the work of making records and keeping accounts; second, in the methods of cultivating cotton which have been coming into use since 1865, and in the character of a considerable portion of the cultivating classes.

Cotton, moreover, is now very largely raised "on shares", or by special agreements of a great variety of forms, which tend to endanger the accuracy of a popular enumeration. Thus, to take a comparatively simple case, a large planter not infrequently cultivates a part of his estate under his own management, while letting other, perhaps the more distant or less valuable, parts to be cultivated on shares by others. Herein, it will be seen, is involved the danger either of duplication or of omission. The planter, in answering the questions of the enumerator, may either report only that cotton which he raises on his own account strictly, or he may include his part of the cotton raised for him on shares, or he may include all that is raised on his estate. The share cultivators, on the other hand, may return all the cotton they raise, or only their shares, or may omit it altogether, assuming that the whole yield of the estate will be reported by the proprietor. Unless, therefore, the enumerators take great pains and exercise a sound discretion, either more or less cotton will be returned from such a plantation than was actually produced.

It is also to be noted in this connection that no inconsiderable part of the cultivating class, in the region specially concerned, are persons lately raised from a servile condition, without education or familiarity with figures, and therefore not well qualified to give intelligent answers to statistical inquiries. In view of these difficulties, the returns relating to this crop were placed under the oversight of Mr. J. R. Dodge, as special agent. Thousands of letters were required to be written for the explanation and possible correction of the returns received. The statistical result of so much labor is very gratifying. It is believed that the aggregate crop reported in the tables following for the census year differs by no more than a few thousand bales from the actual crop gathered, while the distribution of that total among the thirteen states, and the more than one thousand counties contributing thereto, has been effected with all the accuracy that could reasonably be expected of statistics covering so vast a field.

The following table exhibits the acreage and yield of cotton during the census year in each of the states contributing to that crop:

States.	Acres.	Bales.
Total United States*	14,480,010	5,755,359
Alabama	2,330,086	699,654
Arkansas	1,042,076	008,256
Florida	245,595	54,997
Georgia	2,617,138	814,441
Kentucky	2,067	1,367
Louisiana	864,787	508,569
Mississippi	2,106,215	903,111
Missouri	32,116	20,318
North Carolina	893,153	380,598
South Carolina	1,364,249	522,548
Tennessee	722,562	330,621
Texas	2,178,435	805,284
Virginia	45,040	19,595

* Including 35,000 acres and 17,000 bales in the Indian territory, reported by special agent.

In addition to the collection of the simple facts of acreage and yield, it was early determined to be desirable to make the Tenth Census the occasion for a comprehensive and searching investigation into the economic and cultural details of the production of cotton, and into the capabilities of this majestic and most characteristic of American industries. To this end, Professor Eugene W. Hilgard, now of the University of California, but formerly and for many years a professor in the University of Mississippi, and director of the agricultural and geological survey of that state, was appointed a special agent of the census. There is no disparagement to others in saying that the whole United States could not have furnished another man so eminently qualified for the work. To profound learning and great skill as an investigator in agricultural chemistry Professor Hilgard adds a thorough acquaintance with the production of cotton in its economic as well as in its scientific relations. When it is added that these qualities are inspired by enthusiasm and tireless energy, the good fortune of the Census Office and of the country in securing the services of such a man for such a work cannot fail to be appreciated.

Professor Hilgard's assistants in this wide-reaching investigation were most judiciously selected. Professor J. M. Safford, of Tennessee; Professor W. C. Kerr, of North Carolina; Major H. Hammond, of South Carolina; Professor Eugene A. Smith, of Alabama; and Dr. R. H. Loughridge, of Georgia, were early enlisted in the work, and rendered exceedingly valuable services. The result is a report which presents an agricultural description of soil and surface regarding not only each great cotton-growing region and each cotton state, but also, with more or less fullness, as circumstances permitted, of each important cotton county of the United States, except in South Carolina, where a different unit of description is used, the predominant facts being reproduced, for easy popular comprehension, upon an extensive series of soil maps and cotton-culture maps; full accounts of the methods of cultivation employed at every stage of this industry; sketches of the labor system and wages system of the several sections, states, and counties; meteorological information, digested and arranged especially with reference to the exigencies of this branch of production; together with a vast amount of other well-ordered detail of economic and sociological value. This report, on account of its great bulk, will be contained in a separate volume.

THE STATISTICS OF THE TOBACCO CROP.

Another crop which seemed to deserve a special recognition in this "census of the population, wealth, and industry of the United States" [act of March 3, 1879] was the tobacco crop. Of the states of the Union, not less than fifteen raise 2,000,000 pounds or more each, and six raise above 10,000,000 pounds each. The following table shows the acreage and yield of the states having each as much as 1,000 acres in tobacco:

States.	Acres.	Pounds.
Alabama	2,197	452,426
Arkansas	2,004	970,220
Connecticut	8,666	14,044,052
Illinois	5,612	3,935,825
Indiana	11,955	8,872,842
Kentucky	226,120	171,120,784
Maryland	38,174	26,082,147
Massachusetts	3,358	5,369,436
Mississippi	1,471	414,663
Missouri	15,521	12,015,657
New York	4,037	6,481,491
North Carolina	57,208	26,986,213
Ohio	34,676	34,785,235
Pennsylvania	27,566	36,943,272
Tennessee	41,532	29,365,052
Virginia	140,791	79,988,868
West Virginia	4,071	2,296,146
Wisconsin	8,810	10,608,423

On account of the importance of this crop throughout the country as a whole, its wide geographical distribution, and the great differences in the methods of cultivating, curing, and marketing tobacco, Colonel J. B. Killebrew, the distinguished industrial statistician of Nashville, Tennessee, was requested to investigate and report upon the production of this staple, while Mr. J. R. Dodge undertook to cover the ground of its manufacture. The two reports will be found in the order indicated in the present volume.

THE STATISTICS OF SUGAR PRODUCTION.

Among the most difficult subjects of enumeration in the agricultural census of the country is the production of sugar and molasses. The difficulty encountered arises, not from the nature of the subject-matter, but from the indeterminateness of the popular speech. In one section "cane sugar" means sugar from the West Indian cane; in another section, sorghum sugar. If the regions in which the two species of cane are cultivated were widely apart geographically, it would be easy to correct at the Census Office whatever errors might be caused by the inadvertence of enumerators and of cultivators; but, as a matter of fact, the two fields of culture cross each other at many points, and there will often be nothing on the face of the returns to show beyond the possibility of mistake what kind of sugar is intended. Maple sugar, in its turn, may be confounded with sorghum sugar, though never with the true tropical cane sugar.

In meeting the difficulties arising from this liability to confusion Mr. J. R. Dodge rendered invaluable service, disentangling the complicated web with great care and skill.

The following is the summary for the United States of the final returns regarding these species:

Cane:		
Sugar	hogsheads..	178,872
Molasses	gallons..	16,573,273
Sorghum:		
Sugar	pounds..	12,792
Molasses	gallons..	28,444,202
Maple:		
Sugar	pounds..	36,576,061
Molasses	gallons..	1,796,048

Of the total product of cane sugar Louisiana yielded 171,706 hogsheads, Texas contributing 4,951 hogsheads, Florida 1,273, and Georgia 601.

The following states produced over 2,000,000 gallons of sorghum molasses each: Missouri, 4,129,595; Tennessee, 3,776,212; Kentucky, 2,962,965; Illinois, 2,265,993; Iowa, 2,064,020.

The following states produced over 2,000,000 pounds of maple sugar each: Vermont, 11,261,077; New York, 10,693,619; Michigan, 3,423,149; Ohio, 2,895,782; Pennsylvania, 2,866,010; New Hampshire, 2,731,945.

Comparison of the statistics of sugar production in 1870 and in 1880 will reveal the fact that several states which were set down in the Ninth Census as producing small amounts of cane sugar have no cane-sugar production reported in 1880. These states are: Arkansas, 92 hogsheads; Missouri, 49 hogsheads; North Carolina, 35 hogsheads; Tennessee, 1,410 hogsheads. A careful examination of the schedules for 1870 has been made in each such case, with results which confirmed the belief of the Census Office that the sugar returned as cane in 1870 in these states should have been returned as sorghum. In 1870 the agricultural returns were compiled precisely as they came from the assistant marshals, except where some gross discrepancy or something flatly contradicting common fame invited correspondence with the assistant marshals. In 1880, however, the agricultural schedules of the enumerators were subjected to a searching examination by experts, and in this, as in many other instances, the errors of the returns were corrected prior to tabulation.

THE STATISTICS OF THE RICE CROP.

Another crop which, like cane sugar, is confined within a very narrow geographical range, and that at the extreme south, is the rice crop. Of the entire yield, the single state of South Carolina produces nearly one-half (52,077,515 pounds out of 110,131,373), Georgia and Louisiana producing, in equal proportions, nearly all the remainder.

THE STATISTICS OF HOP PRODUCTION.

The north, in its turn, exhibits a product whose range is almost as closely confined as that of rice or cane sugar, viz, hops. Of the 46,800 acres in this crop during the year 1879 New York reports 39,072 and Wisconsin 4,430. No other state besides California reports as many as a thousand acres. Of the sixty counties of New York, four produce five-sevenths of all the hops raised in the state.

THE STATISTICS OF THE GRASS CROP.

The grass crop is well understood to be the greatest of all the crops of the country. Altogether, in addition to what is consumed from the ground during the grazing season, the value of the harvested hay reaches nearly to that of the greatest of the cereal crops. The amount of hay harvested in 1859, 1869, and 1879, as reported, was as follows:

	Tons.
1859	19,083,896
1869	27,316,048
1879	35,150,711

The statistics of the acreage mown, obtained for the first time by the Tenth Census, show 30,631,054 acres for the whole country. Thirteen states show each more than a million acres mown, the figures of aggregate and average yield being as follows:

	Acres mown.	Tons of hay.	Tons per acre.
Illinois	2,467,302	3,276,319	1.328
Indiana	1,274,364	1,361,083	1.068
Iowa	2,490,027	3,613,941	1.451
Kansas	1,281,997	1,601,932	1.250
Maine	1,270,200	1,107,788	0.866
Michigan	1,245,441	1,393,845	1.119
Minnesota	1,053,378	1,637,109	1.554
Missouri	1,297,994	1,083,929	0.835
New York	4,044,452	5,255,642	1.132
Ohio	2,180,782	2,212,133	1.010
Pennsylvania	2,714,909	2,811,517	1.036
Vermont	1,015,020	1,052,183	1.036
Wisconsin	1,484,920	1,907,429	1.285

As we pass southward the importance of the grass crop diminishes, until we reach a line where great populous states report but 10,000, 20,000, or 30,000 acres of grass mown.

THE STATISTICS OF POULTRY AND EGGS.

Probably few persons appreciate the importance of the contribution to the annual production of wealth by the common barn-yard fowl. The statistics of poultry and eggs were gathered, for the first time, by the census of 1880. This is a subject to which the limitations of a popular statistical enumeration, already noted in these remarks, apply with special strictness; yet there is no reason to doubt that the figures approach the facts of the case for the country as a whole, and exhibit with great accuracy the relative importance of this interest in the several sections and states.

The number of barn-yard fowl reported in the census, exclusive of spring hatching, was 102,272,135; of other fowl, 23,235,187; the number of dozens of eggs, 456,910,916. At 12 cents a dozen, certainly a moderate estimate, the annual value of the egg product to the farmer would reach nearly $55,000,000; while we may suppose 150,000,000 to 180,000,000 pounds of meat sold annually out of the stock of fowls reported.

The geographical distribution of the poultry industry is very wide. There are twenty-seven states which report more than 1,000,000 of barn-yard fowls each; seventeen which report more than 2,000,000 each; thirteen which report more than 3,000,000 each; seven which report more than 5,000,000 each, viz, Illinois, Indiana, Iowa, Missouri, New York, Ohio, and Pennsylvania.

The proportion between the number of fowls and the egg crop varies greatly as between states and sections, and not without a manifest reason. If, for the purposes of this comparison, we suppose all the eggs reported to have been produced by the barn-yard fowl alone, we should have the average production of eggs to each fowl ranging from 3 dozen a year upwards to 4, 5, 6, and 7 dozen. It will be observed that in New England, with its system of mixed farming and its great number of commercial and manufacturing towns, affording local markets setting a high price

on the product, and thus making it worth while to feed hens expensively with a view to increasing the yield of eggs, the number of dozen per year rises to a maximum, whereas in some states poultry seems to be kept mainly for the sake of the flesh. Thus we have:

Yield per fowl:	Dozen.
Connecticut	7.1
Maine	7.5
Massachusetts	7.2
New Hampshire	6.9
Rhode Island	6.4
Vermont	5.9

Compare with these figures the average yield of eggs, per fowl, in the following states:

Yield per fowl:	Dozen.
New York	5.0
Pennsylvania	5.2
Ohio	4.9
Illinois	3.6
Indiana	5.0
Iowa	4.3
Kentucky	4.4
Tennessee	4.7
North Carolina	3.6
Alabama	3.2
South Carolina	3.1
Louisiana	3.0

THE STATISTICS OF ORCHARD PRODUCTS.

Hitherto the only return relating to orchard products in the census of the United States has been that which gave the total value of all such products.

In 1870 the value of orchard products returned was $47,335,189. The reduction of this amount by the then existing premium on gold (25.3 per cent. on the average for the twelve months of the census year, May 31, 1869, to June 1, 1870) would yield about $38,000,000. The corresponding return for 1880 was $50,876,154, which shows an increase in gold values during the decade of about 34 per cent., being a trifle in excess of the increase of population.

But the orchard statistics of 1880 are far more full than those heretofore collected. The following are the interrogatories relating to this interest which are embraced in the agricultural schedule:

ORCHARDS.						
Apple.			Peach.			Total value of orchard products of all kinds sold or consumed.
Acres.	Bearing trees.	Bushels. 1879.	Acres.	Bearing trees.	Bushels. 1879.	
No.	No.	No.	No.	No.	No.	Dollars.

The answers to these interrogatories have been compiled and placed in the hands of Mr. J. R. Dodge for discussion. The results will be embodied in a separate report by Mr. Dodge, which will also embrace the information obtained through the issue of many thousands of schedules relating to methods of fruit culture, preferred varieties, etc., together with the statistics of the fruit trade gathered in many of the principal cities of the country, and a report on the semi-tropical fruits of Florida by Hon. A. A. Knight, of Jacksonville.

FOREST WEALTH AND FOREST PRODUCTS.

The value of forest products reported in 1880 was $95,774,735, against $36,808,277 in 1870. Of this it should be observed, however, that the products reported are those only which are obtained from the forest in connection with ordinary farm operations. As already stated, the census of agriculture is a farm census; and those lands which are owned and exploited by lumber speculators, saw-mill operators, and other persons not farmers, are by the terms of enumeration omitted from the account.

Among the items reported in this connection was 51,442,624 cords of wood cut on farms during the year 1879. This and all other items relating to the consumption of wood which were secured in the enumeration, whether on the agricultural, the manufacturing, or the railroad schedule, have been placed for discussion in the hands of Professor Charles S. Sargent, director of the Arnold arboretum of Harvard University, and the special agent appointed under the act of March 3, 1879, to report upon the forest wealth of the country. Professor Sargent has made a most exhaustive investigation of this subject, the results of which will appear in a separate volume.

STATISTICS OF THE VALUE OF FARMS.

The value of the farms of the United States as returned in 1870 was $9,262,803,861. Were this to be discounted at the rate of the then existing premium on gold, it would yield about $7,500,000,000 as the gold value of the farms of the United States at that date. But it is a familiar feature of paper-money inflations that the value of real estate, especially rural real estate, seldom begins to rise so early or continues to rise so long as the prices of commodities. Were we to assume the average enhancement of the value of all the farms of the country, east and west, north and south, in 1870, by reason of the depreciation of the currency, to have been 12½ per cent., being one-half the premium on gold, we should have as their true gold value about $8,250,000,000. This would give as the increase in the gold values of 1870 over those of 1860 (viz, $6,645,045,007) about 24 per cent., and in those of 1880 over 1870 about 24 per cent.

Of course, it is wholly a matter of conjecture what was the average enhancement of the value of farms in 1870 by reason of the depreciation of the circulating medium, but I believe that a good deal of statistical evidence might be presented to show that that enhancement was not far from one-half that of gold.

The value of farming implements and machinery has naturally shown a much greater rate of increase since 1870 than the value of farms, owing to the wonderful progress of invention in this department and to the almost universal capability of the American agricultural laborer to use the most complicated and delicate instruments, a capability which cannot be predicated of the peasantry of a single European country.

The value reported in 1860 was $246,118,141; in 1870, $336,878,429; in 1880, $406,520,055. If we discount the aggregate value of farming implements and machinery in 1870 to the extent of the then existing premium on gold, we have the increase in gold values between 1870 and 1880 almost exactly 50 per cent.

The value of live stock on farms appears not to have increased at all between 1870 and 1880, the figures for the two periods being, respectively, $1,525,276,457 and $1,500,384,707. In the first place, it is to be observed that this is consistent with a great increase in the number of farm animals of almost every kind, as will be seen in the following table:

	1870.	1880.
Horses	7,145,370	10,357,488
Mules and asses	1,125,415	1,812,808
Working oxen	1,319,271	993,841
Milch cows	8,935,332	12,443,120
Other cattle	13,566,005	22,488,550
Sheep	28,477,951	35,192,074
Swine	25,134,569	47,681,700

The solitary exception, it will be observed, to the rule of numerical increase from 1870 to 1880 is in the case of working oxen. Any one who is in the slightest degree acquainted with recent changes in the methods of American agriculture will recognize the justice of the result in the latter case. The use of oxen for draught is rapidly diminishing, whether for the cart or for the plow.

The number of working oxen on farms, as found in the following-named states in 1870 and in 1880, speaks very strongly of this change:

NUMBER OF WORKING OXEN IN CERTAIN STATES.

States.	1870.	1880.
Massachusetts	24,490	14,571
New York	64,141	39,633
Pennsylvania	30,048	15,062
Illinois	19,706	3,346
Indiana	14,088	3,070
Iowa	22,058	2,506

But though the general movement is strongly in the direction indicated, there is a slight counter-current. While oxen are being discarded on the farms of the northern states, a few of the southern states show an increase, more or less marked, in this respect. Thus we have:

States.	1870.	1880.
Alabama	59,176	75,634
Florida	6,202	16,141
Louisiana	32,596	41,729
Mississippi	58,146	61,705
South Carolina	17,685	24,507

Others of the southern states show a decrease in the number of working oxen.

Of course, the explanation of the fact of a large increase in the number of all kinds of farm animals but one, without any increase, and, indeed, with a very slight decrease (about 1⅔ per cent.) in the aggregate value of live stock reported, is found mainly (*a*) in the fact, already several times alluded to, that the values of 1870 were paper values.

If we go back to 1860, we find the value reported to have been $1,089,329,915. An increase of 18 per cent. from 1860 to 1870, and again of 18 per cent. from 1870 to 1880, would bring the amount but slightly above that reported for the latter year. This rate of gain does not compare ill with that of the gain in the number of animals between 1860 and 1880, as below:

	1860.	1880.	Gain.
	Number.	*Number.*	*Per cent.*
Horses	6,249,174	10,357,488	65.7
Mules and asses	1,151,148	1,812,808	57.5
Working oxen	2,254,911	993,841	* 55.9
Milch cows	8,585,735	12,443,120	44.9
Other cattle	14,779,373	22,488,550	52.2
Sheep	22,471,275	35,102,074	56.6
Swine	33,512,307	47,631,700	42.3

* Decrease.

Meanwhile, the rate of increase in the aggregate value of live stock had been close upon 38 per cent.

Attention should again be invited at this point to the fact that the live stock embraced in these returns is only that kept "on farms". [See remarks preceding.]

STATISTICS OF FENCES.

An item which appears for the first time in the census of 1880 is that regarding the cost of building and repairing fences during the calendar year preceding the census.

A great deal of importance has been attributed by many writers and public speakers on agricultural economy to the cost of fencing land. While the subject is indeed of great importance, the wildest estimates have been

a The consideration should at least be mentioned, that in 1870 the country still remained in a degree depleted of animals, especially of certain classes, as is always the case for several years after a protracted war. This fact tended to give an enhanced value to the animals existing at that date as compared with other species of property.

made regarding the capitalized cost of all the fences existing in the country at a given time. It would be difficult even to frame a definition upon which such an inquiry should be pursued, while the practical difficulties attending an investigation reaching over many years, and in the case of some states over many decades, are sufficient to deter even the boldest statistician. No such obstacle, however, withstands the inquiry into the extent of this form of expenditure during a brief period; and consequently the interrogatory mentioned was inserted in the census schedules. The results are given below for the several states:

States.	Cost of building and repairing fences in 1879.	States.	Cost of building and repairing fences in 1879.	States.	Cost of building and repairing fences in 1879.
Alabama	$1,402,609	Louisiana	$1,482,121	North Carolina	$1,809,654
Arkansas	1,579,144	Maine	663,358	Ohio	4,803,063
California	2,119,826	Maryland	1,167,700	Oregon	787,047
Colorado	316,603	Massachusetts	618,503	Pennsylvania	5,507,456
Connecticut	644,295	Michigan	2,975,044	Rhode Island	130,555
Delaware	228,592	Minnesota	1,316,895	South Carolina	917,000
Florida	366,180	Mississippi	1,560,119	Tennessee	2,426,008
Georgia	1,834,625	Missouri	4,614,416	Texas	3,676,603
Illinois	5,925,225	Nebraska	1,249,975	Vermont	607,902
Indiana	3,354,246	Nevada	210,721	Virginia	1,697,180
Iowa	4,624,773	New Hampshire	334,410	West Virginia	951,947
Kansas	2,087,142	New Jersey	902,807	Wisconsin	2,620,458
Kentucky	3,025,125	New York	4,915,017		

It will be noted that the amount of expenditure for the purpose indicated is not proportional to the population of the states, or to their farm acreage, or to the extent of their agricultural operations. It varies according to circumstances innumerable. The most prominent factor in determining the amount of such expenditure is the age of settlement. The nature of the country, the principal crops raised, the abundance or scarcity of building material, the cheapness or dearness of labor, all enter to influence this kind of expenditure.

FERTILIZERS.

Another item appearing for the first time in the census of 1880 is that relating to the cost of commercial fertilizers in the several states and sections in the calendar year preceding the census. While the inquiry is not one that is likely to yield results of a high degree of accuracy, the figures show unmistakably the drift of this force, now operating more extensively than ever before in American agriculture.

The following are the states for which an expenditure in excess of $400,000 is reported:

Alabama	$1,200,956
Connecticut	497,448
Delaware	467,228
Georgia	4,346,920
Maryland	2,838,465
Massachusetts	653,422
New Jersey	1,601,609
New York	2,715,477
North Carolina	2,111,767
Ohio	550,029
Pennsylvania	3,525,336
South Carolina	2,659,969
Virginia	2,137,283

THE AGGREGATE VALUE OF FARM PRODUCTS.

In the census of 1870 inquiry was for the first time made into the aggregate value of all farm productions, "including betterments and additions to stock." The amount returned under this head was $2,447,538,658.

The returns which made up this aggregate were undoubtedly conservative, to say the very least. In the first place, they relate to the value of products, not at the market or on the railroad, but on the farm; it is the value to the farmer which is in question. Of course this makes a vast difference in the return of values. We hear of

corn being burned at times as fuel, or sold at ten cents a bushel. Such instances are doubtless rare, but the frequency of such statements may properly serve to remind us how wide is the difference between the prices of the market and those obtained on the land where the crops are raised. Even in the older states that difference never ceases to be considerable. Hence any criticism of the returns in question, founded on computations in which the quantities of the several reported crops are multiplied by an assumed average price, is very likely to err widely in the direction of excess.

Secondly. Such computations are likely to err, and in the same direction, by reason of duplications, which are excluded from the returns in question. A large part of the corn, and a still greater portion of the hay, returned in the census are consumed for the purpose of the annual product of animal food. (*a*) If the values of both the vegetable and the animal products are counted, there will be duplication to this extent. The farmer, on the other hand, reports only the value to him of his ultimate product; of corn, if he sells his corn; of beef, if he has used his corn in fattening cattle for market.

Thirdly. It is undoubtedly true that, after making the foregoing allowances, the returns of the aggregate value of farm products is likely to be inadequate by reason of the utter indisposition of the average agriculturist to reckon whatever is consumed upon the farm for the support of himself and his family among the products he is called upon to appraise. The spirit of the command, "Thou shalt not muzzle the ox that treadeth out the corn," has a wider application in the mind of the farmer than to the dumb animals he employs. It would be altogether alien and repugnant to his sentiments to give a value, for the purposes of a statistical return, to the garden truck that is carried into the house; the fuel picked out of his woods; the fruit that his children eat; the corn that is sent to the mill for home use; or even the pig that is killed at Christmas. It stands, in his mind, like the corn which the unmuzzled ox, in the olden days, caught up as he made his round among the grain on the thrashing-floor. The statistician may just as well accept this limitation of the returns of the value of farm products first as last.

Fourthly. Altogether, in addition to the considerations indicated, it is not improbable that the fear of taxation, or an unreasoning reluctance to make a statement so summary, has an effect, in a small proportion of instances, to keep down the farmer's estimate of the value of his products.

It has been said that the aggregate value of farm products returned in 1870 was about $2,450,000,000. This was stated to be inclusive of "betterments and additions to stock". The necessarily vague nature of the last enumerated items, the time taken in estimating these, and the probability that at the best they would be estimated very imperfectly, led to the dropping of these items in preparation for the census of 1880, and the returns for this year are accordingly exclusive of betterments and additions to stock. It cannot be known how much the reported value was reduced on this account, but it was doubtless reduced to a considerable extent.

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a An investigation of the distribution and consumption of the corn crop of 1882, undertaken by the statistician of the department of agriculture, made the consumption for feed of cattle and swine, for flesh-making or fattening purposes, 46.6 per cent. of the total crop, estimated at 1,617,225,100 bushels, the distribution being as follows:

	Bushels.
For feed of meat-producing animals	780,000,000
For feed of work animals	520,000,000
For human food	150,000,000
For export, seed, spirits, and surplus	167,225,100

The following is a statement of the local consumption, by districts, according to specific uses:

Sections.	Human food.		Feed for work animals.		Feed for cattle and swine.		Shipped from county.	
	Per cent.	Bushels.	Per cent.	Bushels.	Per cent.	Bushels.	Per cent.	Bushels.
New England	14.0	894,089	29.4	1,873,651	54.2	3,457,579	2.4	150,981
Middle states	9.2	7,224,526	32.7	25,755,430	47.3	37,144,801	10.8	8,460,053
Southern states	16.0	63,185,261	47.2	186,306,087	26.3	103,953,517	10.5	41,349,535
Western states	5.0	56,634,363	20.9	235,692,078	49.4	558,047,200	24.7	279,060,850
Pacific states	30.8	891,439	24.3	700,755	34.6	1,001,426	10.3	298,280
Nevada, Colorado, and territories	15.3	993,388	43.1	2,798,074	29.2	1,899,506	11.4	740,432
Total	8.0	129,823,066	28.0	453,126,975	44.0	705,504,029	20.0	329,981,040

The value returned in 1880 was but $2,212,540,927. It will at first appear incredible that in ten years there should have been no increase of value, notwithstanding the great increase in the numbers of the agricultural class and in the acreage of improved land. The same returns, however, show a large increase in the quantities of the principal crops, as appears by the following table:

Crops.	1870.	1880.	Per cent. of increase.
Wheat ..... bushels.	287,745,626	459,483,137	59.7
Oats ..... do....	282,107,157	407,858,999	44.6
Indian corn ..... do....	760,944,549	1,754,591,676	130.6
Cotton ..... bales.	3,011,996	5,755,359	91.1
Hay ..... tons..	27,316,048	35,150,711	28.7
Rice ..... pounds.	73,635,021	110,131,373	49.6
Tobacco ..... do....	262,735,341	472,661,157	79.9
Irish potatoes ..... bushels	143,337,473	169,458,539	18.2

The explanation of this apparent contradiction is found in the relation of the prices of vegetable products in 1879 to those of ten years before.

The following table, from the second quarterly report of the bureau of statistics, Treasury Department, for the fiscal year 1879–'80, exhibits the average export prices of certain commodities for the year 1870, in comparison with those of 1879:

Commodities.	Price in 1870.	Price in 1879.	Price in 1870, calling the price in 1879 100.
	Dollars.	*Dollars.*	*Dollars.*
Indian corn ..... bushel..	0.925	0.471	196
Oats ..... do....	0.630	0.297	212
Wheat ..... do....	1.289	1.068	121
Cotton, Sea Island ..... pound..	0.537	0.279	192
Cotton, other ..... do....	0.235	0.099	237
Hay ..... ton..	17.423	15.027	116
Hops ..... pound..	0.154	0.128	120
Rosin and turpentine ..... barrel..	3.046	1.940	157
Bacon and ham ..... pound..	0.157	0.070	224
Beef, salted or cured ..... do....	0.073	0.063	116
Butter ..... do....	0.293	0.142	206
Cheese ..... do....	0.155	0.089	174
Eggs ..... dozen..	0.396	0.155	255
Lard ..... pound..	0.166	0.070	237
Pork ..... do....	0.132	0.057	232
Rice ..... do....	0.060	0.048	125
Sugar, brown ..... do....	0.112	0.073	153
Tallow ..... do....	0.102	0.069	148
Tobacco, leaf ..... do....	0.113	0.078	145
Wool, raw and fleece ..... do....	0.359	0.290	124

Here we see that, calling the price of each article in 1879 100, the prices of 1870 ranged from 116 to 255 in the money of the earlier date. Here we find an ample explanation of the fact that so large an increase in quantity was accompanied by no increase in value.

FRANCIS A. WALKER.

AMERICAN AGRICULTURE.

[The following article, by Mr. F. A. Walker, late Superintendent of Census, originally printed in the *Princeton Review*, is here reproduced as containing some points of interest regarding American as contrasted with European agriculture.

The addition made to this article was first published in the *Agricultural Review*.]

It is proposed in this paper to take a general view of the characteristics of American agriculture. Ever since the revolt of the British colonies nullified the royal prohibition of the settlement of the Ohio valley, the frontier line of our population has been moving steadily westward, passing over one, two, and even three degrees of longitude in a decade, until now it rests at the base of the Rocky mountains. The report of the public land commission to Congress, just issued from the press, states that the amount of arable lands still remaining subject to the occupation under the homestead and pre-emption acts is barely sufficient to meet the demand of settlers for a year or two to come. This would seem a fitting point from which to review the course of American agriculture through the last hundred years; to inquire what have been its methods and what it has accomplished.

The subject may be treated under the following titles:

1. As to the tenure of the soil.
2. As to character of the cultivators as a class.
3. As to the freedom and fullness of experiment upon the relations of crops to climate and to local soils.
4. As to what has been done biologically to promote our agriculture.
5. As to what has been done mechanically.
6. As to what has been done chemically. Under which title we shall have occasion to explain the westward movement of the field of cultivation of wheat and corn and the southwestward movement of the cotton culture.

First.—The tenure of land in the United States is highly popular. Throughout the northern and western states this has always been so. The result has not been wholly due, as one is apt to think, to the existence of vast tracts of unoccupied land "at the West", whatever that phrase may at the time have meant, whether western New York in 1810, or Ohio in 1830, or Iowa in 1850, or Dakota in 1880. An aristocratic holding of land in New England would have been consistent with a great breadth of free lands across the Missouri quite as fully as such a holding of land in England is consistent with the existence of boundless fertile tracts in Canada and Australia under the laws of the same empire.

The result in the United States has been due partly to the fact just noted, combined with the liberal policy of the government relative to the public domain; partly to excellent laws for the registration of titles and the transfer of real property in nearly every state of the Union; and partly to the genius of our people, their readiness to buy or sell, to go east or to go west, as a profit may appear.

But while we have thus enjoyed a highly popular tenure of the soil, this has not been obtained by the force of laws compelling the subdivision of estates, as in France, under the law of "partible succession";(a) nor has it been carried so far as to create a dull uniformity of petty holdings. If, as Professor Roscher remarks, "a mingling of large, medium, and small properties, in which those of medium size predominate, is the most wholesome of political and economical organizations," the United States may claim to have the most favorable tenure of the soil among all the nations of earth. We have millions of farms just large enough to profitably employ the labor of the proprietor and his growing sons; while we have, also, multitudes of considerable estates upon which labor and moneyed capital, live-stock and improved machinery are employed under skilled direction; and we have, lastly, those vast farms, the wonder of the world, in Illinois and California, where 1,000 or 5,000 acres are sown as one field of wheat or corn, or, as on the Dalrymple farms in Dakota, where a brigade of six-horse reapers go, twenty abreast, to cut the grain that waves before the eye almost to the horizon.

Whereas in France the number of estates is almost equal to the number of families engaged in agricultural pursuits, the number of separate farms with us is somewhat less than one-half the number of persons actually engaged in agriculture, there being, on the average, perhaps 210 to 220 workers to each 100 farms.

At the south the institution of slavery, with the organization of labor and the social ideas carried along by slavery, generated and maintained a comparatively aristocratic tenure of the soil. The abolition of slavery, accomplished as it was by the violence of war, has not only created a new class desirous of acquiring land, but, by impoverishing the former masters, has brought no small proportion of the old plantations into the market, with the result that farms have been rapidly multiplied in this section. Since 1870 the number of farms in thirteen of the late slave states for which I have the statistics has increased 65 per cent.; and this movement towards the subdivision of the large plantations is likely, in the absence of capital to carry on extensive operations, to continue until the tenure of the soil shall be relatively even more popular than at the north. Mr. Edward Atkinson, an authority on the subject, holds that this minute subdivision of land will be peculiarly favorable to the cultivation of cotton.

Of the farms into which the cultivated area of the United States is divided, 60 or even 70 per cent. are cultivated by their owners. In the northern states the proportion rises to 80 per cent. or even higher. Connecticut, Maine, and Massachusetts, of the New England states, and Wisconsin, Michigan, and Minnesota, of the northwestern states, show an excess over 90 per cent. The rent of leased farms in New England is in a large majority of cases paid in money. In all other sections of the country rents are generally stipulated to be paid in some definite share of the produce, the proportion in many of the southern and western states being three, four, or five farms rented for shares of the produce to one for which a money rent is paid.

Second.—Of the character of the cultivators of the soil in the United States it will not be necessary to speak at length. Confining our view to the country north of the Potomac and the Ohio, we say that, unlike the cultivators in any country of Europe except Switzerland and perhaps Scotland, they have at no stage of our history constituted a peasantry in any proper sense of the term. The actual cultivators of the soil here have been the same kind of men precisely as those who filled the professions or were engaged in commercial and mechanical pursuits. Of two sons of the same mother one became a lawyer, perhaps a judge, or went down to the city and became a merchant, or gave himself to political affairs and became a governor or a member of Congress; the other staid upon the ancestral homestead, or made a new one for himself and his children out of the public domain farther west, remaining through his life a plain, hardworking farmer.

Now this condition of things has made American to differ from European agriculture by a very wide interval. There is no other considerable country in the world where equal mental activity and alertness have been applied to the cultivation of the soil as to trade and so-called industry.

(a) A strong reaction is manifest in France against the requirement of the code that all estates must, at the death of the proprietor, be equally divided among all the children. It is objected to as causing the subdivision of the land into patches too small for profitable cultivation, and as breaking up commercial and manufacturing establishments, rendering it a rare thing that a son should succeed his father in his business.

We have the less occasion to dwell now upon this theme because we shall be called to note, under several heads following, striking illustrations of the effects of this cause in promoting the success of American agriculture.

Third.—To ascertain what are the adaptations of any piece of ground to the cultivation of any single crop, and what variety and order of crops will best bring out the capabilities of soil and climate in the production of wealth, may seem a simple thing, but it is not. It is so far from being a simple thing that a race of men, not barbarous, but, as we call them, civilized, may inhabit a region for an indefinite period and this thing not be done at all. Such may be the lack of enterprise, such the force of tradition, that crops may be cultivated from generation to generation, and from century to century, while yet the question has never been fairly determined whether the agriculture of the district might not advantageously be reinforced and the soil be relieved by the introduction of new crops, or even by throwing out the traditionary crops altogether.

Gonzales in his "*Tour of England*" (1730) wrote: "And my tutor told me that a good author of their own made this remark of Wiltshire, 'that an ox left to himself would, of all England, choose to live in the north of this county, a sheep in the south part of it, and a man in the middle of both, as partaking of the pleasure of the plain and the plenty of the deep country.'" The remark does not exaggerate the nicety of those distinctions which determine the range of the profitable cultivation whether of an animal or a vegetable species. A certain rough canvass of the agricultural capabilities of any district is easily made, and a process of elimination early takes place by which certain crops are discarded, for once and for all, as hopeless. But among the great variety of crops which may be cultivated in any region, justly to discriminate between the good and the very good, and to reject those which, though within the "limit of tolerance", as the money-writers say, are yet on the whole, and in the long run, not profitable, demands long, careful, and elaborate experimentation. Beyond this is the selection of varieties within the retained species, in which alone may reside the possibilities of success or failure; the fortunate choice of varieties, among the almost indefinite number, often making all the difference between profit and no profit.

To do this work satisfactorily requires great mental enterprise and what we may call intellectual curiosity, a natural delight in experimentation, a ready apprehension combined with persistency, in due measure, and with a sound judgment. To do this work both well and quickly, being neither slow in testing new and promising subjects, nor easily discouraged by the accidents which beset initiation and experiment, nor yet reluctant in drawing the proper inference from failure, would task the intellectual powers of any race of men.

In Europe the knowledge of soils and of climate, on which the cultivation of large estates or peasant properties, is based, is the accumulation of hundreds of years of experience. In the United States the course of settlement has called upon our people to occupy virgin territory as extensive as Switzerland, as England, as Italy, and latterly as France or Germany, every ten years. And it has been in meeting the necessity of a rapid, rough-and-ready reconnaissance of new soils under varying climatic conditions that the character of our cultivating class, as indicated under the previous title, has come most strikingly into play.

During the colonial period the work of experiment had so far advanced that every crop but one (sorghum) now recognized in the official agricultural statistics of the country was cultivated within the region east of the Alleghanies. In the long course of experiment which has resulted in the naturalization of the crops now so well known in New England, the following had, according to Professor Brewer, been tried and rejected from our agriculture, viz, hemp, indigo, cotton, madder, millet, spelt, lentils, and lucern.

But while so much of the adaptations of our general climate to agriculture had been thus early mastered, much in the way of studying the agricultural capabilities of the infinite varieties of soil subject to this climate remained to be done within the region then occupied; while with every successive extension of the frontier of settlement the same work has had to be done for the new fields brought under cultivation. To say with what quick-wittedness and openness of vision, what intellectual audacity yet strong common-sense, what variety of resource and facility of expedients, what persistency yet pliancy, the American farmer has met this demand of the situation would sound like extravagant panegyric. No other agricultural population of the globe could have encountered such emergencies without suffering tenfold the degree of failure, loss, and distress which has attended the westward movement of our population during the past one hundred years.

Fourth.—In asking what has been done biologically to promote American agriculture, we have reference to the application of the laws of vegetable and animal reproduction, as discovered by study and experiment, to the development of new varieties of plants and of animals, or to the perfection of individuals of existing varieties. In this department of effort the success of the American farmer has been truly wonderful, and our agriculture has profited by it in a degree which it would be difficult to overestimate. A few examples will suffice for our present occasion.

Receiving the running horse from England, we have so improved the strain that for the two years past, notwithstanding the unlimited expenditure upon racing studs in England, notwithstanding that English national pride is so much bound up in racing successes, and notwithstanding the grave disadvantages which attend the exportation of costly animals and their trial under the conditions of a strange climate, the honors of the British turf have been gathered, in a degree almost unknown in the history of British racing, by three American horses; and while Iroquois was last summer winning his unprecedented series of victories, two if not three American three-year-olds, generally believed to be better than Iroquois, were contesting the primacy at home.

The trotting horse we have created, certainly the most useful variety of the equine species, and we have improved that variety in a degree unprecedented, I believe, in natural history. Two generations ago the trotting of a mile in 2 minutes and 40 seconds was so rare as to give rise to a proverbial phrase indicating something extraordinary; it is now a common occurrence. "But a few years ago", wrote Professor Brewer in 1876, "the speed of a mile in 2:30 was unheard of; now perhaps five or six hundred horses are known to have trotted a mile in that time". The number is to-day perhaps nearer one thousand than five hundred. Steadily onward have American horse-raisers pressed the limit of mile-speed, till, within the last three seasons, the amazing figures 2:10 have been reached by one trotter and closely approached by another.

Take an even more surprising instance. About 1800 we began to import in considerable numbers the favorite English cattle, the Short-horn. The first American Short-horn herd-book was published in 1846. In 1873 a sale of Short-horn cattle took place in western New York, at which a herd of 109 head was sold for a total sum of $382,000, one animal, a cow, bringing $40,600; another, a calf five months old, $27,000, both for the English market. To-day Devons and Short-horns are freely exported from New York and Boston to England to improve the native stock.

In 1793 the first merino sheep, three in number, were introduced into this country, though, unfortunately, the gentleman to whom they were consigned, not appreciating their peculiar excellencies, had them converted into mutton. Since that time American wool has become celebrated both for fineness of fiber and for weight of fleece. The finest fiber by microscopic test, ever anywhere obtained, was clipped about 1850 from sheep bred in western Pennsylvania. More recently the attention of our wool-growers has been especially directed to increasing the quantity rather than to improving the quality of the wool.

Illustrations of the success of American agriculture, biologically, might be drawn from the vegetable kingdom, did space permit.

Fifth.—To ask what has been done mechanically to promote our agriculture is to challenge a recital of the better half of the history of American invention. Remarkable as have been the mechanical achievements of our people in the department of manufacturing industry,

they have been exceeded in the production of agricultural implements and machinery, inasmuch as, in this branch of invention, a problem has been solved that does not present itself for solution, or only in a much easier shape, in those branches which relate to manufactures; the problem, namely, of combining strength and capability of endurance with great lightness of parts.

In no other important class of commercial products, except the American street carriage or field wagon, are these desired qualities so wonderfully joined as in the American agricultural machines, while the special difficulty arising from the necessity of repairs on the farm, far from shops where the services of skilled mechanics could be obtained, has been met by the extension to this branch of manufacture of the principle of interchangeable parts, a principle purely American in its origin. Through the adoption of this principle by the makers of agricultural machines, a farmer in the Willamette valley of Oregon is enabled to write to the manufacturer of his mower or reaper or thresher, naming the part that has been lost or become broken or otherwise useless, and to receive by return mail, third-class, for which the government rate will be only two or three shillings, the lacking part, which, with a wrench and a screw-driver, he can fit into its proper place in fifteen minutes.

All the agricultural machines of to-day are not originally of American invention, although most of them are, in every patentable feature; but I am not aware that there is at present in extensive use one which does not owe it to American ingenuity that it can be popularly used. Without the improvements it has received here, the best of foreign inventions in this department of machinery would have remained toys for exhibition at agricultural fairs or machines only to be employed on large estates under favorable conditions.

But more, even, than the ingenuity of inventors and manufacturers has been required to give to agricultural machinery the wide introduction and the marvellously successful applications it has had in the cultivation of our staple crops east and west. "Experienced mechanicians," says Professor Hearn, "assert that, notwithstanding the progress of machinery in agriculture, there is probably as much sound practical, labor-saving invention and machinery unused as there is used, and that it is unused solely in consequence of the ignorance and incompetency of the work-people." This remark, which is perfectly true of England, and the force of which would have to be multiplied four-fold in application to the peasantry of France or Austria, utterly fails of significance if applied to the United States. It is because mechanical insight and aptitude, in the degree respecting which the term "mechanical genius" may properly be used, are found throughout the mass of the American people that these products of invention and skill have been made of service on petty farms all over our land, and in the most remote districts. Lack of mechanical insight and aptitude, in the full degree requisite for the economical use and care of delicate and complicated machinery, is almost unknown among our native Northern people. Not one in ten but has the mechanical sense and skill necessary for the purpose.

But it has not been through the invention and wide application of agricultural machinery alone that the peculiar and extraordinary mechanical genius of our people has increased our national capacity for agricultural production. In what we may call the daily commonplace use of this faculty, throughout what may be termed the pioneer period, and, in a diminishing degree, through each successive stage of settlement and industrial development, the American farmer has derived from this source an advantage beyond estimation in dealing with the perpetually varying exigencies of the occupation and cultivation of the soil.

Sixth.—When we ask what has been done chemically to promote American agriculture, we reach at once the most characteristic differences between our cultivation of the soil and that prevailing in older countries; and we have, at the same time, the explanation of the contemptuous manner in which our agriculture is almost universally spoken of by European writers. Did I say contemptuous? The word "indignant" would often better express the feeling aroused in these writers by the contemplation of our dealing with the soil, which, from their point of view, they cannot but regard as wasteful, wanton earth-butchery. "In perusing the volumes of Messrs. Parkinson, Faux, Fearon, and others," says Hinton, in his *History of the United States*, "some hundred pages of invective occur because the Americans will persist in taking up fresh land instead of the more costly process of manuring a worn-out soil; will raise extensive crops instead of highly cultivating and beautifying a small space."

A few British tourists, indeed, notably Professor Johnston and Mr. James Caird, have shown a somewhat juster appreciation of American agriculture; but even these have given only a qualified approval of our method of dealing with the soil, and have fallen ludicrously short of the truth in attempting to fix the limit of time during which this policy could be maintained.

Johnston, one of the best writers of his time on agricultural chemistry, publishing his "Notes on North America" in 1851, expressed his belief that the exportable wheat of the continent, as a whole, was "already a diminishing quantity". In the light of to-day the following reads somewhat strangely:

"It is fair and reasonable, therefore, I think, to conclude, until we have better data, that the wheat-exporting capabilities of the United States are not so great as they have by many in Great Britain hitherto been supposed; that they have been overstated on the spot, and that our wheat-growers at home have been unduly alarmed by these distant thunders, the supposed prelude of an imaginary torrent of American wheat, which was to overwhelm everything in Great Britain, involving farmers and landlords in one common ruin".

What, then, has been this American way of dealing with the soil to which our English brethren have so strongly made objection?

The American people, finding themselves on a continent containing an almost limitless breadth of arable land, of fair average fertility, having little accumulated capital and many urgent occasions for every unit of labor power they could exert, have elected—and in doing so they are, I make bold to say, fully justified, on sound economical principles—to regard the land as practically of no value and labor as of high value; have, in pursuance of this theory of the case, systematically cropped their fields, on the principle of obtaining the largest crops with the least expenditure of labor, limiting their improvements to what was required for the immediate purpose specified, and caring little about returning to the soil any equivalent for the properties taken from it by the crops of each successive year. What has been returned has been only the manure generated incidentally to the support of the live-stock needed to work the farm. In that which is for the time the great wheat and corn region of the United States, the fields are, as a rule, cropped continuously, without fertilization, year after year, decade after decade, until their fertility sensibly declines.

Decline under this regimen it must, sooner or later, later or sooner, according to the crop and according to the degree of original strength in the soil. Resort must then be had to new fields of virgin freshness, which with us in the United States has always meant "The West". When Professor Johnston wrote, the granary of the continent had already moved from the flats of the upper Saint Lawrence to the Mississippi valley, the north and south line which divided the wheat product of the United States into two equal parts being approximately the line of the eighty-second meridian. In 1860 it was the eighty-fifth; in 1870, the eighty-eighth; in 1880, the eighty-ninth.

Meanwhile what becomes of the regions over which this shadow of partial exhaustion passes, like an eclipse, in its westward movement? The answer is to be read in the condition of New England to-day. A part of the agricultural population is maintained in raising upon limited soils the smaller crops, garden vegetables and orchard fruits, and producing butter, milk, poultry, and eggs for the supply of the cities and manufacturing towns which had their origin in the flourishing days of agriculture, which have grown with the age of the communities in which they were planted, and which, having been well founded when the decadence of agriculture begins, flourish the more on this account, inasmuch as a second part of the agricultural population, not choosing to follow the westward movement of the grain culture, is ready with its rising sons and daughters to enter the mill and the factory.

Still another part of the agricultural population gradually becomes occupied in the higher and more careful culture of the cereal crops on the better portion of the former breadth of arable land, the less eligible fields being allowed to spring up in brush and wood; deeper plowing and better drainage are resorted to; fertilizers are now employed to bring up and keep up the pristine fertility of the soil.

And thus begins the serious systematic agriculture of an old state. Something is done in wheat, but not much. New York raised 13,000,000 bushels in 1850; thirty years later, when her population has increased 70 per cent., she raises 13,000,000 bushels. Pennsylvania raised 15,500,000 bushels in 1850, with a population of 2,250,000; in 1880, with 4,500,000 inhabitants, she raises 19,500,000 bushels. New Jersey raised 1,600,000 bushels then; she raises 1,900,000 now.

More is done in corn, that magnificent and most prolific cereal, more still in buckwheat, barley, oats, and rye. Pennsylvania, though the tenth state in wheat production, stands first of all the Union in rye, second in buckwheat, and third in oats; New York, the same New York whose Mohawk and Genesee valleys were a proverb through the world forty years ago, is but the thirteenth state in wheat, but is first in buckwheat, second in barley, and third in rye.

It is in the way described that Americans have dealt with the soil opened to them by treaty or by purchase. And I have no hesitation in saying that posterity will decide, first, that it was both economically justifiable and politically fortunate that this should be done; and, secondly, that what has been done was accomplished with singular enterprise, prudence, patience, intelligence, and skill.

It will appear, from what has been said under the preceding titles, that I entertain a somewhat exalted opinion concerning American agriculture. Indeed, I do. To me the achievements of those who in this new land have dealt with the soil, under the conditions so hurriedly and imperfectly recited, surpass the achievements of mankind in any other field of economic effort. With the labor power and capital power which we have had to expend during the past one hundred years, to have taken from the ground these hundreds, these thousands of millions of tons of food, fiber, and fuel for man's uses, leaving the soil no more exhausted than we find it to-day; and, meantime, to have built up, out of the current profits of this primitive agriculture, such a stupendous fund of permanent improvements, in provision for future needs and in preparation for a more advanced industry and a higher tillage; this certainly seems to me not only beyond the achievement, but beyond the power, of any other race of men.

ADDENDUM.

So much in retrospect. Let us now turn to the future.

As we cast our eyes over the broad surface of the United States, it might seem that our people had, as yet, little more than commenced the occupation of their patrimonial estate. The wholly unsettled area of the United States, as shown by the census of 1880, amounted to about 1,400,000 square miles, being nearly one-half of the area of the country.

Where are the vacant tracts? What is their character, in the respects of soil and climate? What their prospective capability of agricultural production? Will they remain unoccupied through the period while our population is rising from fifty to one hundred millions, as they have remained without inhabitants while our population has increased from four to fifty millions; or will the thirty or forty years necessary to raise our numbers to that gigantic total just mentioned find these regions covered with shops and farms, schools and churches, supporting their share of the century of millions of our people, and contributing their stores of grain and meat to feed the populations of Europe?

The unsettled area of the thirteen original states aggregates 14,500 square miles. It is composed of the northern two-fifths of Maine, a small tract in New Hampshire, and the Adirondack regions of New York.

Inasmuch as the unsettled area of the country east of the Appalachians has been reduced by but 10,000 square miles during the fifty years since 1830, when this region embraced 70 per cent. of the population of the United States, to the present time, when it embraces but 40 per cent. of a population which has increased fourfold, it is not unreasonable to suppose that, in the future as in the past, intending settlers will pass these regions by, to seek more fertile soils and a warmer sun, beyond the great Atlantic chain.

Of the original domain of the United States west of the Appalachians, 20,500 square miles, about evenly divided between Wisconsin and Michigan, remain, as yet, devoid of settlement. These are tracts still or recently covered by dense forests, or of a rocky character, containing mineral deposits of an unknown value. Although mining, lumbering and fishing parties have invaded this region from all points during the past ten years, it is not probable that these lands will, at any near period, contribute appreciably to the grain production of the country.

To the south lie two vast bodies of unsettled territory. Florida contains nearly 21,000 square miles still vacant of population. Much of this region is covered by dense forests and everglades, almost inaccessible to man. Of the remainder, no small part consists of swamps and sandy barrens. Many a decade will pass before these vast spaces on the map of population will be filled.

Far in the southwest, Texas shows 137,000 square miles destitute of inhabitants. Much of this consists of land now unoccupied, solely by reason of the newness of settlement in that region. Other vast tracts are destined to afford a field only for a few thousands of herdsmen and cow-boys; other vast tracts have, so far as known, no adaptation whatever to the wants of civilized man, and must, through an indefinite future, remain the ranging ground of the buffalo and the Apache.

Of the remaining domain of the United States west of the Mississippi and northwest of Texas, about 1,200,000 square miles are at present embraced in the category of unsettled territory, or occupied only by Indians, viz: in Minnesota, Kansas, and Nebraska, 90,000; in Montana, Dakota, and Wyoming, 355,000; in Oregon, Washington, and Idaho, 188,000; in New Mexico and Colorado, 155,000; in California, Nevada, Utah, and Arizona, 350,000; in the Indian territory, 64,000.

Of this aggregate, one-fifth, or about 240,000 square miles, is comprised within Indian reservations. Of the remaining four-fifths, how much remains destitute of population, purely by reason of the newness of the country and its very recent and partial exploration; how much, on the other hand, by reason of ruggedness and ill adaptation to human wants, is likely to remain unoccupied through a distant future? This is a question which, though the answer must necessarily be vague in the absence of precise data, is yet of such tremendous import to the power and the consequence of our country, that it cannot be without interest or profit to consider the matter in the light of our present knowledge.

One great part of the region in question is comprised within the Cordilleran chain of North America—a mighty mass of mountains, unequaled in their totality upon the face of the globe, forming, when seen by the eye that is not bewildered by complexity or the contradiction of individual features, a vast lozenge-shaped figure upon the surface of the continent, bounded by two parallels north and south, and two northwest and southeast sides, the length of each of the four sides being approximately six hundred miles.

Within the giant outlines thus drawn can be counted over and over again, and still many times over, as many peaks, 12,000 feet and upwards, as Europe contains from the Atlantic to the Oural. These mountain ridges shut in numerous valleys, themselves five or six thousand feet above the sea, some of them large enough to form first-class states, which will doubtless become the seats of no inconsiderable populations, while here and there the discovery of rich mineral deposits will cause villages and even cities to be perched eight or ten thousand feet above tide-water; but the great bulk of this mountain region is destined to remain void of settlement through an interminable period, either from ruggedness of surface and barrenness of soil, or from the lack of the moisture necessary for successful agriculture.

These, and the great plains sloping eastward and westward from the outer walls of this mountain fortress, form the "arid lands", which are the subject of a valuable report of Major Powell, comprising, according to his estimate, something more than two-fifths of the entire surface of the country. Here the 45 to 60 inches annual precipitation of the Atlantic coast is reduced to 15, and even 10 or fewer, inches of rainfall a year. Agriculture is absolutely precluded, except upon the single condition of artificial irrigation. To the eastward of the nearly north and south line which bounds the arid lands of the continent, lies a zone consisting of vast elevated plains whose surface offers no obstruction to the movements of population, whose soil is not wholly destitute of the elements of fertility, yet up whose slow incline population shows a great reluctance to climb. This is the region of high maximum temperature and of *scanty* rainfall, the precipitation of the year ranging from 12 to 28 inches. It constitutes what Powell calls the "sub-humid region", comprising hundreds of thousands of square miles, divided, perhaps not unequally, between good and bad lands. Here agriculture may be carried on, but subject to casualties which make its profitableness very questionable, with the possibility of ultimate loss. Any year may be a good one; but every year will not. Disastrous droughts occur over this zone, more frequently indeed towards the west, yet even on its eastern border, in Kansas, Nebraska, and Dakota, the constant imminence of a partial or a total failure of crops makes the occupation of these lands a very doubtful experiment. With a proper revision of our riparian laws, and with improvements reasonably to be anticipated in the art of irrigation, such of these lands as lie near the streams may become the field of a highly successful agriculture. Those for which the supply in the streams is not sufficient will be cultivated at a risk of loss which the owners of small lots cannot afford to take. Possibly among the innovations of the coming age may be cultivating companies, which, possessing large capital, may be able to average good years and bad, as the poor single cultivator cannot, and may thus keep extensive portions of this zone in crops; but this must be regarded as very doubtful. Many well-informed persons think that fully as much of this region is already improved as is likely to be maintained in cultivation, and, indeed, that a refluent wave of population from the extreme frontier is not improbable.

It thus appears that, notwithstanding the imposing total of 1,400,000 square miles of still unsettled territory, the amount of land available for occupation for ordinary agriculture is not large.

The public land commission, in their report of 1880, say: "It was estimated, June 30, 1879, that (exclusive of certain lands in southern states) of lands over which the survey and disposition laws had been extended, lying in the west, the United States did not own, of arable agricultural public lands, which could be cultivated without irrigation or other artificial appliances, more than the area of the present state of Ohio, viz, 25,576,960 acres."

The quantity of lands taken up in the arable region during the year ending June 30, 1880, was about 7,000,000 acres. The commission therefore reach the startling conclusion that, at the same rate of absorption, the arable lands so situated will all be taken up within three years, or by June 30, 1883. Of the character and quantity of the public domain remaining June 30, 1880, the commission make the following estimates in acres:

(1.) Timber lands	85,000,000
(2.) Coal lands (to be largely increased by better classification and survey)	5,529,970
(3.) Lands containing known mineral deposits of value (subject to a large increase by new discoveries)	64,800,000
(4.) Arable lands remaining in northern states and territories, over which United States laws, as to survey and disposition, have been extended	17,800,000
(5.) Lands in southern states, surveyed and unsurveyed	25,585,641
(6.) Irrigable lands which can be taken under desert land act—say one-twentieth of the remainder—being the lands which can be irrigated from the present water supply	30,000,000
(7.) The remainder—pasturage, grazing, desert, and all other lands useless for agriculture by reason of altitude, lack of water, or soil, including balance of lands likely to be segregated for private land grants, etc., still unsatisfied, and Indian and military reservations, including, also, unsurveyed area of Indian territory, viz, 17,150,250 acres	565,701,222

It is, indeed, an astonishing announcement that the public land system, so far as relates to agricultural settlers, has virtually come to an end; that the homestead and pre-emption acts are practically exhausted of their contents.

During the past twelve months 600,000 immigrants have arrived upon our shores and there was a free farm for all who chose to take it. The immigrants of another year, and perhaps of still another, are provided for; but what is to become of the millions whom Europe is ready to pour upon our shores? It will scarcely seem the United States any more, when we cannot boast of our readiness to give a farm to every comer. It is a question well worthy of careful consideration what effect the loss of this free—by which I mean gratuitous—resort to the land will have upon the conditions of manufacturing among us, and upon the character of our industrial classes.

With reference to our present inquiry, however, namely, the possibility of keeping up our traditional methods of agriculture and maintaining the volume of our food exports, the situation described is not so serious as might be thought.

Vast quantities of land which have passed out of the hands of the government, through patents to states, to schools and colleges, to railways, etc., have not yet come under cultivation and occupation. Other large quantities are in the hands of private owners, who have never cultivated them, or, at least, have not done so *bona fide*, having taken them speculatively, (*a*) and kept up a merely formal compliance with the requirements of the law. Considerable additions to the public lands may also be expected from the reduction of Indian reservations, as the tribes concerned take up small lots in severalty, and cede the remainder to the United States. Some parts of the extensive mineral and coal lands, withdrawn from the scope of the general land law, will unquestionably be found to have an agricultural value; and the surface will be worked for one kind of wealth while the recesses beneath are searched for another.

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a It appears by the report of the public land commission, that it is possible for one person, under existing laws, to take up, in all, 1,120 acres, under one sort of title or another.

From all these sources additions will doubtless be made to the body of land available for occupation, though not under the homestead and pre-emption acts. It is, moreover, not improbable that the lands of the sub-humid region, large parts of which, on the eastern side of this great longitudinal belt, have already been taken up, and are under cultivation with varying success, large parts of which still remain open to settlement, may be found to have a somewhat wider adaptation to agricultural purposes than is assigned them by Major Powell. Culture, if it do not increase the annual precipitation, will secure a more equal distribution of moisture in the soil; while the introduction of mixed farming, the advantages of which are now so admirably illustrated in New York state, will, while perhaps reducing the maximum profits of good years, protect the cultivator in some measure from the disasters of dry seasons, inasmuch as the periods of planting and harvesting differ widely in the case of the several crops which would probably form the subject matter of such cultivation in western Kansas, Nebraska, and Dakota.

There remains, moreover, to be brought into account the body of lands in the arid region, fairly subject to irrigation, which may be taken up under the desert land act, and for which a sufficient amount of water is now found in the streams. The aggregate extent of these lands is stated by the public land commission at 30,000,000 acres. There is reason to believe that large portions of this will soon, and all of it eventually, be made productive by systems of reservoirs and irrigating canals.

As the joint effect of all these considerations, I reach the conclusion that it is not unreasonable to suppose that the extent of lands actually occupied for the production of exportable crops may go on increasing to the close of the century. Supposing the amount of arable lands in the possession of individuals disposed to cultivate them to attain, at that date, its maximum, the further question arises, what term may then be allowed us, as a people, for continuing our traditional system of cropping, with something like the degree of immediate profit to the owner of the soil (for, let it be borne in mind, it has never been the greed of occupiers who were not owners which has led to the steady pursuit of this system in the past) which has heretofore attended it?

Any answer that might be given to this question would, of necessity, be very largely conjectural. What with improvements in agricultural methods and appliances, which are certain to be sooner apprehended and more widely used here than anywhere else in the world; what with the rapid extension of our railway lines; what with the intensification of culture, either through the subdivision of existing landed properties, or through the multiplication of hired hands upon the larger farms, I see no reason to doubt that throughout the first half of the coming century the production of the chief staples of American agriculture might go on increasing, not only absolutely, but even per capita of population, as it has increased from 1800 to the present time, new lands, now nominally occupied, but not cultivated up to a half, a quarter, or a tithe of their capability, coming in not only to make good the loss by exhaustion of lands now of full bearing virtue, but to allow the increase of our population up to the gigantic total of a hundred or a hundred and twenty-five millions, without impairing our ability to export as largely and as variously of agricultural produce as to-day.

But there is even a better prospect for our agriculture than this. The powerful reasons, economical and political, which have, in the past, justified the cultivation of the soil, in some degree at the expense of future generations, have mainly ceased to exist, and will soon disappear altogether. The country, in its arable parts, is settled, and the line of population now rests near the base of the great sterile mountains which occupy so large a portion of the continent. The accumulations of capital out of the profits of American agriculture, under the system of cropping that has been described, have been so great at the north and west as even to keep ahead of the occasions for their remunerative investment, as is shown by a falling rate of interest; and there is no longer any reason to be found in the scarcity of capital for postponing the systematic cultivation of the soil. Lastly, the political reasons which made the early settlement of the country so urgently desirable, are no longer of force.

With adequate labor power and capital power, and with all national exigencies satisfied, the time has come when economical and political considerations alike demand that the soil bequeathed to this generation or opened up by its own exertions, shall hereafter be deemed and held as a fund in trust for the American people through all time to come, not to be diminished or impaired for the selfish enjoyment of the immediate possessors.

Down to this time our apparently wasteful culture has, as I have sought to show, been the true economy of the national strength; our apparent abuse of the capital fund of the country has, in fact, effected the highest possible improvement of the public patrimony. Thirty-eight noble States, in an indissoluble union, are the ample justification of this policy. Their school-houses and churches, their shops and factories, their roads and bridges, their railways and warehouses, are the fruits of the characteristic American agriculture of the past.

But from a time not far distant, if indeed it has not already arrived, a continuance in this policy will be, not the improvement of our patrimony, but the impoverishment of our posterity. There will be all the difference between the past and the future, in this respect, morally, economically, and patriotically considered, which there is between the act of the strong, courageous, hopeful young man, who puts a mortgage on his new farm, that he may stock it and equip it for a higher productiveness, and the act of the self-indulgent man of middle life who encumbers his estate for the purposes of personal consumption.

BOSTON, August 1, 1882.