

## AGRICULTURE AND RURAL LAND USE

As one travels across Colorado there is often the impression that much of the land is devoted to agriculture of one sort or another. Herds of cattle and sheep graze in the mountains, plateaus, and plains of the state, or they fill huge feedlots. In the major river valleys, fields of corn, beans, sugar beets, alfalfa, and vegetables, as well as orchards of apples, peaches, cherries, and grapes appear to fill the landscape. Elsewhere, it is common to encounter broad fields of small grains, especially wheat and barley.

Colorado is an important agricultural state. Among all the states, Colorado ranks 10<sup>th</sup> or higher for more than thirty-five of the commodities produced on its farms and ranches. Still, perceptions can be misleading. For example, less than 3 % of the resident population is directly involved in agriculture. Moreover, almost one-half of all counties are experiencing a decrease in the amount of land devoted to farming. Many things account for this, including land taken out of production for conservation purposes, competition for water, and land converted to residential or other non-agricultural uses.

### READING THE MAPS

The first map in this series uses a technique called graduated pie-charts to convey patterns of RURAL LAND USE. Typically the colors are the first element to attract attention. These depict one or more of three land use classifications for each county. From these it is possible to quickly judge if a county's land area is primarily devoted to crops, pasture and rangeland, or woodland. Notice also that the size of the circle (or pie) represents the total amount of land in the three uses just listed. Be aware also that some counties with large land areas may have relatively small pie charts. In such cases much of the county's land may be owned by the Federal Government and thus does not get classified according to our three-fold land use classification.

Two patterns emerge at once. Eastern and northeastern Colorado contain much land that is farmed, meaning that it is normally planted to some type of crop. Yet this same region also has significant amounts of pasture and rangeland. The second impression created by this map is that throughout Colorado much land is classified as pasture and rangeland. Some of this is actively grazed by cattle and sheep, but some of the land in this use is actually idle or has little agricultural production. However, notice also that much of the land in counties in the mountains is not classified as woodland but as pasture. Mountain lands are often used for summer grazing and thus fall into the classification of pasture and rangeland even when they may be forested.

\* \* \*

The map of CROPLAND HARVESTED CHANGE 1949 TO 1997, must be examined with care. Notice in the legend that three of the four classes depicted represent a reduction or loss of cropland that is harvested. As mentioned in the introduction, agriculture in Colorado is experiencing significant change, but the change is not uniform.

Two regions are evident in which cropland increased between 1949 and 1997. The eastern region contains seven counties, five of which are along the Colorado-Kansas border. If you glance back at the RURAL LAND USE map it is clear that in these counties cropland constitutes one-half or more of each counties' area. This is truly rural Colorado and there is little competition for land apart from agriculture.

Cropland is also being expanded in and around the San Luis Valley in south central Colorado. Potatoes, malting barley, and lettuce are among the dominant crops in this region of growth. Notice again that this is a very rural portion of the state,

One factor linking the two cropland growth regions is a very modest rate of population growth. Between 1990 and 2000, the eastern region grew by 9 %. However, if Adams County is excluded (since it extends into the Denver Metro area) the growth rate drops to just over 4%. In the southern region the

decade of the 1990s produced a 17% increase in population. But neither region came close to matching Colorado's overall growth for the period, which exceeded 30%. What emerges are two regions with expanding cropland but comparatively little growth in population. This is made possible by modern agriculture in which fewer people farm more by heavy reliance upon mechanization.

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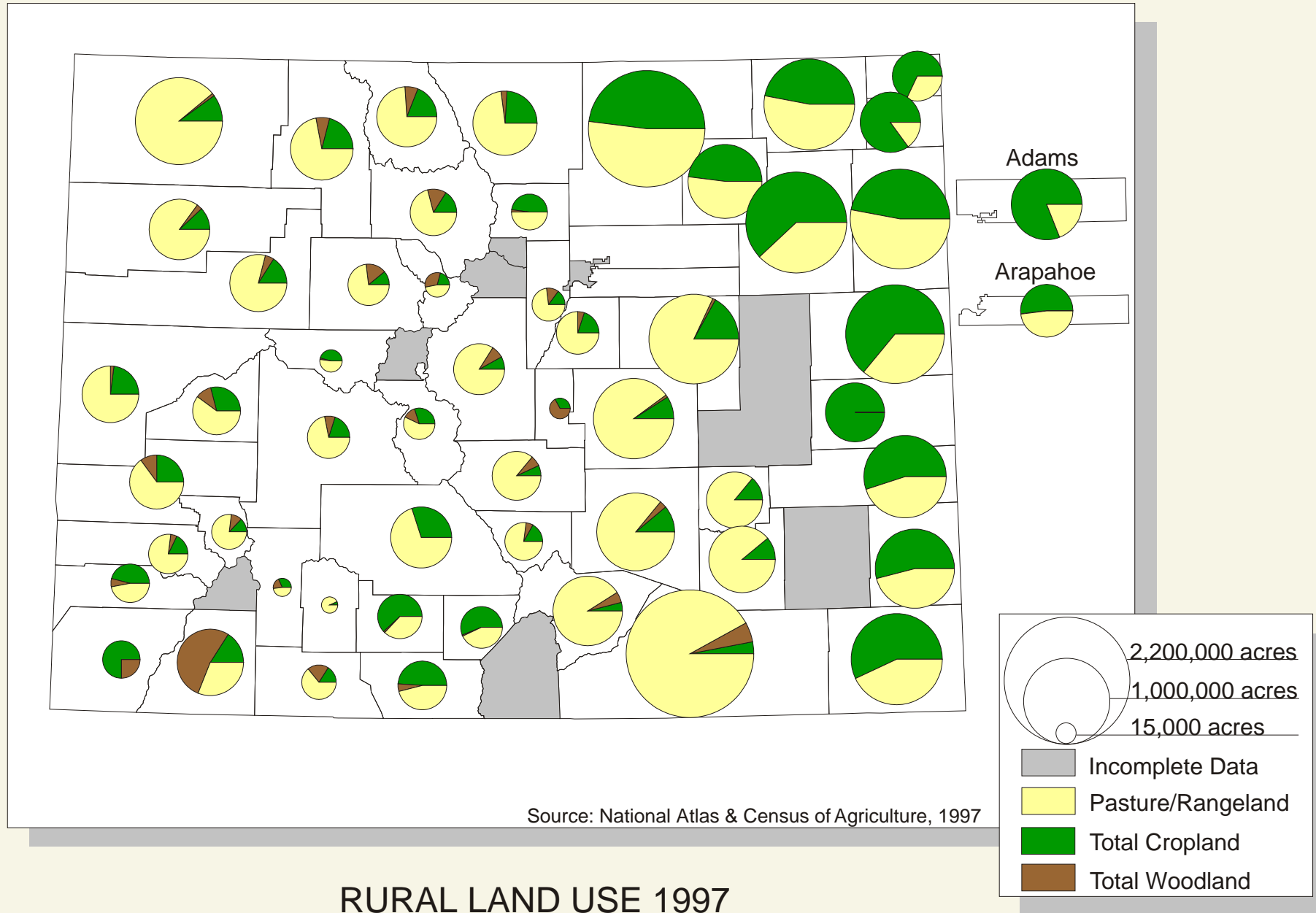
The collection of agriculture-related maps that follows includes both choropleth and dot-distribution maps. A variety of information is depicted including farm and ranch characteristics and crop and livestock distributions. The dot-distribution maps may be somewhat unfamiliar at this point. Remember this about such maps. Each dot represents a certain quantity of the item being depicted. By viewing the concentration or dispersion of dots, that is their relative density within a county, an impression of comparative importance is gained. Also, it is important to remember that the dots do not represent the actual location of the item being mapped. Rather, the computer program used to generate these maps randomly distributes the dots within the counties' boundaries.

## QUESTIONS TO THINK ABOUT

While Colorado is a relatively large state (in area the 8<sup>th</sup> largest in the U.S.), there are a number of conditions that might limit how much its farms and ranches can produce. A partial list of these conditions or factors includes the portion of the state that is mountainous, the high average elevation of Colorado, and the relative aridity.

Can you discover on the maps of AGRICULTURE AND RURAL LAND USE patterns that reflect these physical constraints? Or patterns that suggest ways in which Colorado's residents have worked to overcome such constraints?

Economic, social, and political conditions also impact Colorado's agriculture. Can you think of any? Perhaps you can interview a farmer or rancher about his business. There are also books, magazines, and websites that provide information about agriculture. A good starting point is <http://www.ag.state.co.us/> the URL for the Colorado Department of Agriculture.



RURAL LAND USE 1997

# RURAL LAND USE 1997

## READING THE MAP\*

Segmented, proportional circles, also called pie charts, convey two types of information. In the current map it is possible to see the comparative or relative use of land within each county. Then, by comparing the size of the circles and their relative segmentation, one can make comparisons between or among counties.

Green was chosen as a strong color and symbolic of cropland, i.e., things being grown. It is immediately apparent that the eastern Colorado plains dominate in terms of the relative amount of land that is devoted to farming. Remember, this does not necessarily mean that production of crops is always greatest in the counties with the largest circles and the highest share of green, though that would be a reasonable association in most cases. Also remember that the measure is total cropland and does not distinguish between crops that are irrigated and those that are not.

Modern mechanized farming is best performed on flat to gently sloping terrain. For this reason eastern Colorado stands out in terms of the proportion of its area that is cultivated or farmed. However, with one exception even the plains counties have mixed land use. Some of the factors that influence whether land is used for crops or pasture/rangeland are availability of water, soil types, and terrain. At different times in Colorado's history much land that was perhaps best suited for grazing cattle was plowed in order to plant crops. One such episode in the late nineteenth and early twentieth centuries contributed to the infamous Dust Bowl of the 1930s. More recently, the ability to pump water from underground sources has allowed former rangeland to be farmed successfully.

The relatively small fraction of land in crops in central and much of western Colorado is explained by both terrain and water availability. The Rocky Mountains do not typically lend themselves to cultivation except in river or valley bottoms. To a lesser degree this is true of the plateau regions of western Colorado as well.

Note that with the exception of La Plata County, very little land use is classified as Woodland. This classification is understandably most common in Colorado's

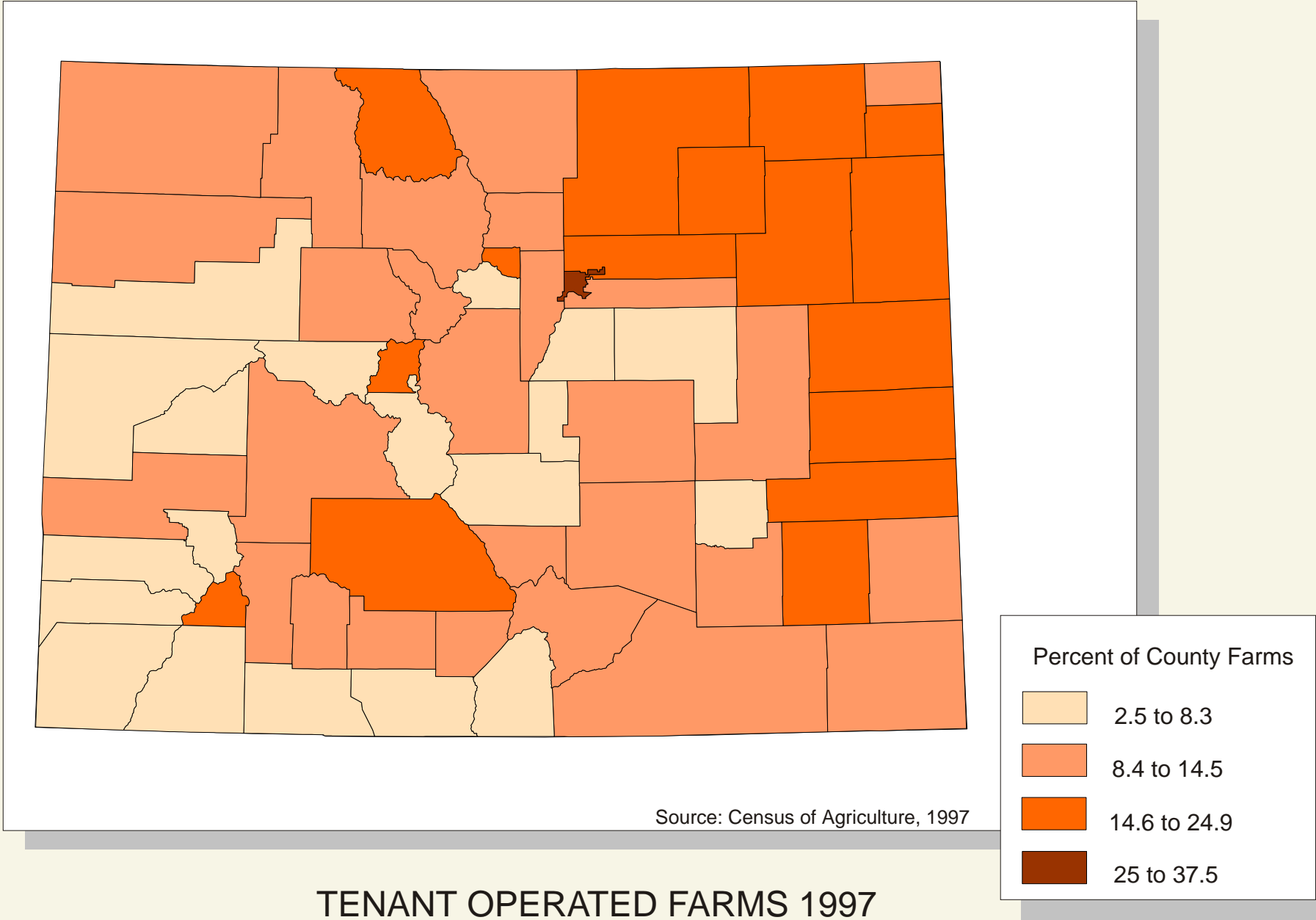
mountain counties. However, many forested areas of the state are also used for grazing and this may reduce the Woodland designation by shifting some of it into the Pasture/Rangeland category.

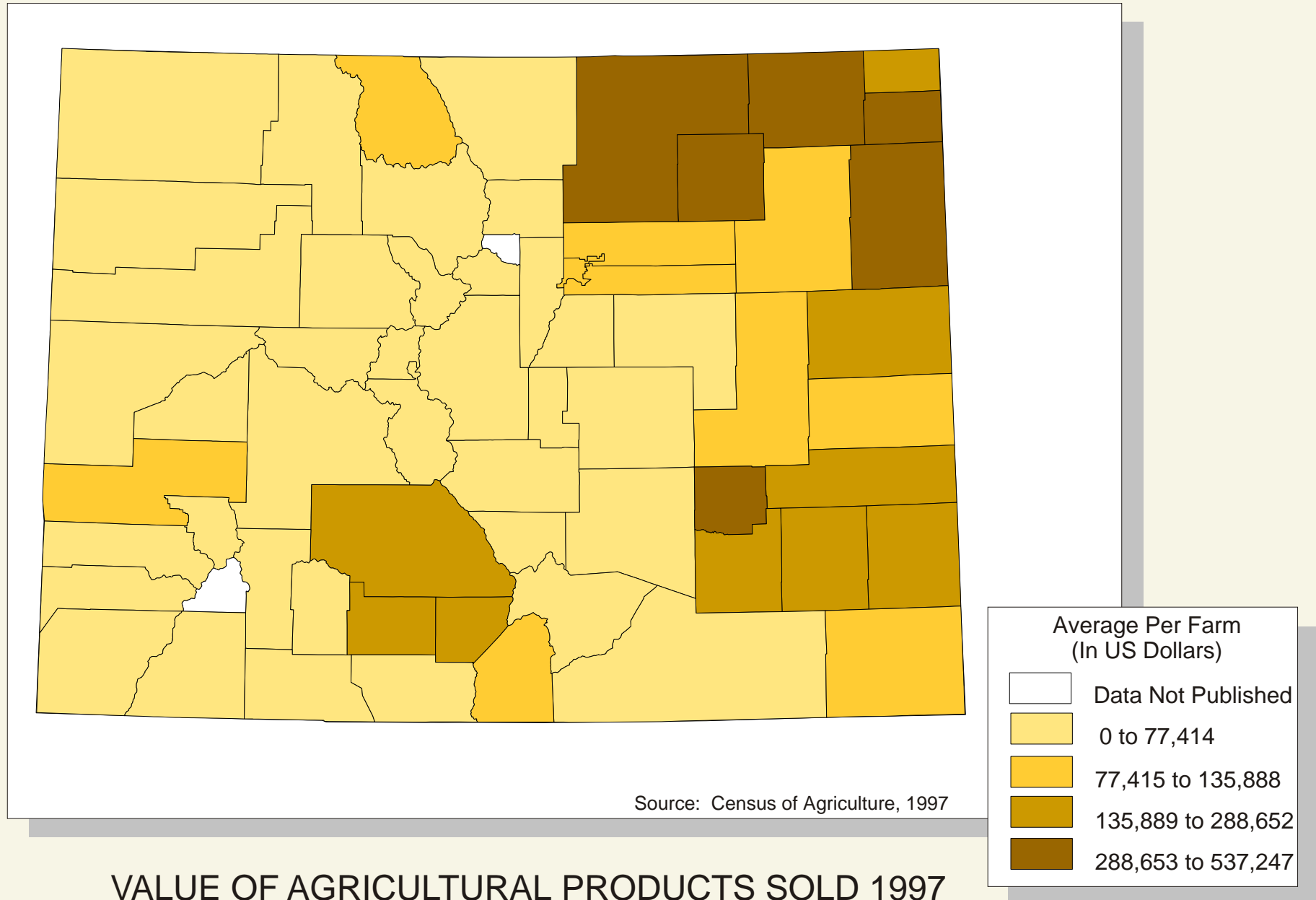
**\*NOTE:** It appears that Adams and Arapahoe Counties have been moved into Kansas. In fact, the circles for these two important counties could not be fitted into their actual location and instead had to be shown as an inset. This is a common cartographic technique.

### QUESTIONS TO THINK ABOUT

Most counties that are large in area have large land use circles or pies, e.g., Kit Carson, Las Animas, Washington, Weld, and Yuma counties. However, this is not always the case. Look for counties where the circle is much smaller than the county. How do you explain this? Are there other land use classifications that might account for the rest of the land in these counties? What might these be?

What changes or kinds of things might cause a shift in rural land use in Colorado? Can you anticipate factors that would cause cropland to be converted to pasture, or pasture to be converted to cropland? What might produce a change in the percent of land in Woodland? Are these factors related to the natural environment, changes in population, new laws, the state or national economy?





# VALUE OF AGRICULTURAL PRODUCTS SOLD 1997

## READING THE MAP

When viewing a choropleth map the eye is naturally drawn first to the pattern of colors or shades, especially the darker ones. However, it is important to quickly turn attention to the legend to understand what is being depicted and how that depiction is organized. In the present map the critical unit is average value of products sold per farm or ranch. Notice also that the range of values depicted in the four class intervals range tremendously, from 0 to more than half a million dollars in sales for an individual agricultural enterprise in a single year.

A first impression is that northeastern Colorado contains a majority of the counties with the highest average sales. Three of the counties are in the South Platte Valley, with two others adjacent. Notice next a region of five counties, one in the highest interval and four in the next highest. These occur in southeastern Colorado's Arkansas River Valley. Finally, there is a three-county region in the next to highest interval in southern Colorado corresponding to the northern end of the San Luis Valley. At this point you should be asking yourself if there is a common trait or situation that links these three highly productive regions, that is, beyond their productivity. The most evident commonality is that all three contain sizeable areas of irrigated agriculture. There may be others.

One should not assume that only the counties in the upper class intervals contain productive agriculture. Remember, the map is showing the value of sales for the average farm or ranch for that entire county. Other counties may have some very productive farms or ranches, but the presence of many less-productive units brings the county average down. Indeed, in some Colorado counties farms and ranches are being broken up into smaller parcels for people who want to live in the country and perhaps farm or raise livestock on a small scale. It also may be that for the year indicated (1997), the value of the products sold is not indicative of the normal productivity of farms or ranches. Some of Colorado's larger agricultural holdings, including dryland grain farms and ranches, have not been consistently productive in given years owing to a



variety of factors. These include weather conditions, plant or livestock diseases, and uncertain markets or prices for the commodities in which these large operations specialize.

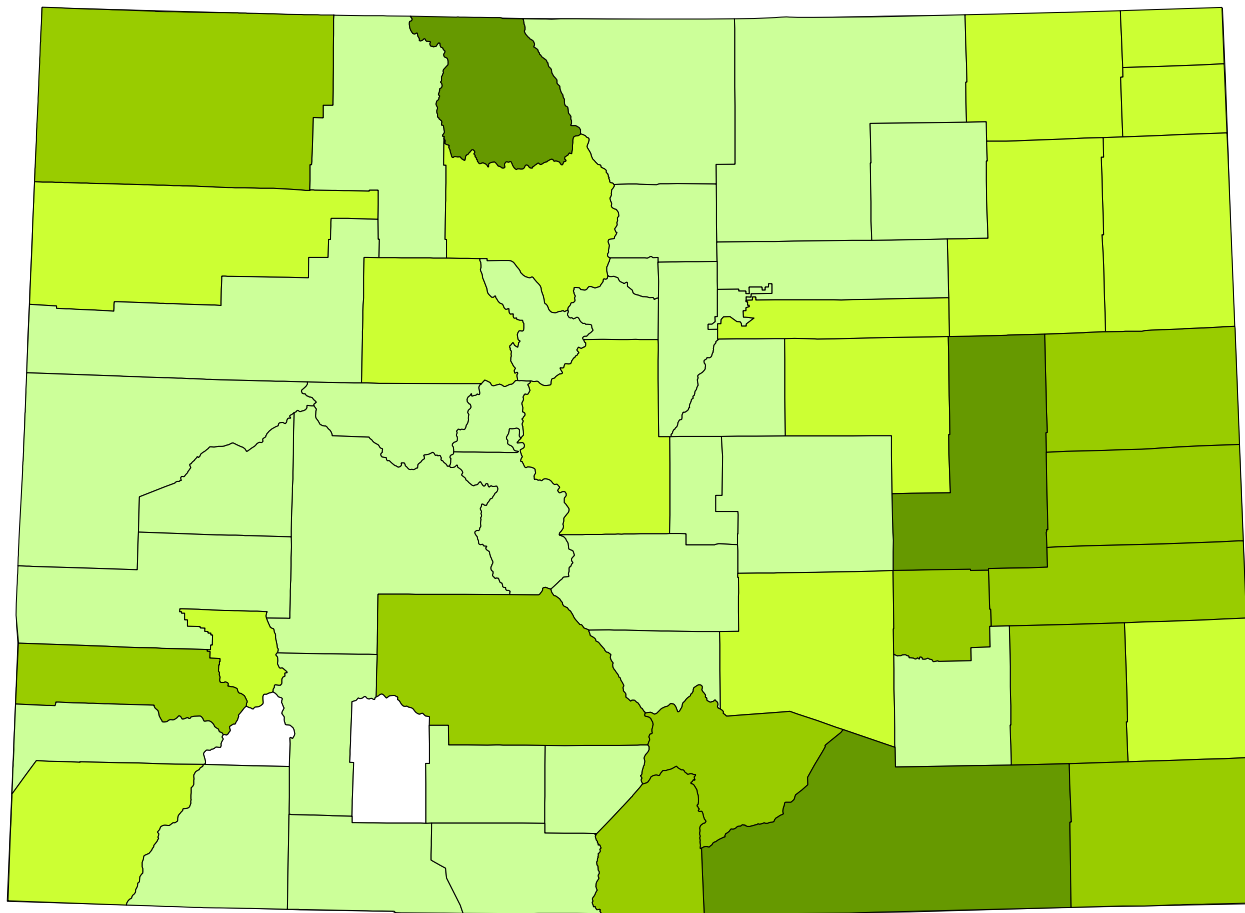
## QUESTIONS TO THINK ABOUT

What, then, does the map tell you? Mainly this: you are more likely to find in the counties in the highest class interval (dark brown) farms or ranches that sold significant quantities of goods in 1997. It does not mean that all the agricultural operations in these counties are highly productive; nor should you assume there are no highly productive farms or ranches in the other intervals, even the lowest (light yellow). Remember you are dealing with county-wide **averages**.

Do you think farming and ranching conditions in Colorado were the same or different compared to 1998, or 2000, or 2004? Remember that farmers and ranchers must deal with many environmental conditions that can change from year to year or even week to week. What are some of these? Examples can include precipitation (too little or too much), temperatures (too high or too low), wind, hail, and various pests or diseases. Even the report of diseases elsewhere, such as “Mad” Cow Disease, can have a great impact on what a rancher or cattle feeder receives for his animals.

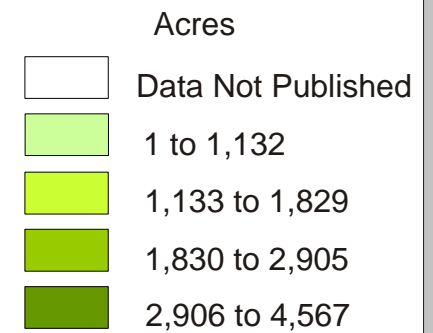
How do you explain the apparent relationship between location, irrigation, and agricultural production in Colorado? Which crops or products require irrigation? Which do not? Can livestock benefit from being in irrigated regions?

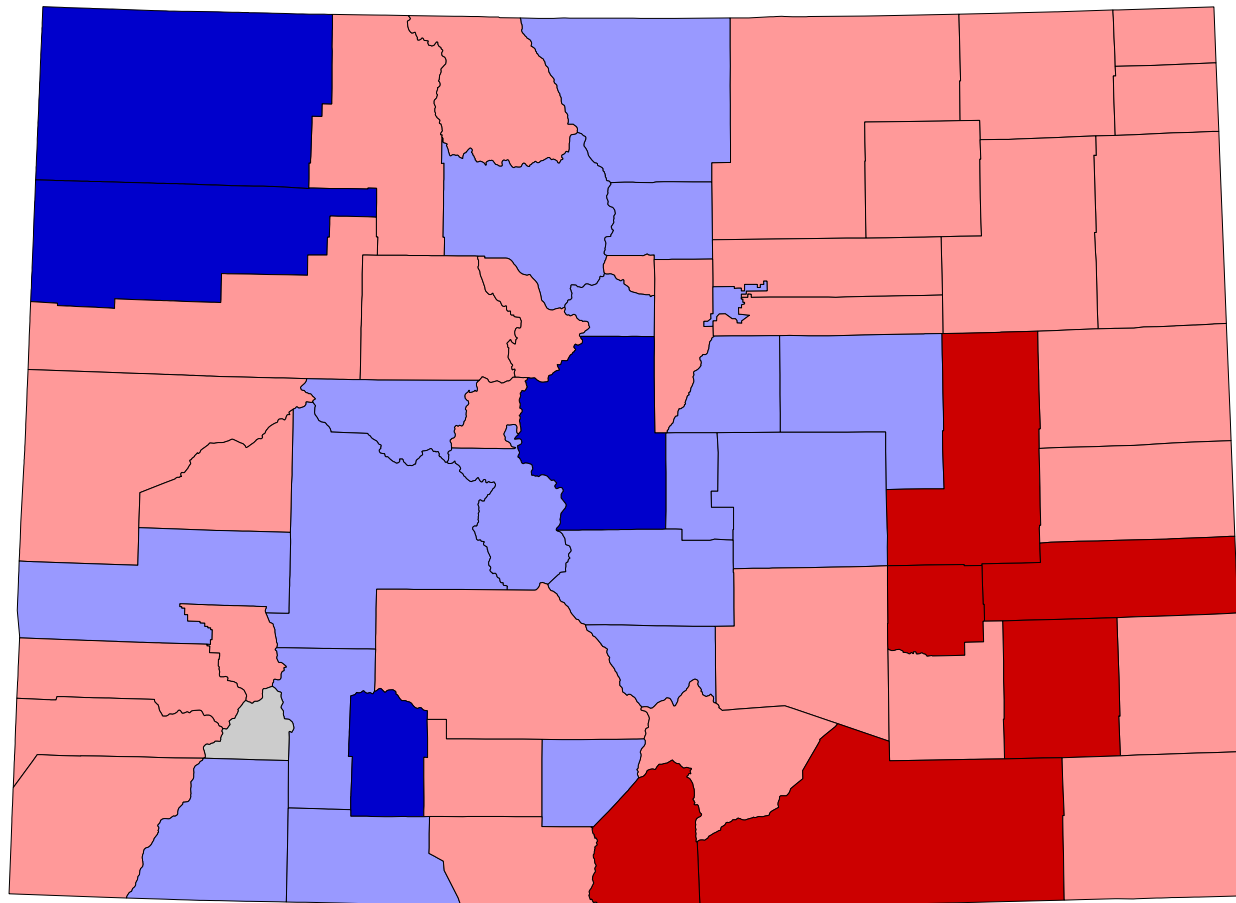
If a map shows conditions or a situation for just one particular year, is that good? Might there be a better or more accurate way to depict information? Would a multi-year average be a better way to measure and map some topics? Does it depend upon the topic you are trying to analyze and explain? When we choose information to map, what kinds are basically the same year after year and what kinds can change frequently?



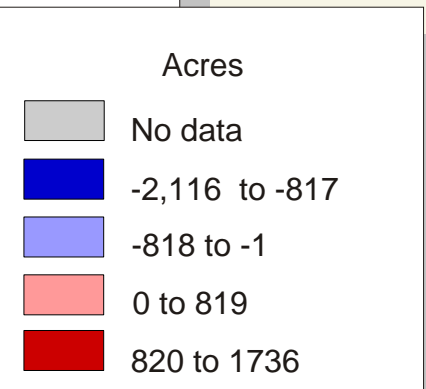
Source: Census of Agriculture, 1997

## AVERAGE FARM SIZE 1997

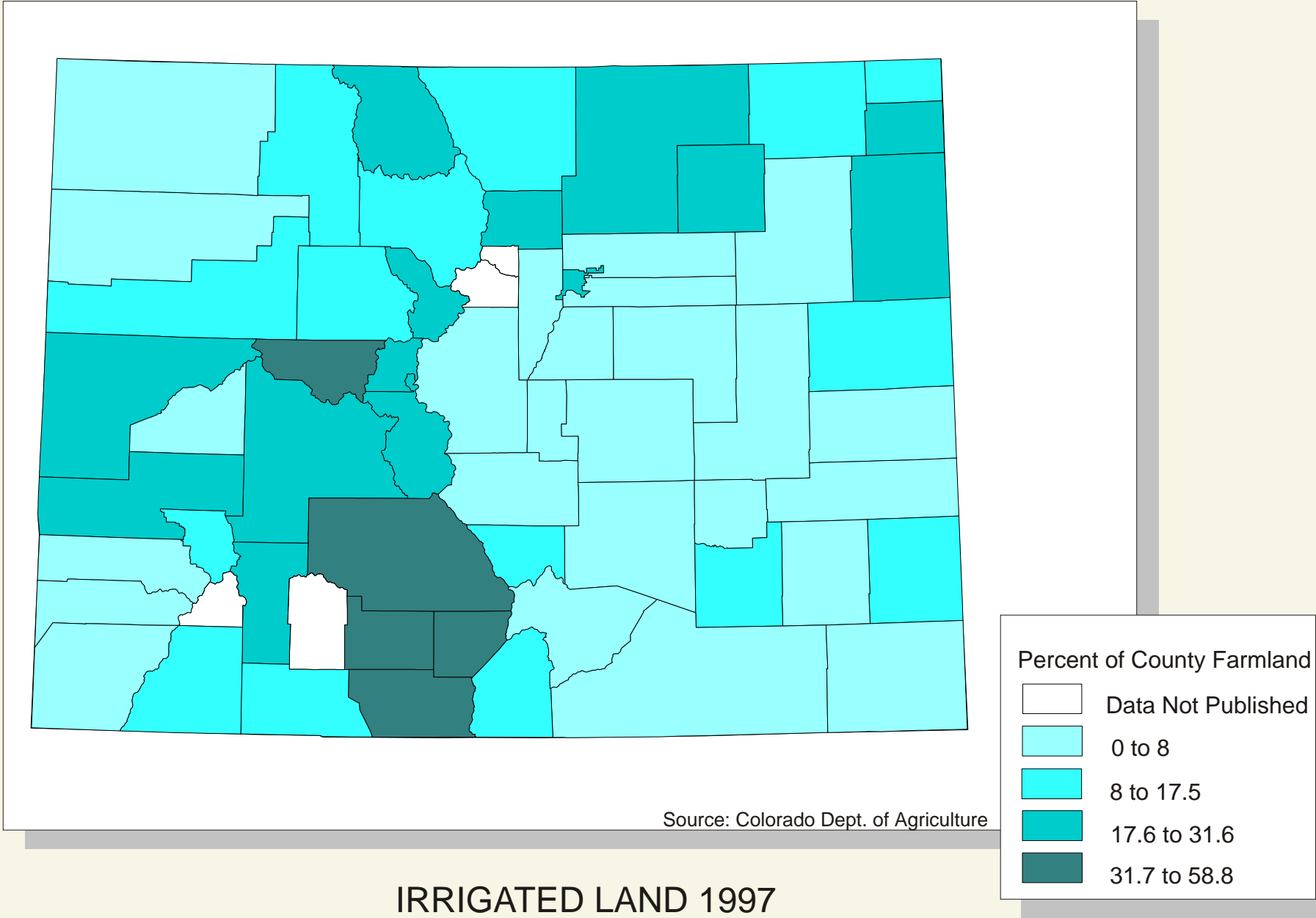


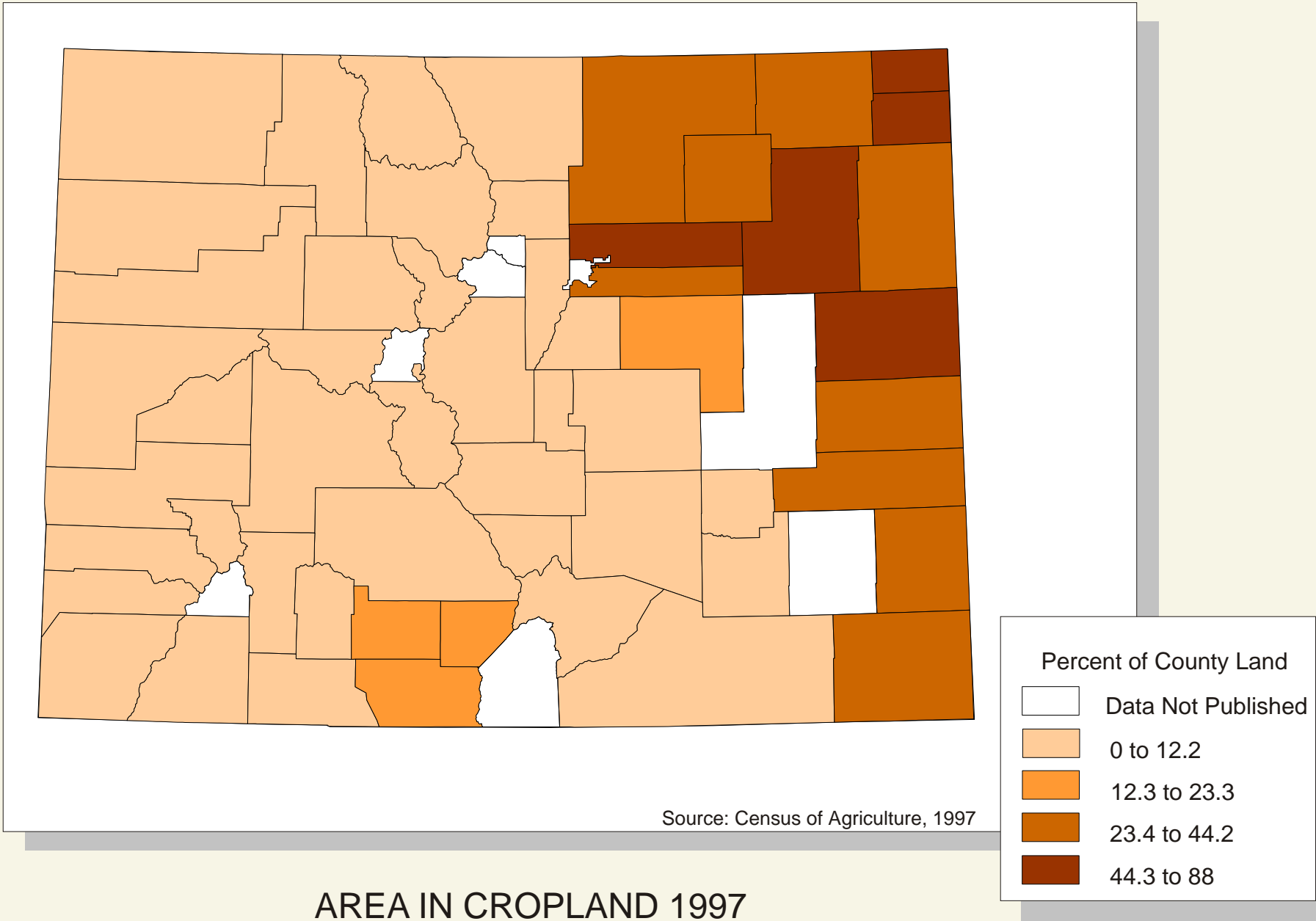


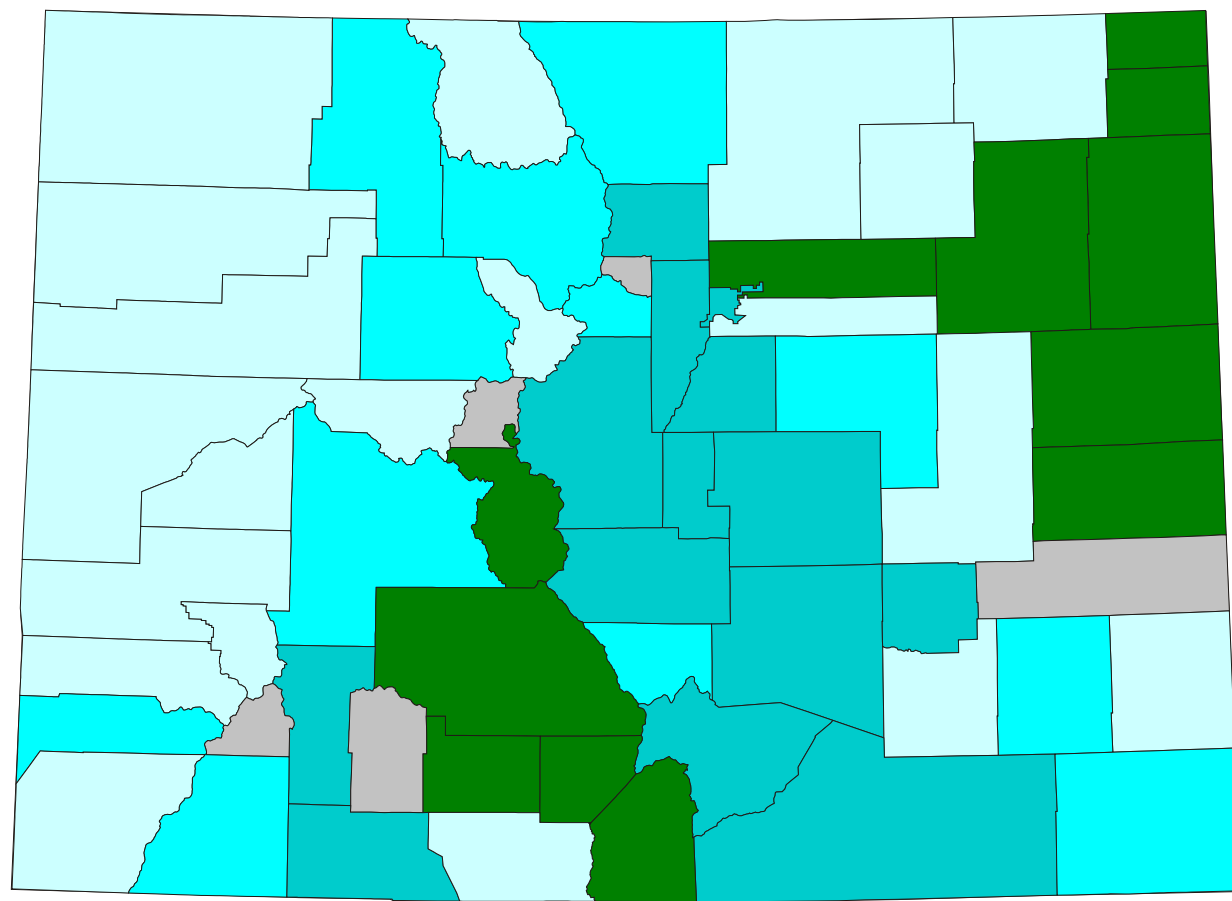
Source: Census of Agriculture



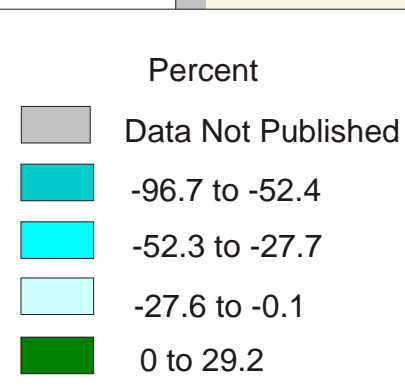
CHANGE IN AVERAGE FARM SIZE FROM 1949 TO 1997



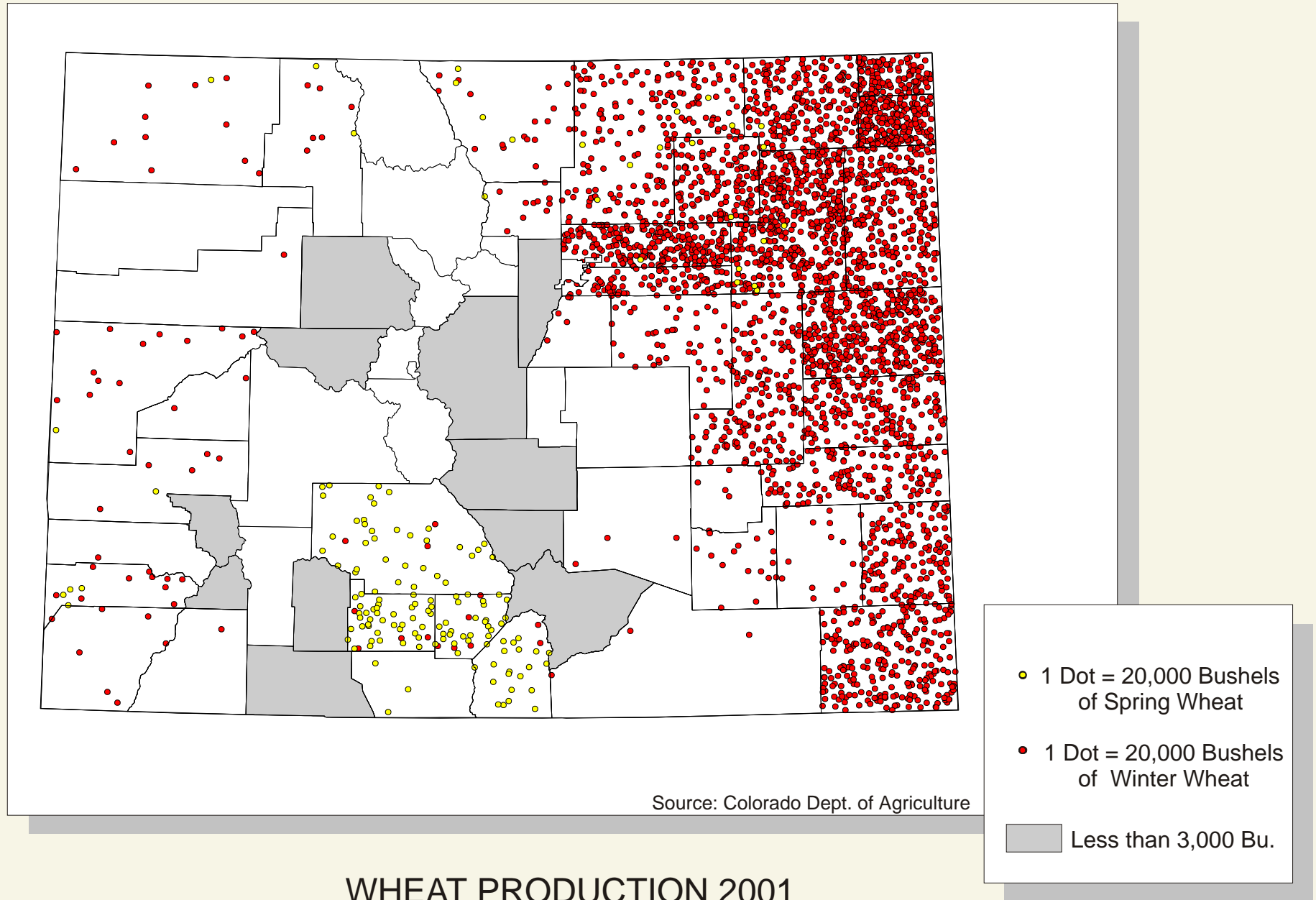


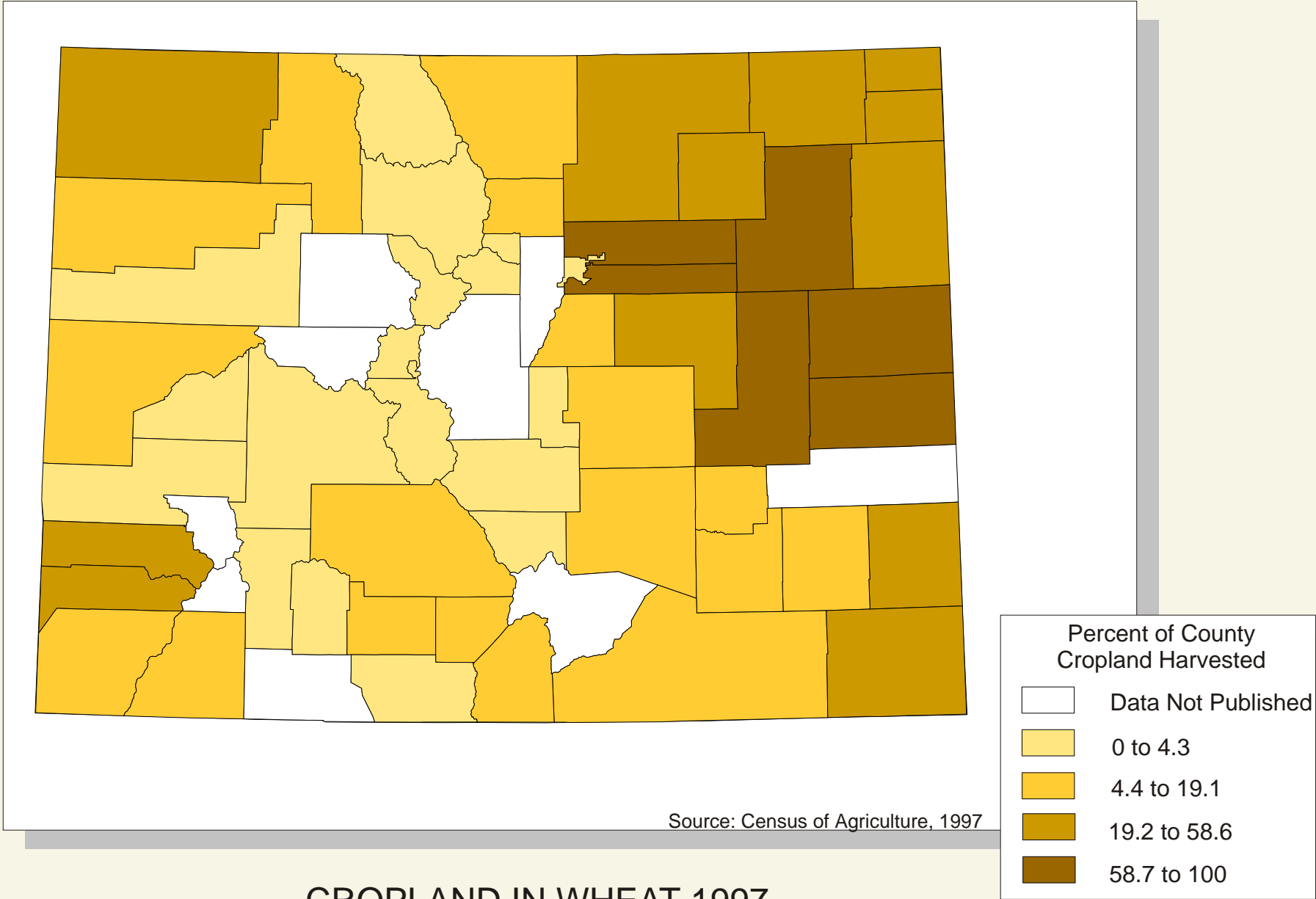


Source: Census of Agriculture, 1950 & 1997



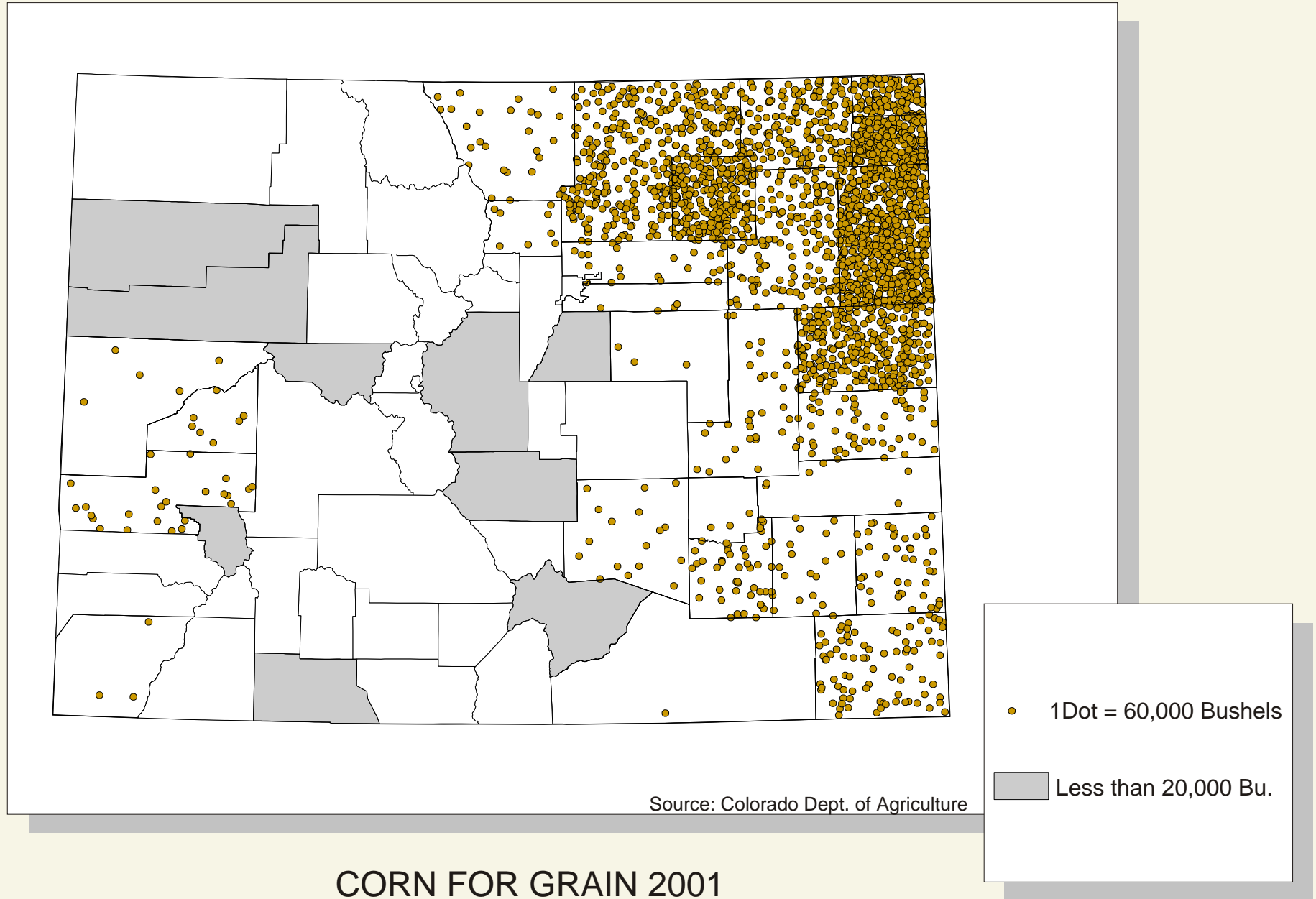
## CROPLAND HARVESTED CHANGE 1949 TO 1997

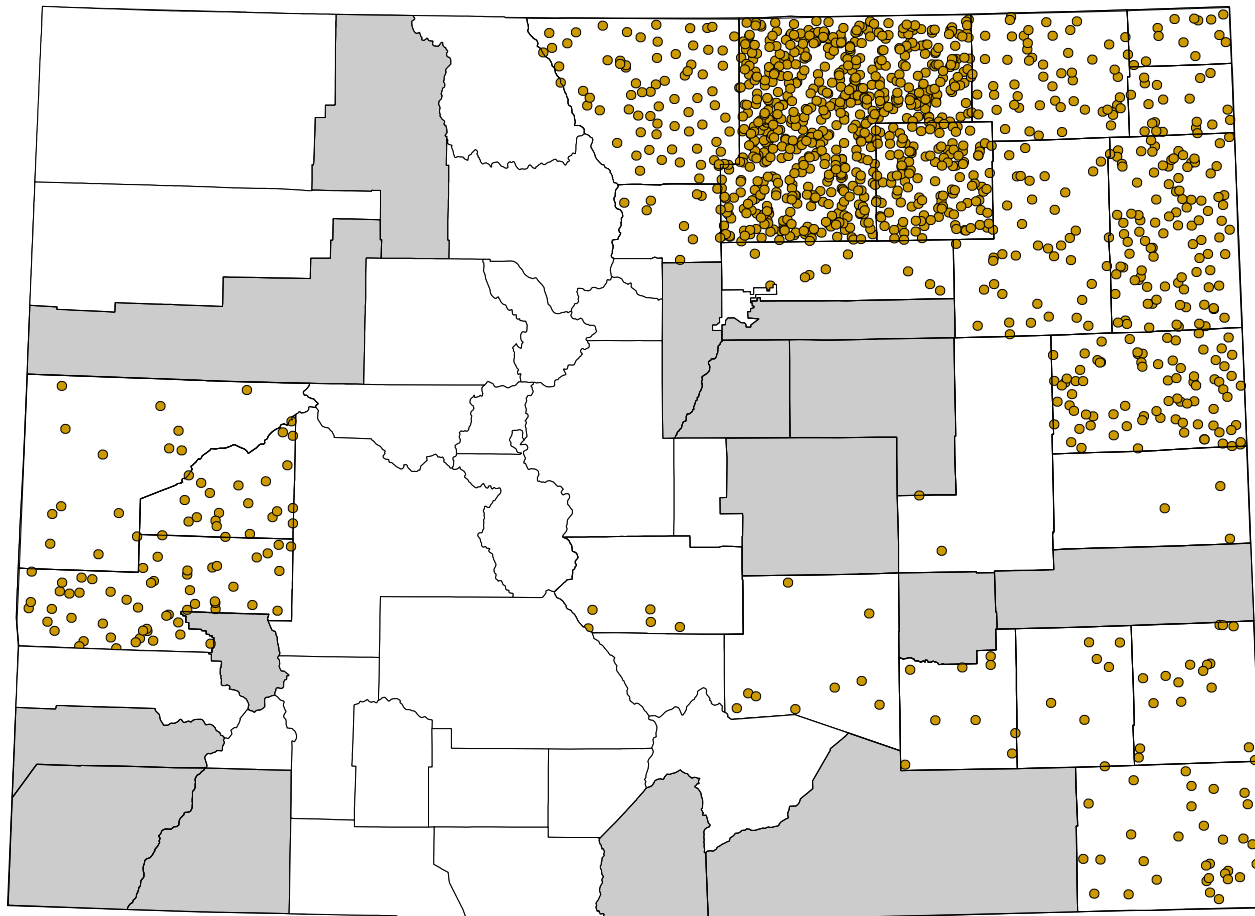




CROPLAND IN WHEAT 1997







Source: Colorado Department of Agriculture

• 1 Dot = 2,000 Tons

■ Less than  
1,000 Tons

## SILAGE PRODUCTION 2001

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## READING THE MAP

Silage, corn chopped while green, is a specialized feed for livestock. Whereas corn for grain is fed to everything from chickens to hogs to cattle, silage is almost exclusively used as feed for the latter. Consequently, there is a spatial correlation between the production of silage and the presence of feedlots and dairies. A second correlation is with irrigation since most corn grown for silage, in order to attain maximum tonnage, is irrigated.

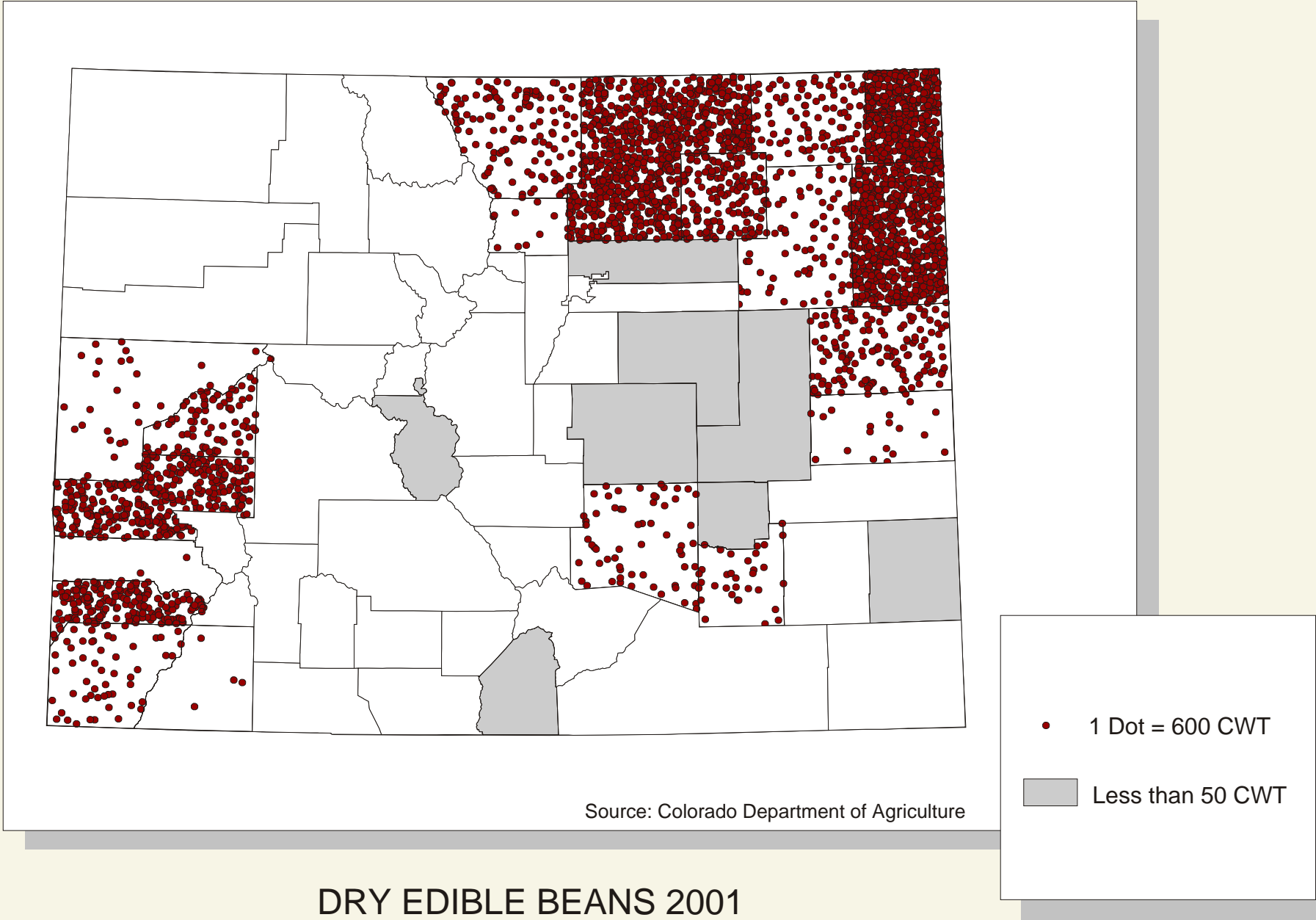
The dominant silage producing region is in the central South Platte Valley. Weld and Morgan counties together account for one-half of the state's total production. Other counties in the South Platte drainage are also important, as are Yuma and Kit Carson counties adjacent to the state's northeastern border. Secondary regions are located in the lower Arkansas River Valley and the Colorado river drainage in extreme western Colorado.

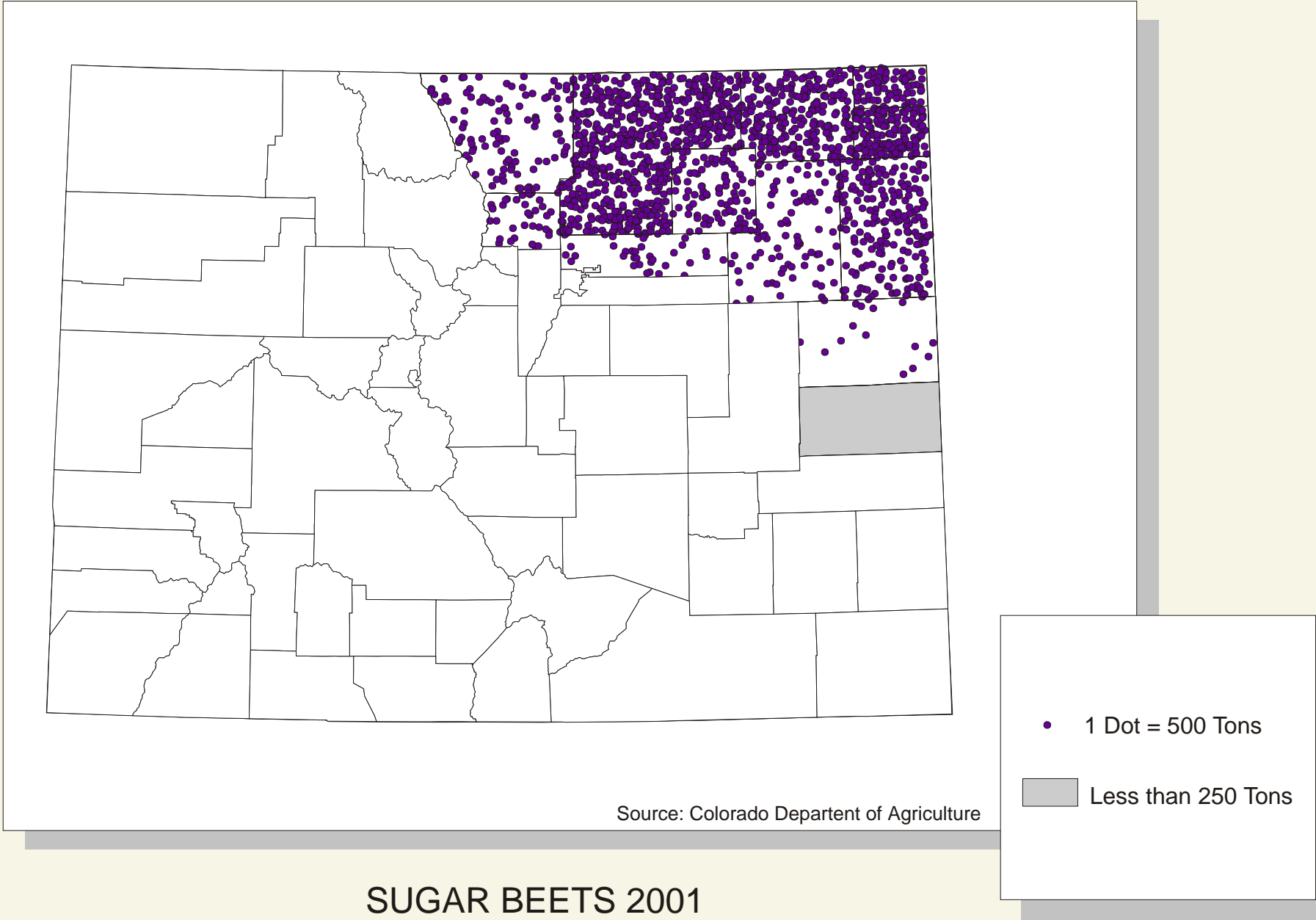
The spatial relationship between cattle and silage is reciprocal. Corn silage is typically stored in large pits (trenches in the ground) within a few miles of where the crop is grown. Since cattle are more mobile they are brought by truck to feedlots and dairies within the silage growing area. On the other hand, the presence of a large feedlot or dairy will encourage local farmers to grow silage corn to serve these markets.

## QUESTIONS TO THINK ABOUT

Why does it make more sense to haul cattle to the corn than vice-versa? Some kinds of cattle feed are hauled considerable distances, in fact, across several states. So why is corn silage not transported over long distances?

The answers to these questions involve both weight and the value, by weight, of feed versus cattle. A semi-truck load of corn silage, weighing approximately thirty tons, has a value of between \$600-\$700. A similar truck loaded with one hundred beef cattle, each weighing 400-500 pounds, can be worth more than \$50,000. To haul the same value of product, the truck carrying silage would need to make more than seventy-five trips to equal the value of one truckload of cattle.





# SUGAR BEETS 2001

## READING THE MAP

It is immediately apparent that current sugar beet cultivation in Colorado has a very concentrated distribution. While beets may be grown in some of the counties shaded in gray, the total amount is insignificant. Two variables largely dictate the dominance of northeastern Colorado. First, sugar beets in Colorado require irrigation. At one point significant amounts were grown in the Arkansas Valley and on the lower Colorado River, in addition to the Platte Valley of northeastern Colorado. However this broader distribution has been shrinking in recent years. For example, between 1997 and 2002, the total acreage and production each declined by more than 40 percent. The second locational variable for sugar beet production is access to refining facilities. Once harvested, sugar beets must be quickly refined. Unlike some other crops beets cannot be stored for long periods. Historically, sugar refineries were more widely dispersed in Colorado but today they operate only in northeastern Colorado. In a real sense sugar beets and sugar refineries are spatially co-dependent.

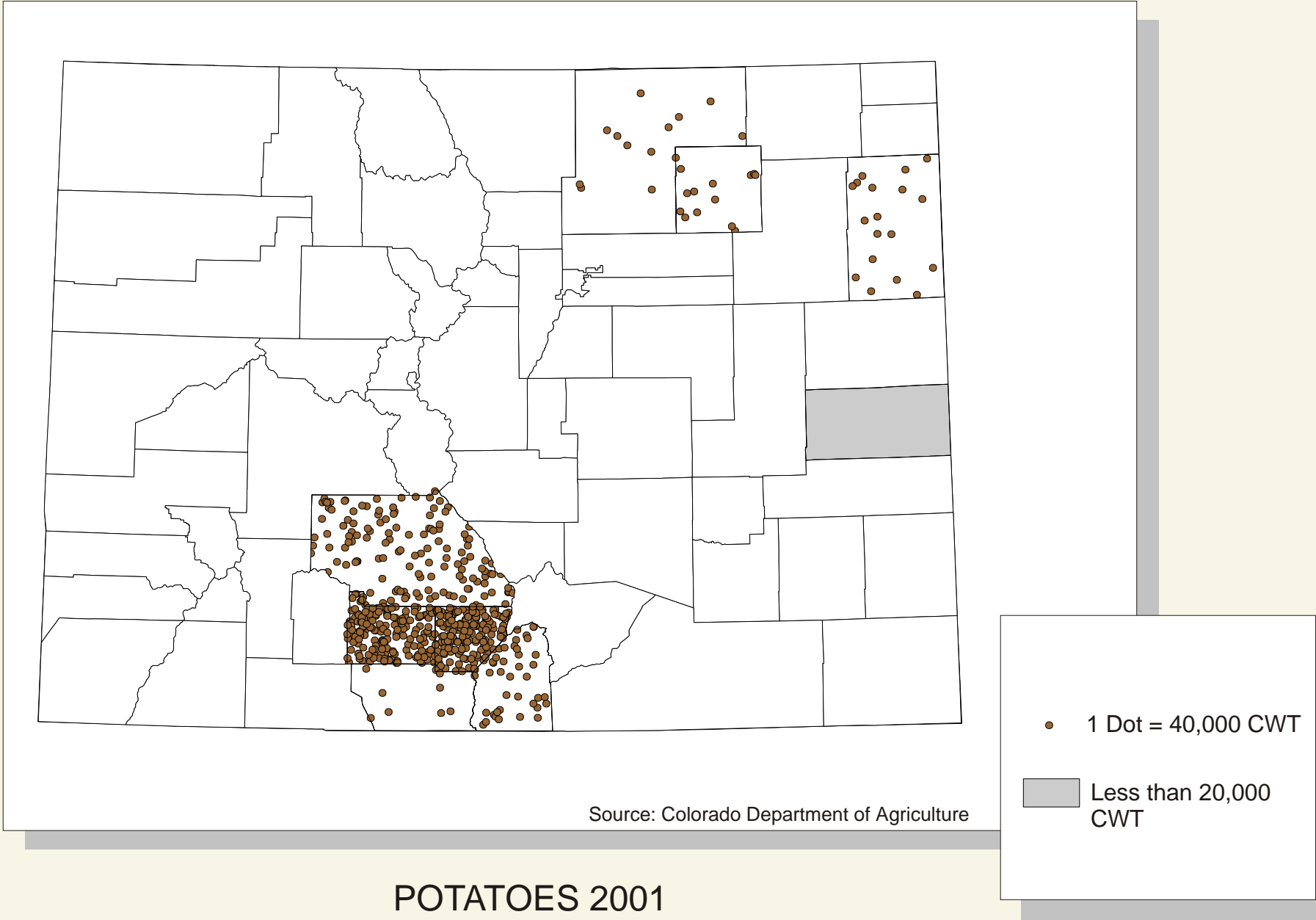
## QUESTIONS TO THINK ABOUT

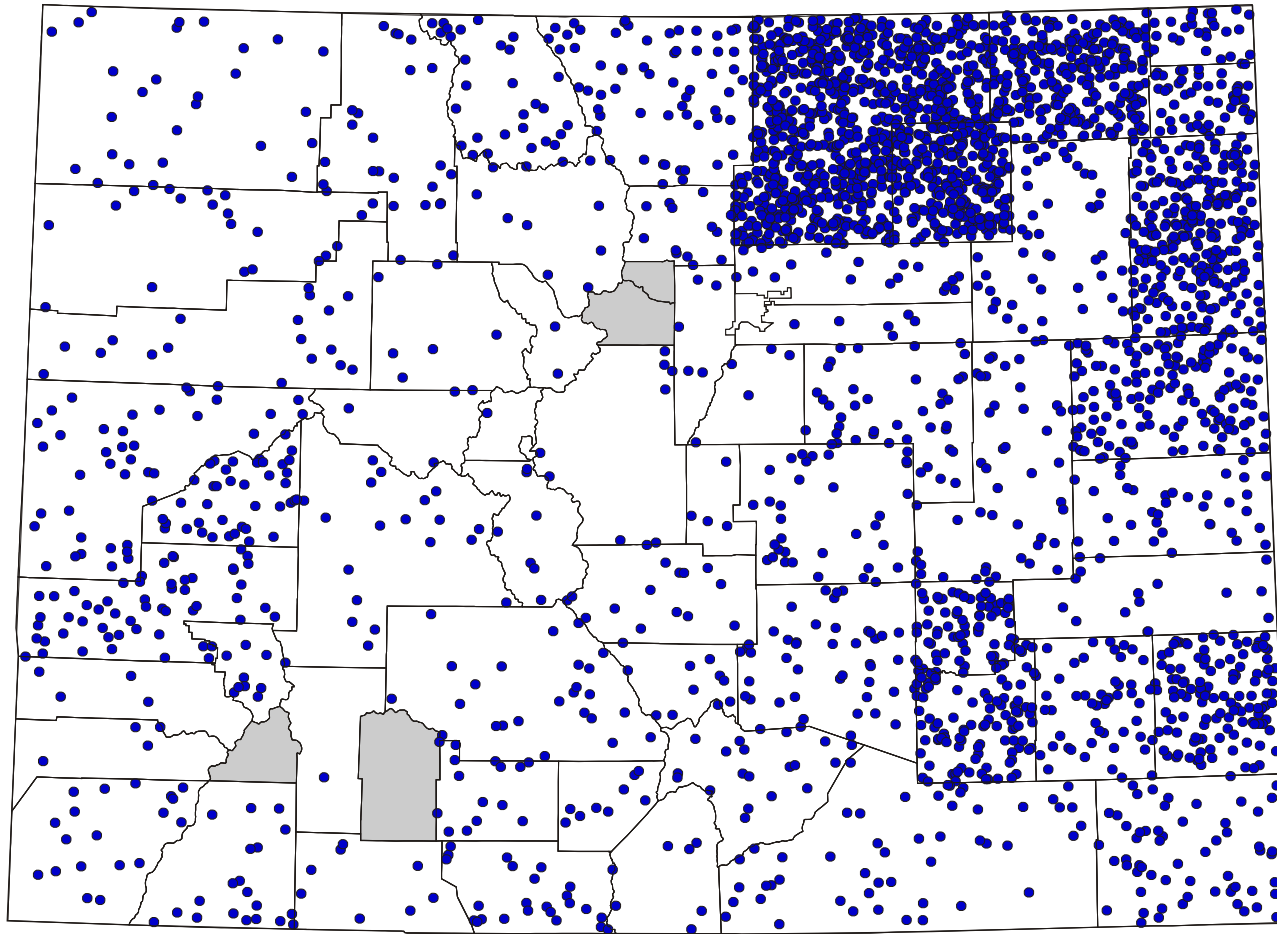
Crop regions are subject to constant change. For example, at one time the present U.S. "Corn Belt" was actually more important for growing small grains such as wheat, oats, and barley. Competition from higher yielding corn effectively "pushed" small grains westward into drier regions. In Colorado, the sugar beet region is also experiencing change. In the past sugar beets were considered an important cash crop, one that potentially earned the farmer more per acre than wheat or hay or vegetables. How has this changed?

Two factors impacting sugar beet farming are changes in diet and foreign competition. In the first case there is a concern about healthier diets, which usually is interpreted as eating less sugar or at least using more sugar substitutes. In fact, sweeteners made from corn are increasingly important.

Sugar produced in the U.S. comes from both beets and sugar cane. Much of the latter is grown on the Gulf Coast from Florida to Texas. However, most of the world's sugar is produced in tropical regions from cane, with China, India, and Brazil the largest producers. In each of these countries production costs are much less than in the U.S. and so imports of foreign sugar continue to grow and constitute direct competition for sugar beet farmers in Colorado.

Should Colorado beet farmers try to change to crops that are healthier than sugar beets? Is your family eating more or less sugar than in the past? Will they make more or less money if they do so? Should U.S. farmers, including Colorado sugar beet farmers, be protected from foreign competition?





Source: Colorado Department of Agriculture

• 1 Dot = 1,000 Head

■ Less than 1,000 Head

## CATTLE AND CALVES 2001



# CATTLE AND CALVES 2001

## READING THE MAP

Cattle are found in every Colorado county. Note that each dot represents 1,000 head. Also recall that the distribution of dots within a county is random and is not meant to indicate the precise locations of cattle and calves. The function of this dot density map, and any such map, is to create a comparative depiction or impression. Even at first glance the message is conveyed to the reader that the density distribution of cattle and calves is varied or uneven. The dark pattern of high density indicates that northeastern Colorado, and specifically a group of counties in the South Platte Valley, holds high numbers of cattle. A second region extends southward from the extreme northeastern corner of Colorado in a line of counties along the Nebraska and Kansas borders. The lower Arkansas Valley represents a third concentration of higher-than-average cattle numbers. A fourth region is apparent in western Colorado in Montrose, Delta, and Mesa counties.

Cattle and calves are part of three different types of agricultural operations. People often think of cattle in terms of grazing on ranches across the state. However, many of the state's cattle are found in feedlots, at least in the latter stages of their growth, fattening, and preparation for processing. Colorado also has significant numbers of cows and calves associated with the dairy industry. Each situation creates a somewhat different pattern of distribution.

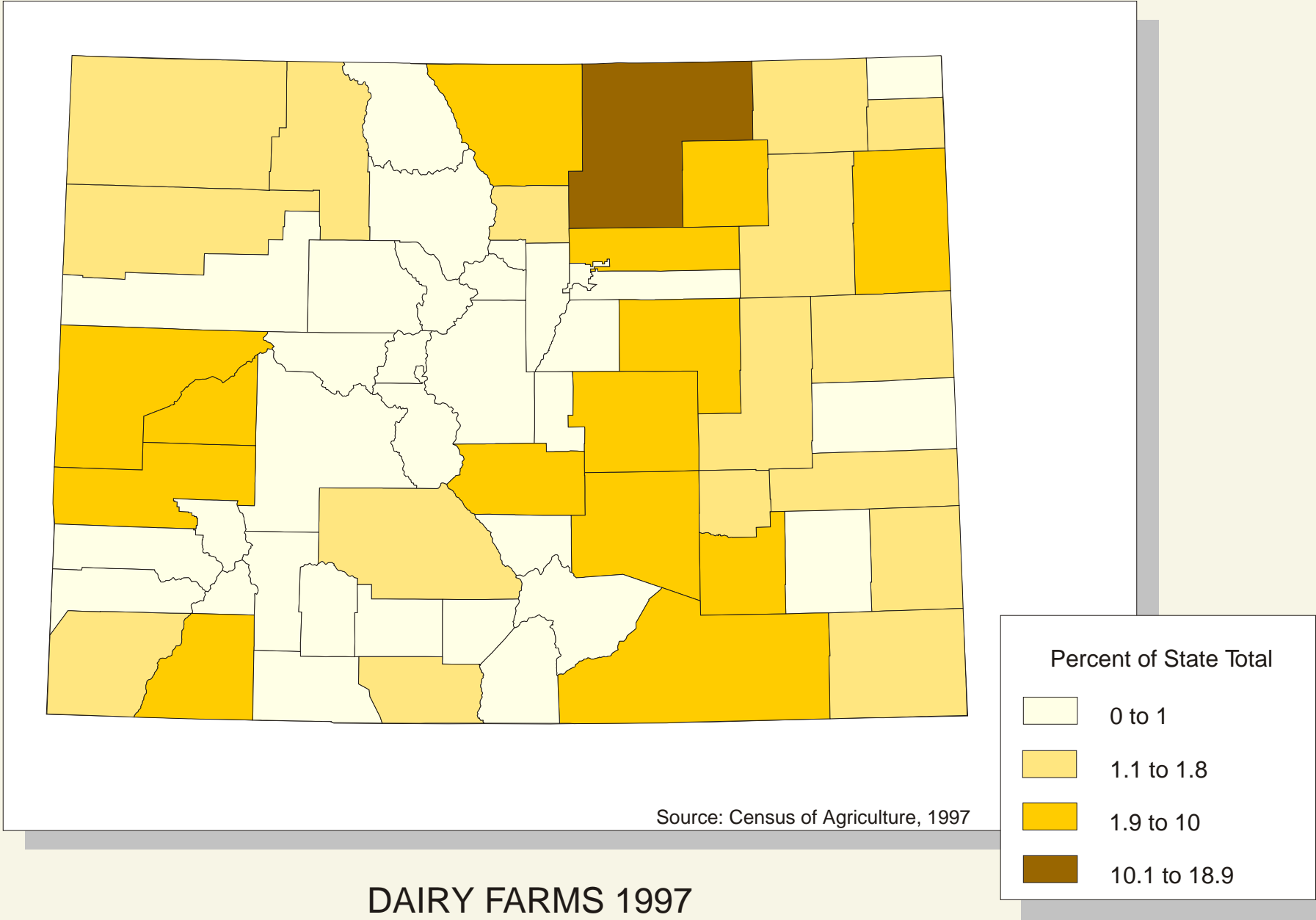
The climate and vegetation of Colorado do not support year-round grazing. Cattle that graze on pastures during the late spring, summer, and early fall are typically confined in pens and fed during the winter months. On the other hand, large commercial feedlots have cattle moving through on a continuous basis. Lighter weight cattle enter and are fed until they reach a certain weight at which time they are shipped to packing plants. Dairy cattle tend to be more stationary. While young replacement stock may be brought in, or raised locally, once a cow begins producing milk she normally spends her entire productive life in the same location.

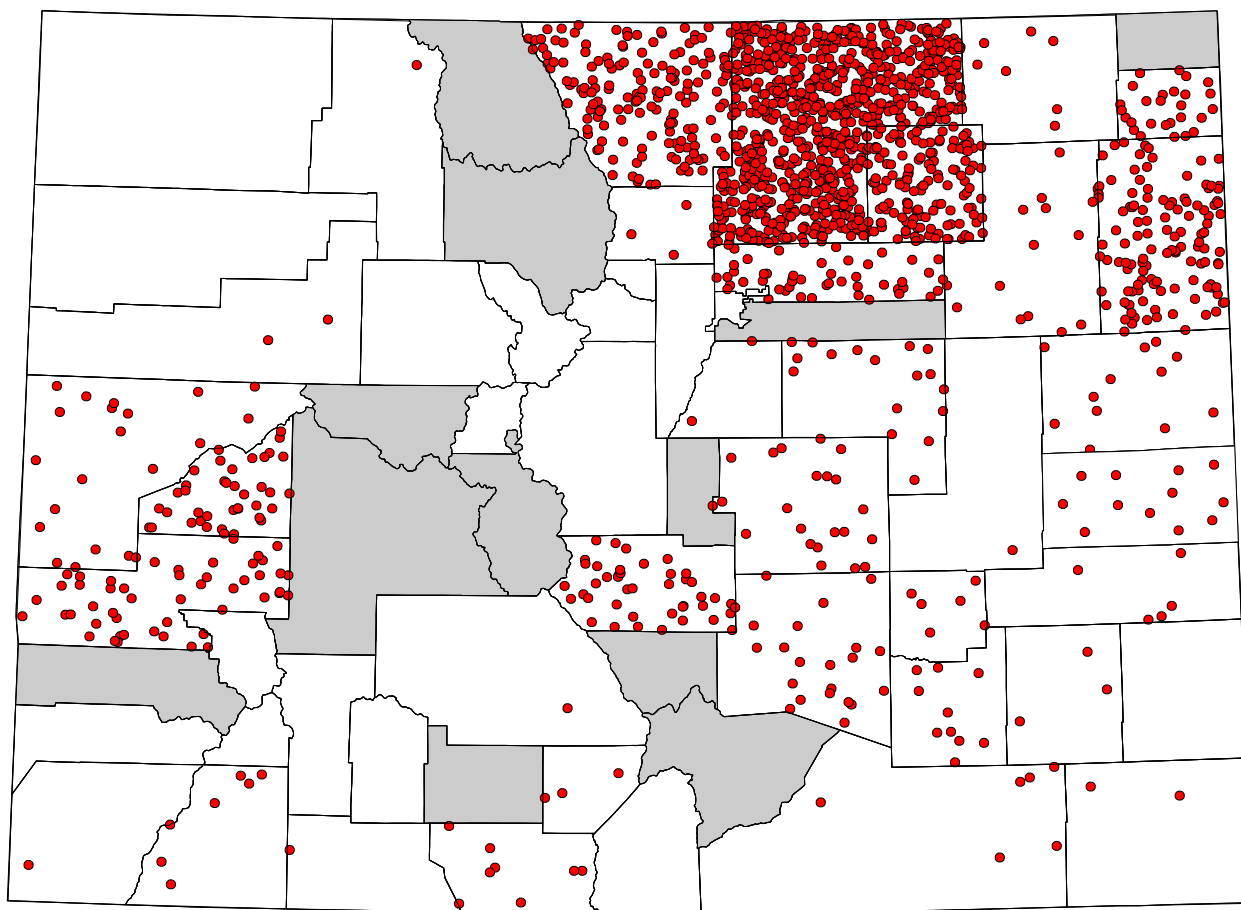
Most of the cattle in counties of highest concentration are in feedlots. To a degree this distribution is related to locally produced feed. In counties such as Weld, Morgan, Yuma, etc., much of the farmland produces corn or alfalfa specifically for the feedlots or local dairies. Conversely, in counties along Colorado's southern border and in the northwest quarter of the state, cattle are more likely to be on grazing land. Some of these cattle will eventually be trucked to feedlots for fattening. Notice that in Colorado's more mountainous counties the number of cattle is less and the dots appear scattered. Grazing of cattle on mountain pastures is strictly seasonal. Mature breeding stock will be kept and fed over the winter but most young stock will be trucked out to feedlots on the plains. Finally, many of Colorado's largest dairy operations are situated to take advantage of both local feed sources and the market for fresh milk. With so much of the state's human population concentrated in the Front Range Corridor, it makes sense for dairies to locate nearby to facilitate shipping the perishable fresh milk to processors and consumers.

#### QUESTIONS TO THINK ABOUT

Are you aware that many specialized breeds of cattle exist in Colorado? Some types of cows have been bred (developed) to produce large quantities of milk. Other breeds produce milk that has more cream (a higher butterfat content) that can be used to make butter or cheese. But most cattle in Colorado are raised for meat. Certain breeds are preferred for grazing while others grow very rapidly and to a large size when fed in feedlots. The "Cattle Business" is very complex and utilizes many aspects of science and research involving nutrition and disease control.

You may be accustomed to thinking of cattle moving about the state but only in terms of their grazing upon the large pastures accorded by the extensive plains and mountain meadows. But did you realize that cattle travel a great deal? Trucks move cattle into, across, and out of Colorado on an almost daily basis. A map of cattle and calves in Colorado in July would look different from a map in November. And the products from these cattle are shipped to markets throughout the United States and around the world. If you have visited Tokyo and had a hamburger, it may have been made from beef grown in Colorado.



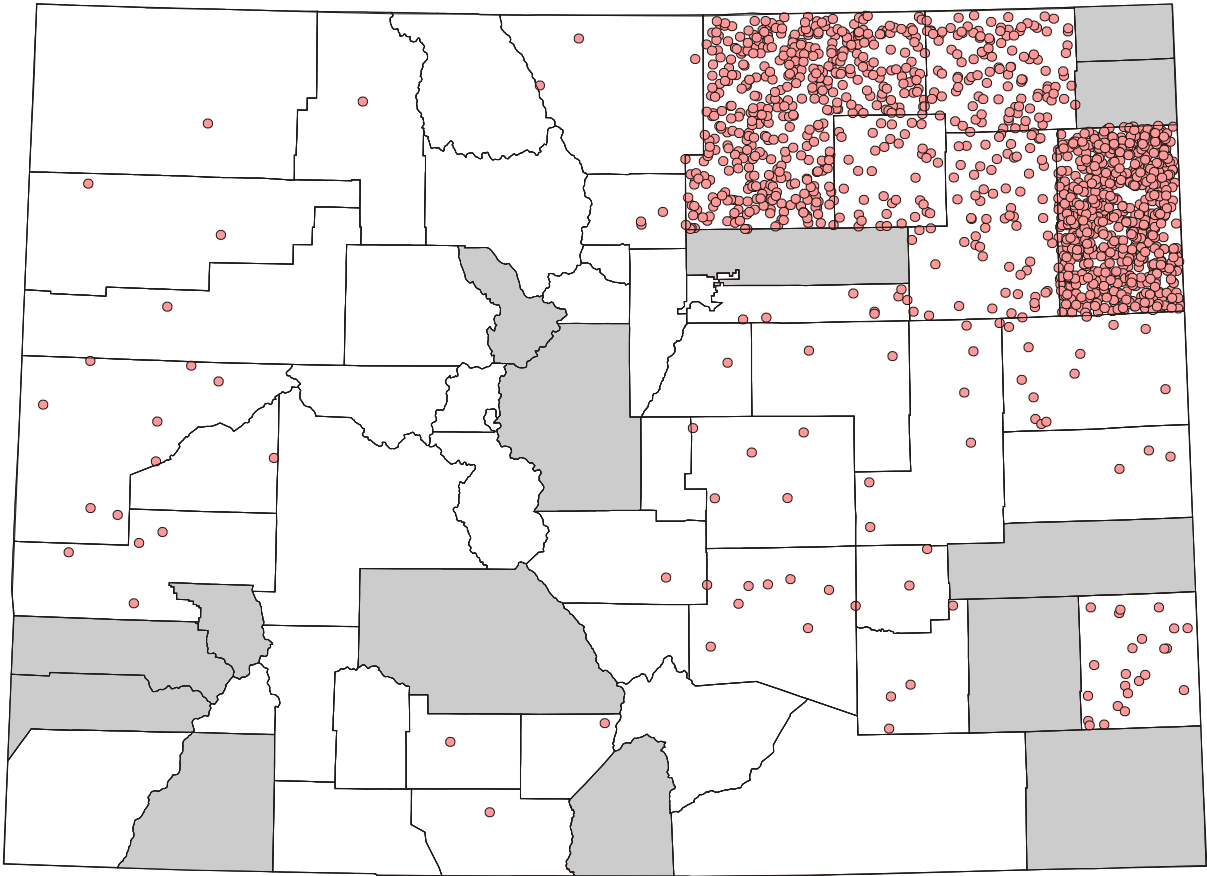


Source: Census of Agriculture, 1997

• 1 Dot = 50 Head

■ Data Not Published

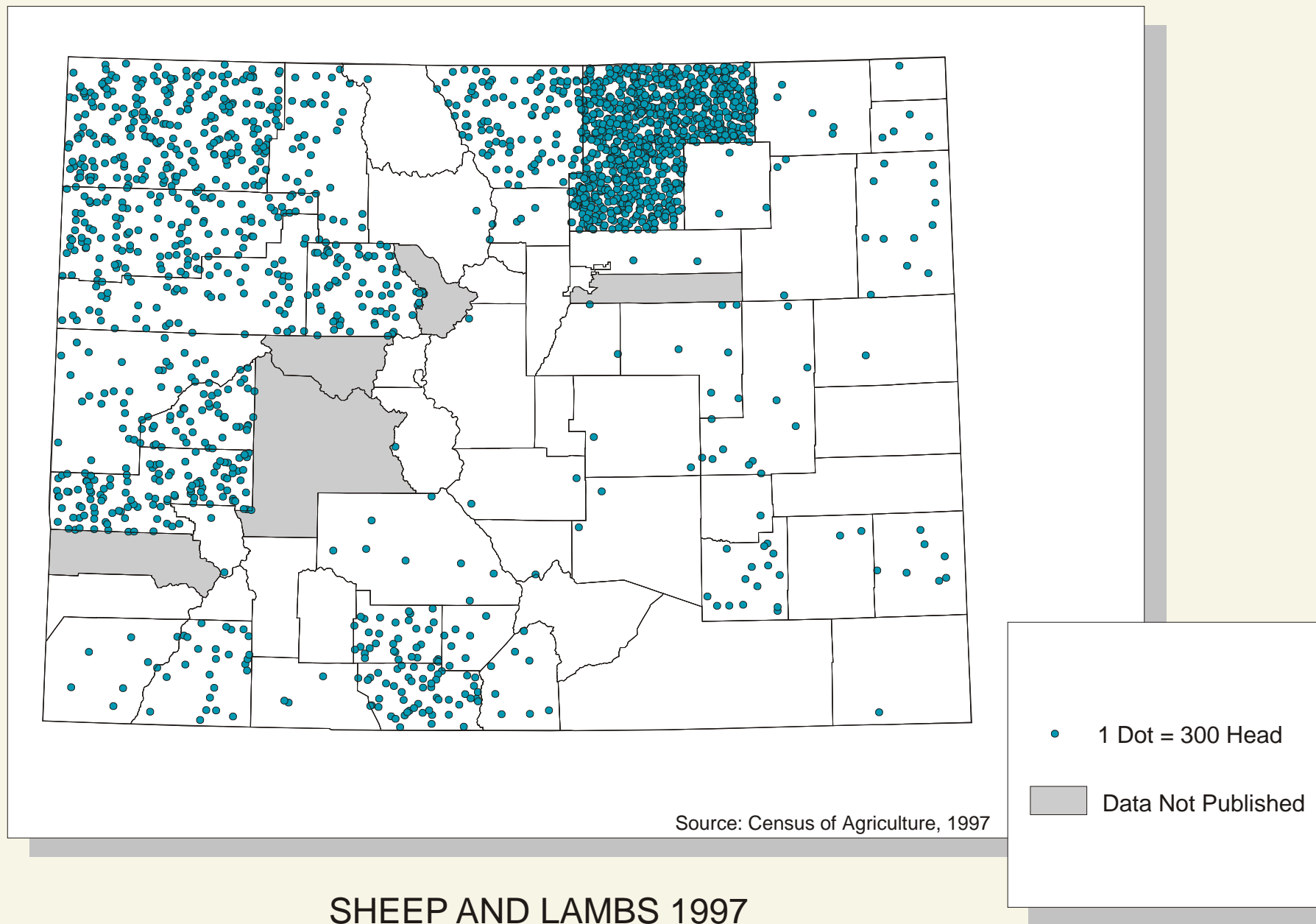
MILK COWS 1997



Source: Census of Agriculture, 1997

- 1 Dot = 300 Head
- Data Not Published

HOGS AND PIGS 1997



COUNTY	AREA (SQ. MILES)	NUMBER OF FARMS 1997	% OF OWNER OPERATED FARMS 1997	CROPLAND HARVESTED 1997 (ACRES)	IRRIGATED LAND 1997 (ACRES)	AVERAGE FARM SIZE 1949 (ACRES)	AVERAGE FARM SIZE 1997 (ACRES)	FARM SIZE CHANGE 1949-1997 (ACRES)	VALUE OF PRODUCTS SOLD AVERAGE/FARM 1997
Adams	1235	696	79.02	263940	27140	432	968	536	126062
Alamosa	719	306	80.07	82756	106104	751	621	-130	186912
Arapahoe	800	258	84.88	87414	3901	592	1290	698	91519
Archuleta	1353	206	82.04	5392	16764	915	547	-368	29850
Baca	2554	608	80.26	283882	65068	1297	1879	582	127252
Bent	1517	270	84.44	63074	62709	1394	2905	1511	188798
Boulder	742	657	84.02	41542	39464	201	195	-6	66471
Chaffee	1008	189	77.25	16327	24406	675	453	-222	27308
Cheyenne	1783	333	80.48	200850	20632	2104	2390	286	101035
Clear Creek	396	12	91.67	300	-9999	663	426	-237	2490
Conejos	1284	429	82.98	97938	130581	504	664	160	59411
Costilla	1227	171	78.95	36280	44010	1194	2124	930	93441
Crowley	790	203	83.25	20338	21647	859	1920	1061	362007
Custer	740	152	82.89	16391	19633	1137	949	-188	31681
Delta	1141	1041	87.90	46435	70981	202	271	69	37544
Denver	111	16	43.75	18	14	7	5	-2	135888
Dolores	1064	160	84.38	41914	7508	595	973	378	53753
Douglas	841	574	82.93	15999	3645	871	356	-515	29823
Eagle	1690	124	69.35	15212	16637	1032	1492	460	59784
El Paso	2129	851	86.60	35243	15010	1044	1019	-25	35641
Elbert	1851	822	85.28	79310	6135	1343	1332	-11	38016
Fremont	1538	561	89.13	9132	19272	553	505	-48	21615
Garfield	2952	475	79.58	39209	51383	584	899	315	48035
Gilpin	149	11	100.00	D	D	498	797	299	D
Grand	1854	161	72.05	27704	39778	1791	1560	-231	54861
Gunnison	3238	187	71.66	29444	51397	1324	1043	-281	45114
Hinsdale	1115	14	78.57	583	2324	1301	631	-670	26955
Huerfano	1584	273	81.32	14032	16208	1662	2348	686	35461
Jackson	1614	126	57.14	82141	123645	2967	3786	819	123754
Jefferson	768	377	79.05	7597	3277	193	259	66	51655
Kiowa	1758	339	79.35	D	5922	1653	2696	1043	182077
Kit Carson	2160	718	77.30	429646	145730	1175	1874	699	246588
La Plata	1692	781	88.09	41955	71855	1035	743	-292	20227
Lake	379	20	95.00	D	3917	793	859	66	25655
Larimer	2604	1298	81.97	86054	77695	430	418	-12	77414
Las Animas	4771	485	84.12	30157	24020	2831	4567	1736	41930
Lincoln	2586	467	82.66	201255	4509	2141	3530	1389	95873
Logan	1818	879	79.41	288121	109198	741	1284	543	333038
Mesa	3309	1489	87.98	58436	87648	216	280	64	33882
Mineral	877	10	40.00	D	183	2017	D	D	14551
Moffat	4732	389	83.55	54366	29576	3733	2651	-1082	48683
Montezuma	2038	718	90.39	67579	61081	618	1303	685	30465
Montrose	2240	866	87.30	65276	85040	433	429	-4	101933
Morgan	1276	759	80.11	204763	142212	549	976	427	534842
Otero	1247	512	83.59	54833	63001	736	1132	396	195731
Ouray	542	79	73.42	9683	18349	1081	1480	399	40980
Park	2192	183	72.13	15081	17998	3127	1700	-1427	19795
Phillips	688	344	75.00	248140	87816	818	1347	529	340302
Pitkin	968	70	67.14	7190	9650	542	360	-182	21812
Prowers	1629	522	80.84	230472	111091	888	1653	765	288652
Pueblo	2377	664	85.09	38628	35638	1040	1239	199	50666
Rio Blanco	3222	255	80.78	29190	35905	2646	1829	-817	55239
Rio Grande	913	348	77.87	110696	136141	406	666	260	209246
Routt	2367	494	81.38	58846	49920	928	1054	126	46271
Saguache	3167	248	67.74	121632	207200	1520	1942	422	202844
San Juan	388	4	100.00	D	D	D	D	D	D
San Miguel	1287	83	73.49	11242	12341	1235	1951	716	34907
Sedgwick	540	215	72.09	127048	51698	661	1368	707	254654
Summit	607	35	77.14	6117	10939	908	987	79	43166
Teller	559	84	80.95	2766	1646	1136	993	-143	15207
Washington	2520	792	83.21	438730	55568	1110	1760	650	123608
Weld	3990	2959	82.22	547532	393030	494	647	153	434821
Yuma	3365	896	80.02	435123	274057	1009	1524	515	537247



Wheat Equipment

The plains of eastern Colorado are another important region for grain growing. Wheat occupies the greatest acreage and virtually all is grown without irrigation. Such "dry" farming is risky since average yields are low and complete crop failures a fact-of-life owing to wind, hail, or even too much rain at times. Farming practices involve cultivating as many acres as possible as efficiently as possible, a strategy that requires large, expensive equipment.





Wheat Harvest

Ripe wheat must be harvested quickly before wind, rain, or hail can destroy the fragile crop. Large combines move rapidly across the huge fields, often operating late into the night. Custom harvest crews also assist with the work. Fleets of combines, trucks, trailers, and workers begin the harvest in the southern regions of the wheat belt, in Texas and Oklahoma, and make their way northward as the grain ripens, usually passing through eastern Colorado in the first half of July.



Grain Elevator

The tallest, most visible landmark on the Plains is often the grain elevator. Situated along railroads and highways, these large granaries hold wheat until it is moved to market either by train or by semi-truck. When traveling across eastern Colorado it is the elevator that gives the first clue that a town lies ahead; it is also the elevator that most prominently displays the town's name, as well as the nature of its economy.



## Barley Storage

Commercial brewers of beer have exacting standards for the barley they use. Certain varieties are preferred and growing conditions are considered important for production of a quality beverage. The cool dry conditions of the San Luis Valley are reputedly excellent in this regard and the Coors Company contracts for much of the barley raised here.



Corn Harvest

Much of the corn grown in northeastern Colorado is fed to livestock. Here a large self-propelled cutter fills a truck with chopped green corn. This "silage" will be stored in large pits until it is needed. Corn silage is fed to both beef and dairy cattle, and to sheep. Some corn is harvested later in the year exclusively for grain. This "shell corn" is fed to cattle, hogs, and poultry.





Center Pivot Landscape

As with most innovations, center pivot sprinklers represent a series of tradeoffs. The high cost of the equipment (\$100,000 and more) and of electricity to power it is offset by reductions in the water required to grow a crop and the amount of labor needed to apply that water. Farmers are able to farm more acres using a sprinkler and to farm land with an uneven topography that would prevent more conventional methods of irrigation. At some locations in Colorado's eastern High Plains the landscape has been transformed into hundreds of circles within squares.



Center Pivot Irrigation

Much of Colorado's agriculture is dependant upon irrigation to supplement limited natural precipitation. Farm operators and agricultural engineers continuously investigate more efficient methods of applying water to crops. A major innovation is the center pivot sprinkler that produces an artificial rain, in the process leaving large green circles on the state's often arid landscape.



Artesian Well

The San Luis Valley is underlain by extensive water-bearing layers or aquifers. Rain and snowmelt percolate into the San Juan mountains to the west, flow eastward beneath the valley, and are blocked by upturned strata of the Sangre de Cristo mountains along the valley's eastern margin. Drilling into the aquifers produces artesian wells that flow by hydrostatic or natural pressure. Most of the water is used for irrigation, but some supplements the flow of the Rio Grande. In recent years developers have sought unsuccessfully to divert part of this water to Front Range urban use.



Concrete Ditch

The competitive demand for water in Colorado produces innovations in all systems of irrigation. A concrete-lined ditch delivers more water to the crop by reducing percolation or seepage of water into the soil around the ditch. The aluminum siphon tubes lift the water from the ditch and into the field rows. Lined ditches and siphon tubes reduce labor and also the troublesome growth of weeds along the irrigation ditch by depriving them of water.





Irrigation Tubing

Often referred to by its trade name, Nu-flex, these thin-walled plastic tubes are an improvement over open ditches, even concrete-lined ones. By enclosing the water evaporation is held to a minimum; weed growth is also discouraged. At the end of the crop season the tube is discarded, while the individual gates through which the water is controlled are collected and reused.



Mellon Irrigation

The Arkansas Valley is renowned for production of melons, including watermelons and cantaloupe. Irrigation of this field is by the traditional "flood/furrow" method. Small ditches are made between the rows of plants and the water percolates through the soil to reach the plants' roots. Though this is still the most common method of irrigation, its weakness is uneven application of water and loss of water by runoff and high rates of evaporation.



Potato Storage

San Luis Valley farmers must be able to store a portion of their crop in order to sell when (and if) the market prices rise. Potatoes must be kept at cool and constant temperatures. The concrete structure on the right uses mounded earth as natural insulation to maintain desirable temperatures. The steel structure on the left is lined with insulating material for the same purpose.





San Luis Valley Crops

The two most important crops in the valley are barley (left) and potatoes. Both crops are well suited to the high elevation (av. 7,500 feet) and cool temperatures of this intermontane basin. Potatoes are marketed fresh or for chips and fries. Nearly all of the barley is malting barley used for brewing. As in other regions of the state, center pivot irrigation has made a significant impact on farming practices.



Poultry Feedlot

While beef may still be the meat of choice in the U.S. diet, over the last two decades consumption of poultry has increased significantly. Chickens and turkeys are fattened in Colorado, in large part with locally grown feeds. The birds are confined to facilitate intensive feeding and sheltered to protect them from sudden or severe changes in the weather. This location is ideally situated to serve the expanding Denver Metro and Front Range markets.



Cattle Feedlot

Colorado ranks prominently among the fifty states in terms of cattle feeding. Using corn and alfalfa from the state's fields, as well as cattle and feeds imported from other states, companies fatten cattle in huge feedlots. This facility near Greeley, Colorado, is one of the largest in the world. The company-owned mill prepares and combines feeds so that cattle receive a nutritious mixture that causes them to grow quickly to slaughter weight.



## Cattle Grazing

While the economic contribution of agriculture has declined relative to manufacturing or recreation, ranching and farming are still important to the state and to the nation. Moreover, these activities give visual character to the geography of the state's diverse regions. On a ranch on Colorado's eastern plains, cattle still graze the short but nutritious native Buffalo and Grama grasses as cattle have for more than a century. However, these animals will be trucked to market rather than driven, and perhaps sold to a buyer who has only seen them on video.





Vineyard, Palisade, Colorado

The valleys of the lower Colorado River system specialize in fruit farming. On this somewhat warmer western side of the state, apples, peaches, pears, and cherries are grown and marketed widely. A relatively new crop is grapes, which in some cases are replacing older orchards of peaches or pears. This vineyard is situated at the base of the Book Cliffs whose light colored face creates something of a warmer microclimate by reflecting and radiating solar energy. Note, however, the large stationary propeller which is used to move and mix the air when low temperatures threaten the fruit at critical growth times.