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A SOIL SURVEY OF IOWA COUNTY,  
WISCONSIN

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A SOIL SURVEY OF IOWA COUNTY WISCONSIN

BY

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## Soil Survey of Iowa County, Wisconsin

In the spring of 1909, the Wisconsin Legislature following the lead of several other states, appropriated funds for the carrying on of a survey of the soils of the state under the direction of the geology and soils departments of the University.

The work was commenced in the early summer of that year. Iowa was one of the five counties in which the survey was first started, the work being carried on there from July to November in 1909 and completed in May to July in 1910.

This thesis is a summary of the work done in the county by Mr. Clarence Townsbury, representing the U. S. Department of Agriculture, and the author representing the State, their joint report and soil map being published by the U. S. Bureau of Soils in conjunction with the Wisconsin Geological and Natural History Survey. The work was directly under the supervision of Professor Whitson of the Soils Department of the University.

### Situation

Iowa County is in the southwest portion of Wisconsin, in the second tier of counties north of the Illinois line. On the north the Wisconsin River separates it from Sauk and Richland counties. Dane and Green counties bound it on the east, Lafayette on the south, and Grant county on the west.

### Geology

The rocks exposed in the county are of the Paleozoic age, comprising beds of sandstone, shale, limestone, and dolomite. The section of the rock beds and their estimated depth is as follows:

	Thickness
Niagra Limestone - -	Max. 100-200 ft.
Hudson River Shales -	about 250 ft.
Galena Limestone - - -	40-100 ft.
Trenton Limestone - - -	50-150 ft.
St. Peter Sandstone - -	75-150 ft.
Lower Magnesian Limestone -	100-250 ft.
Potsdam Sandstone - - -	Max. 1000 ft.

The Niagra Limestone, the latest deposit, along with the Hudson River Shales, has been eroded away, and is found only on the top of Blue Mound where its large chert content has made it specially resistant to erosion.

The Galena Limestone is the country rock of the district, immediately underlying most of the soil except on and about

Blue Mounds. This is the ore-bearing rock of the region also, lead and zinc being mined especially in the lower portion of this formation.

The St. Peter Sandstone is soft, and its erosion results in flat, open valleys, with abrupt sandstone ledges. Owing to its easy erosion, its present extent is unimportant and its influence upon the soils of the county comparatively slight.

The Potsdam Sandstone (upper part) outcrops along the Wisconsin River valley and its influence is more extensive and important in the valley bottom and the bluffs bordering it.

#### Topography and Drainage

The topography of the county is that of a very deeply dissected peneplain. Military Ridge, representing the original plain surface, forms a divide separating the drainage into the Pecatonica River on the south from that into the Wisconsin river on the north.

The drainage of the county is complete, the streams to the south of the Ridge having a gentle slope and the surface of the country being gently undulating. The streams are tributaries of the Pecatonica River.

The streams north of Military Ridge descend rapidly to the Wisconsin River. The topography becomes much more rugged as the River is approached, especially so in the western two-thirds of the county. The stream valleys are abrupt and rocky and more extensively wooded. Rocky cliffs and crags

are common, and isolated towers and chimneys are seen in the upper stream depressions.

From west to east, the north-flowing streams successively are; Underwood, Otter, Wyoming (Sweed), Mill, and Mounds Creeks. The valleys through which they flow widen out to 1/4 and 3/4 of a mile and are of large agricultural importance to the county.

The portion of the Wisconsin valley within the county, which is from three to four miles wide in its broadest portions, with its rugged bluffs, flat valley bottom and level alluvial sands, present another feature of the topography of the county.

### Origin of Soils

The upland soils of the county being in the driftless area, are largely residual and the product, in part, of the decay in place of the underlying rocks. The surface material of the Barnes silt loam and the subsoil of both Barnes and Edmund silt loam types covering by far the largest portion of the county, is a light, buff-colored, silty material. This corresponds in texture and appearance to löess, a silty, granular material probably of eolian origin, which has been found along the Mississippi River in other portions of the state.

The progressive increase in depth of soil from east to west in the county favors the supposition that löess deposits have extended thus far. Near the Mississippi, this material is found in beds ten to fifteen feet or more in depth, plainly

distinguishable from the residual soil beneath. But the deposits become rapidly thinner toward the east and it becomes difficult to identify the material either because of its very great resemblance to some of the residual soils on which it has been deposited; or because of its being but thinly deposited, it was readily affected by the elements and converted into soil resembling other soils about it under like conditions.

The growth of grasses on the prairie and favorable conditions being developed for the formation of large amounts of humus from this decaying vegetation, have produced a typical prairie soil with slightly different surface texture and separate agricultural characteristics, which was mapped as Edmund silt loam.

In the more rugged portions of the county to the north and south of the prairie ridge, cut by valleys and ravines, the soil tended to be eroded away by the elements; conditions favorable to forest growth were developed and thus a soil of the same general origin but of different present agricultural uses and value is found in the Barnes silt loam.

The water-carried-and deposited soils of the valleys and stream courses, portions of them lacking drainage, present a different type of soil in the Wabash loam and silt loam.

The level Wisconsin valley bottom with its water borne sands, its sandy loams, and wide marshy areas, gives other types of soil with their own particular characteristics and uses.

in the Avoca sand and sandy loam and the muck and meadow areas bordering the river.

### Classification of Soils

The division of soils into types defined by their physical or chemical properties, composition and their vegetation, with the location of these types on a map is of the greatest practical importance in any scientific study of soils.

The object of the Soil Survey is to make such a study and to further agriculture in the areas studied.

Agricultural use and value of soils are a large factor in their division into types, but the classification must be fundamental and other factors, such as geology, origin and vegetation as well as fertility, texture and composition must help to determine the division into types.

These factors have been considered in the mapping of Iowa county soils and hereafter follows a brief description and comparison of the types as mapped in that county.

### The Prairie Type

The prairie soil, for present convenience called Edmund Silt Loam, is found on the elevated prairie ridges, comprising about 150 square miles or approximately one-fifth of the county.

The soil is dark-colored silt loam, originally covered with grass or small brush. Forests as far as known never occupied the prairie soil.

The color of this soil varies from black to a yellowish brown with somewhat heavy texture.

The surface soil, rich in organic matter derived from prairie grasses which long covered it, averages ten inches in depth, below which, a light brown, heavier silt or clayey loam is found. At from 18-24 inches, the subsoil becomes a deep yellowish silt, heavier and often sticky just above the sandstone or limestone rock which lies at a depth of from a few inches under the shallower soils of the east side of the county, to several feet beneath the surface of the deep prairie soil of the western part of the county. This raw clayey material near the rock is often deeply colored with iron, and when exposed to the weather crumbles and gets hard when dry. In this condition it is called ochre, it being possible to make paint from it.

The prairie enters the county on the east and extends to the west line as an elevated, rolling to level ridge, called Military Ridge, from which extend several lobes to the south and one to the north at Highland.

The Chicago & Northwestern railroad track marks the north boundary of the prairie. South of West Blue Mound, the prairie is four or five miles wide; at Ridgeway it is just cut in two by a narrow strip of the hilly type which connects the main north and south areas of that type.

South from Dodgeville a prairie lobe extends toward Mineral Point, and another to the west of Linden.

The prairie expands and the soil deepens in the west portion of the county and the topography becomes less rolling. The prairie is some ten miles wide along the west edge of the county.

On the east side, below Blue Mounds, the prairie soil is extensively quite shallow. In very few places is the soil three feet deep above limestone or soft sandstone.

At Dodgeville, the ridge soil is still shallow. At Edmund it is much deeper and between Cobb and Montfort in the west it is from twelve to twenty feet in depth.

### Erosion

The Edmund silt loam is less subject to washing than the Barnes type of the hilly country, not only on account of its smoother topography, but because of its heavier texture as well. The ditches formed are flat and shallow and not deep, as in the Barnes type.

In general, but little care is used or needed to prevent serious erosion on the prairie.

### Drainage

The natural drainage is good and very little tile need be used on any of the type.

## Value

The prairie land is considered as valuable as any in the county. The prairie from Ridgeway westward is specially good for general farming. The hog and cattle industry prevails and corn and grains are the principal crops.

Prices range from \$60 to \$100 or more per acre. Crops and agricultural practices are treated under History and Conditions of agriculture in the county.

## The Barnes Silt Loam

The most extensive type of soil in the county is that which occupies the hill country. It is generally called clay or Barnes clay. This is a forest soil, found in all the rougher, wooded portion of the county. The surface is a grayish to yellow silt loam of lighter texture than the Edmund type. It has a soft, floury feel.

The surface averages eight to twelve inches deep, below which, typically, is a clear, soft, yellowish or clay-colored silt. This at 18 to 22 inches becomes a yellow silty clay increasingly heavy with depth.

The Barnes type varies greatly in depth. The tops of ridges are often but thinly covered with soil. Places where three foot borings can be taken are hard to find on ridge tops. In many places, at the foot of slopes, the soil is six to eight feet or more in depth.

When plowed, the soil often has a white, almost ashy appearance. Ridge tops on this type are very apt to be stony.

### Erosion

There seems to be no doubt but that the Barnes soil washes more easily than does the prairie soil. A few farmers did not see much difference between these soils in this respect, but the majority, many of whom had farmed on both types said emphatically that the Barnes soil is much more subject to wash, not only because of the steepness of the slopes but because of its lighter character also.

One farmer said that the prairie soil forms little rolls and pellets under action of water and does not readily wash away, but that the Barnes silt, being soft and fine "flows" away like mills."

Excepting in the very smoothest areas, it may be said in general of this type in the county that corn should not be planted on it two years in succession. Where this is done, extensive washing ensues the second year and ditches often form during a storm the first year the soil is cultivated. Brush and straw are sometimes thrown into these ditches to catch the soil as it crumbles away, and to lessen further washing.

The steeper and rougher portions of the type are indicated by cross lining and land thus included should not be put in a regular rotation or cropped oftener than once in four or

five seasons and had better be kept in permanent pasture. Though the soil is largely residual, it probably owes its uniform soft silty character and buff color to a more or less extensive admixture of the wind blown material known as löss.

Because of its rough topography, dairying is very well suited to the Barnes type of soil and this is almost the sole kind of farming carried on. Corn, oats, barley, clover and timothy are common crops. Sweet clover grows quite generally south of Military Ridge indicating the presence of proper bacteria for alfalfa in the soil. This crop has been tried with varying success in small patches. Adverse weather conditions and inexperience in handling the unfamiliar crop seem to be the chief obstacles to raising alfalfa.

The non-agricultural land of the county is found almost exclusively in the territory occupied by the Barnes silt loam, and as this land comprises a large percent of some portions of the county, prices of farm land are generally lower than on the prairie. As low as \$20-\$30 per acre is paid in the roughest portions and \$80 to \$100 in the best portions of the type.

#### The Alluvial Soils

The soil of the smaller creek bottoms, designated Wabash loam, is very mixed up. In the intermittent stream courses and smaller valleys, a fine black silt or silty loam predominates. Frequent overflow and wash from the upland have formed

irregular clay, sand, and gravel beds. Springs keep portions in a wet marshy condition, also.

Rocky cliffs or steep, wooded slopes line the sides of many of these bottoms. Their average width is from 200 to 500 feet. The Pecatonica and Otter Creek Bottoms are often one-fourth to one-half a mile wide.

Where there are continual streams, these wind back and forth across the bottoms cutting new channels and filling old ones. The streams are fed by springs which are numerous in the hill country. Bottoms or portions of bottoms too wet to pasture or cultivate, bear good crops of marsh grass and red top.

Willows and clumps of small oaks and poplars grow in places. Pines grow on the rocky or sandy cliffs and oak, basswood, hazel, cherry, poplar and birch grow on the steep slopes.

## II Wabash Silt Loam

On the wider portions of the secondary valleys south of the Wisconsin valley, uniform areas of the alluvial silt large enough to separate out are found, and these are mapped as Wabash Silt Loam. This soil was also found in the Wisconsin valley bottom where it has been washed down and spread over the valley sand. At the mouth of Underwood Creek, west of Avoca is such an area of soil about three square miles in

extent deposited over sand next the bluffs. It is a dark brown to black silty loam, very heavy, containing 20% to 30% of very fine sand, the same of clay, and 40% to 45% of silt. At from 14 to 18 inches is a heavy silty loam, light brown to orange or buff in color.

Sand underlies the soil at some depth. On approaching the adjoining sand type, the silty surface is shallower and shallower. At one place near the bluffs, sand was found at five feet.

Portions of the soil are apt to be wet and occasionally overflowed, though not to the injury of crops.

The Wabash Silt Loam is very productive and sells at \$70-\$100 per acre. It yields 60-90 bushels of corn, 30-45 bushels of oats and barley. One detriment is the fact that grain, especially oats, often lodges quite badly on this soil. About 1000 acres of this soil were mapped in Wyoming and Hillside valleys where much of it would be benefited by tile drainage. Mapped also in Ray's and Mounds Creek valleys.

### III Terrace Silt Loam

In the wider creek bottoms, small terrace-like areas bearing soil resembling the Barnes type in texture and stratigraphy were separated out. Its difference from the Barnes type lies in its position. Lying on a perfectly level terrace, elevated 4 to 10 feet above the valley floor it is undoubtedly

alluvial in character and is not subject to erosion as the Barnes type is, more or less. Crop yields are the same as on the Barnes soil.

## The Wisconsin Valley Soils

### Location

The north boundary of Iowa county follows the middle of the main channel of the Wisconsin River. The stream runs close to the south side of the valley opposite the middle of the county, and bends away again to the north opposite the east and west sides so that large portions of the bottom are included in Iowa County only near its east and west sides.

The valley is three to four miles wide here, is very sandy, and the river channel is choked with bare shifting bars and sand islands covered with grass, shrubbery or trees.

Sand increases in value with distance from the stream.

A Near the stream, land mapped as meadow, consists of flat, marshy areas covered with a tangle of trees and brush. The soil consists of layers of clean white or yellow sand and black mucky material, leaf mould, etc. This land is always wet and but slightly elevated above water level even in the summer months.

### B Muck

On practically the same level as the meadow and bordering

the river, are level, open marshy areas whose soil is a wet muck. These areas are covered with a thick growth of marsh grass, and being generally free from brush, stumps, etc., much hay is cut on them during low water level in the summer.

This hay sells for ten to twelve dollars per ton and is much in demand in dry seasons when hay is short on the ridges. As the muck is over-flowed at every rise of water in the river, and as it is underlaid by sand, very little of it could be easily dyked or permanently drained. The muck is usually slightly acid.

#### C Sand (Avoca Sand)

Separated from the river by the meadow and marsh is the sand prairie which is the main valley sand area lying about four to ten feet above the meadow. This is the Avoca sand, bearing little vegetation in dry weather except the crops which are planted on it. Rye, corn and buckwheat are almost the sole crops, yielding 10-15 bushels of rye and 20-25 bushels or corn. The present income from this land is \$6 to \$15 per acre and it sells at from \$10 to \$15. Much of it has been continuously cropped, with little or no manure put upon it. The sand is from 30 to 50 feet deep.

Wind-blown areas of from 5 to 100 acres are quite numerous. Most of these dunes or "blows" are kept timbered and farm buildings are placed in their shelter. Scrub oak, jack pine, soft maple and locust trees grow upon this sand.

Pasture is found only in wet years and on low wet spots. The water table is from one to six or eight feet below the surface.

#### D Avoca Sandy Loam

Separated from the prairie by long sand dunes is a better type of sand to sandy loam nearer the bluffs. This soil grows good clover and fair grain crops which the prairie sand will not do. Much of the type has more fine material than the prairie sand. The land sells at from \$25 to \$35 per acre, and much better corn and grain crops grow on it than on the prairie sand.

### The Sandy Soils

#### Description

#### I Avoca Sand

The only sandy soils of importance or large extent are found in the Wisconsin valley bottom and on the tops and sides of the bluffs bordering the river and portions of its tributaries.

The sand of the river bottom, of alluvial origin, is a dark brown sand of fine to medium grade to about 18 or 20 inches, below which it becomes a lighter color until at about 30 inches it has a bright yellow color.

It has nearly level topography, but does not make a good

general farming soil. It is too loose and open to produce pasture, but fair crops of corn and rye are raised upon it.

This sand is easily blown by the wind and a phase of it lying in billowy knolls and loose, low ridges partly covered with trees was mapped as dune sand. This sand is yellowish in color and has little organic matter.

## II Barnes Sandy Loam

The sand of the bluffs and hills along the Wisconsin valley is a colluvial wash from the Potsdam sandstone which outcrops on the lower hills along the valley and from three to four miles back to the south.

It is generally a very fine sandy loam with more body than the river sand. Some of it is but very slightly loamy and varies in color from reddish brown to nearly white. It raises good crops and can be cultivated on very steep slopes without excessive washing. It is easy to till but is more or less affected by drought and crop yields depend largely on the amount of rain. Clover grows well on it, as do oats and barley.

The sand from the St. Peter sandstone, small areas of which were mapped in the southwest part of the county, is coarser and not quite so valuable agriculturally. When well manured it raises good hay and grain crops in wet seasons.

These sands vary greatly in depth. On slopes they often have a sandy clay subsoil at from 10 to 30 inches.

Below is a table showing the mechanical analyses of the Edmund and Barnes upland soils and the Wabash loam from samples sent to the Bureau of Soils.

Soil	Location	Composition					
		Coarse Sand 1.0-.5 mm.	Medium Sand .5-.25 mm.	Fine Sand .25-.1 mm.	Very fine Sand .1-.05 mm.	Silt .05-.005 mm.	Clay - 0 mm. .005
Edmund Silt Loam	S. of Dodgeville	.4	.1	.3	6.3	66.9	26.0
Subsoil		.1	.1	.3	3.7	71.5	24.3
Edmund S. L.	S. of Barneveld	.3	1.3	1.5	23.2	52.1	21.3
Subsoil		.1	.2	.4	1.5	65.9	31.9
Edmund S.L.	W. of Cobb	.5	.3	.6	23.1	54.0	20.9
Subsoil		.2	.2	.3	.3	68.0	31.1
Barnes Silt Loam	E. of Mifflin	.6	.4	.8	11.4	74.7	12.2
Subsoil		.1	.2	.8	2.3	75.9	20.6
Barnes S.L.	S. of Ridgeway	.4	.3	.7	15.0	68.4	14.6
Subsoil		.4	.4	.9	1.2	69.8	27.8
Barnes S.L.	N. of Barneveld	.5	.9	3.1	17.6	59.6	17.7
Subsoil		.3	.7	1.6	.4	66.2	30.6
Barnes S.L.	S.E. of Avoca	.6	.4	1.4	24.6	60.2	12.7
Subsoil		.1	.1	.7	26.1	57.3	15.2
Wabash Loam	S. of Mifflin	.1	.2	1.0	1.5	79.3	18.0
Wabash Loam	N.E. of Highland	.7	1.7	7.7	4.3	75.7	10.0

## Agricultural History

In their development in Iowa County, methods of farming have gone through several changes. The three stages of farming are something like this:

- I The wheat farming stage.
- II Beef and pork production farming.
- III Dairying.

The first process was that of the land robber at whose hand Iowa County suffered along with the rest of the country during and following the days of westward emigration. It was a period of rapid decline in fertility of the soil caused by the continual raising of one crop, with no return of fertility to the soil. Wheat was the main crop year after year till the yield became too small on the older fields for profit. The decline in price of wheat also had something to do with the abandonment of this style of farming. After wheat, flax went through the same process on many fields in the county. The prairie land was not then held as desirable as the Barnes type, being considered less valuable for grain raising.

In the next stage, the prairie came to the front because its soil and level topography were better suited for large yield and continuous production of corn -- the basis of beef and pork farming. Much of the prairie and more of the hill country was turned into pasture.

Dairying developed where beef and pork production were less profitable and butter making gave way largely because of the greater profit in the production of cheese. Since dairying became general, the shallower lands of the eastern side of the county and the hill country are gradually overtaking the prairie in productiveness. The largest number of cows and the most cheese factories are found in these portions. Dairying has made its way more slowly in the western prairie portion of the county.

Captain J. B. Estes, who broke forty acres in the town of Linden (R 2, T 6) started the first extensive farm in Iowa County in 1829. His land was famed for its large strawberries and the first crops of wheat and oats were harvested on this farm in 1831. This farm later attained large proportions. Jas. Jenkins, (Sec. 21 T 6, R 3) and Jno. Messersmith (Sec. 24 T 6, R 3) also cleared up farms, beginning in 1829.

### Population

The first people to come to Iowa County were mainly from the south. Yankees, Welsh and English quickly followed into the lead regions and many settled permanently on farms. At present, Iowa is one of the ten counties of Wisconsin, smallest in foreign born population. English, Germans and Scandinavians predominate in the order named.

In 1905 the county had 31 people per square mile. Of the 22,971 population, 2,654 were farmers and 1,528 were farm laborers. Five-eighths of the county were reported as improved land (280,597 acres and 2,353 farms.)

### Present Conditions

#### Markets

Iowa County has no large cities, but it has numerous small towns well distributed over the county. The most important towns with their population in 1905 are as follows:

Mineral Point	3,252	Linden	583
Dodgeville	2,152	Cobb	603
Highland	919	Ridgeway	358
	Rewey	335	

Edmund, Mifflin, Waldwick and Braneveld are other towns in the county.

#### Industries and Transportation

The Chicago, Milwaukee & Puget Sound Railroad follows the river valley on the north, and the Chicago & Northwestern follows Military Ridge through the middle of the county, 18 miles to the south. A branch line of the Illinois Central runs to Dodgeville from the south-east corner of the county, and the Mineral Point & Northern Railroad runs from Mineral Point north to Highland.

Iowa County is distinctly an agricultural county, and is

one of Wisconsin's best dairy counties, having in 1906, 106 cheese factories and 12 creameries. In the south-west quarter of the county, lead mining is an important industry. Many mines are run by outside capital but farmers have their diggings as well. Highland, Mineral Point, Mifflin and Linden are leading centres of the mining industry.

Brick and tile are made in a new factory at Hollandale. Carriages and wagons are made at Dodgeville. Two grist mills operate on lower Otter Creek and one on Mill Creek. Mills run by steam or electricity are located at Mineral Point, Rewey, Ridgeway, Barneveld, Hollandale, Avoca and Arena.

#### Farms

As previously stated, dairying is the foundation of successful farming in most of the county. This is most noticeable on the Barnes type and on the thin prairie soil of the east side of the county. Here much of the land is in pasture and hay fields, and cheese factories are most numerous.

On the prairie to the west, however, a difference is seen. On this level, deep, dark soil conditions are most favorable for corn and grain raising and dairying has not yet so completely superceded beef and pork interests. Larger corn fields and grain fields, more numerous grain stacks, fewer cheese factories and larger numbers of hogs and steers are some of the things immediately noticeable here.

## Crops

Corn is raised most and is a better crop on the prairie because it can be put on the land oftener without fear of erosion and because the soil itself is better adapted to continuous corn production than the Barnes type.

As good corn is raised on the alluvial bottoms, but frost is more apt to injure crops there.

Barley and Oats are raised most successfully on the Barnes type of soil. The weight of the grain is greater than that of the grain raised on prairie soil. On the eastern side of the county, the yield of oats has somewhat declined and barley is oftener raised.

Wheat is not raised nearly so extensively as it was twenty years ago. This crop was then raised till the yields were too low for profit. Many farmers state that where they could raise no wheat fifteen years ago and where 12 bushels was a good yield ten years ago, they can now produce 20 bushels or more per acre. The advent of dairy farming and the natural recuperative powers of the soil are causes attributed to this increased productiveness.

Not a great deal of grain is now shipped from the county and practically all the corn is fed at home. Fifteen thousand bushels of oats were shipped from Cobb in 1908. Rye from the Wisconsin valley is shipped from Arena.

Clover grows well on all the silt soils and sandy loams. This crop is generally used in maintaining and increasing fertility.

Alfalfa is seen only in small scattered patches.

Rye is grown most extensively on the sandy upland and the sandy soils of the Wisconsin Valley.

Flax, once an important crop, is not now grown.

Potatoes, sufficient for home consumption only, are raised.

#### Herds

Farmers milk from 15 to 40 cows. The 1905 Census shows that there were 29,000 cows in the county. Most herds are grade cows. Holsteins, Jerseys, Guernseys, Red Polls, Short-horns and Durhams are seen. Many car loads of calves are shipped in spring and early summer and hogs in fall and winter.

#### Buildings

Another indication of the profitableness and recent advent of dairying into the county is the surprising number of barns being built or recently constructed in the hill country.

Probably, fully fifty percent of the modern barns in the north half of the county have been erected in the last five years.

Silos are not yet in general use. More are seen on the prairie in the west part of the county. The majority of the farms in the hill country are in the barn-building stage and have not yet reached the silo stage, tho many new silos are being built.

Approved.. *A. P. Whitson* .....

Date.. *October 1-1910* .....





