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MISSOURI RIVER BASIN INVESTIGATIONS

PRELIMINARY INVESTIGATION
OF DRY LAND FARMING POSSIBILITIES IN THE
WESTERN SEGMENT, FORT BERTHOLD INDIAN RESERVATION
NORTH DAKOTA

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Soil investigations were made on that portion of the Fort Berthold Indian Reservation lying west of the Missouri River and north of the Little Missouri River. The purpose of the investigations was to determine the nature and extent of any lands in the area suitable for dry farming. The study was of a generalized nature, and not in sufficient detail to warrant planning individual farms.

The area investigated consists mainly of rolling to steep uplands. The steep breaks separating this area from the bottom lands consist of badlands and near badlands, obviously unsuited to cultivation, and so were not traversed on this investigation. Even on the rolling uplands, most of the land is not suited for cultivation because of unfavorable soil and topography. There are some areas, however, ranging in size from a few acres to three or four thousand acres that would be suitable for dry farming. The soils on the more level or gently rolling areas consist of a silt loam surface with a clay subsoil. Class II and III land suitable for dry land farming dominate these areas. The northern and

central portion is covered with glacial deposits, some of which are too stony and steep for cultivation and others nearly level or gently rolling. The southern portion of the uplands consists of residual soils over sandstone and shales, but only a small portion of the soils over sandstone has topography suitable for cultivation. These soils, however, are not too well suited for cultivation in a dry climate because of the sandy nature of the subsoil.

At present most of the land on the western segment is used for grazing, only a few scattered tracts being in cultivation. On similar land just west of the Indian Reservation a much higher percentage of the land is in cultivation.

Precipitation is a limiting factor for dry farming in this section of North Dakota. In an area embracing eastern McKenzie County, northwestern Dunn County, southern Williams County and most of Montrail County the warm season precipitation is less than 10 inches, lowest seasonal rainfall of any part in the state. (See "Climate and Weather in North Dakota", 1946). The western portion of the area investigated falls within this low rainfall area. Rainfall in the area is very erratic, varying considerably from year to year. At Sanish, the total precipitation for 1934 was only 5.45 inches, whereas 23.29 inches fell in 1941. Most of the rainfall occurs during the growing season but it is not dependable.

The following excerpt from a table in "Climate and Weather in North Dakota", shows that areas west of the reservation have more drought years than further east.

Station	No. of years record	No. of years less than 12 inches precipitation	No. of years less than 16 inches precipitation
Beulah	30	9	18
Elbowoods	52	12	27
Garrison	68	7	35
Sanish	19	6	14
Watford City	32	8	22

Watford City has 8 years out of 32 or one-fourth, with less than 12 inches of precipitation, whereas Garrison has only 7 years out of 68, or one-tenth, with this lower rainfall. In the United States Department of Agriculture's Technical Bulletin 636, "Correlation between Annual Precipitation and Yield of Spring Wheat in the Great Plains", it is indicated that a yield of 8 to 12 bushels per acre may be expected with 12 inches of precipitation, and a yield of 20 to 40 bushels per acre can be obtained with a precipitation of 20 inches. The yields expected with 12 inches of rainfall are near the lower limit of profitable agriculture. Yields less than this may be considered a failure.

The findings of this investigation are presented on the accompanying map. There are some areas of arable land too small to show on this scale map. Three dynamic profile soil

types are recognized. Each is discussed in detail below.

Class II and III dry farm land, silt loams with permeable clay subsoils, largely of glacial origin. These soils consist of a silt loam surface becoming heavier with depth. On the better areas there are 8 to 10 inches of silt loam on the surface, below which is clay loam to around 24 inches with a permeable clay below extending well below 5 feet. On the poorer areas clay is reached at a depth varying from 6 to 12 inches below the surface. There is more organic matter in the soil where the clay is well below the surface than where it is near the surface. Some of the soil, especially near Sanish, has a small amount of gravel imbedded in the clay but this has no influence on the internal drainage. Large granite boulders are scattered over some of the area. The topography ranges from nearly level to hilly. Most of the land classed as arable is gently rolling. On the soil survey of McKenzie County, 1942, this type of soil is mapped as Williams loam and Williams clay loam. Although not the very best soil in the county, Williams loam is the best of the extensive soils. Small tracts of this type of land are under cultivation on the western segment at the present time. *

Marginal dry farm land, loams with sandy subsoils, residual on sandstone. The soils on the southern part of the area are residual over sandstone. The surface 8 or 10 inches consist

of loam underlain by fine sandy loam or sandy loam down to the 18 to 30 inch levels, below which is partially weathered sandstone consisting of loamy sand and sand intermingled with sandstone fragments. These soils are quite droughty and produce good crops only in the years of high precipitation. The topography tends to be more rolling than on the better glaciated areas. The McKenzie County soil survey maps this land type as Morton loam. It is stated that this soil is "80 to 85 percent as productive as the better soil". In dry years the contrast would be much more pronounced. Even though these are class III lands in years of sufficient moisture, the frequency of dry years makes it undesirable to bring them under cultivation. Some of this type of land was cultivated on the western segment at one time but abandoned during the drought years. None was found under cultivation at the present time. These abandoned fields now have a good grass cover.

Class II dry farm land, alluvial silt loams with permeable clay subsoils. This is the best soil of the area for dry farming purposes but is very limited in extent. Only one body, used for grazing, was found in T. 148 N., R. 94 W. although more detailed survey may reveal others. This soil is found on well drained alluvial fans and terraces. The top 8 to 10 inches consist of silt loam underlain by clay loam

to a depth ranging from 24 to 30 inches. The subsoil below the clay loam consists of permeable clay down to 5 feet or deeper. Not all of the alluvial soils are so good. Some consist of heavy clay with an alkali or salinity problem. Others consist of poorly drained or seep areas. Since these areas do not have dry farm possibilities they are not delineated on the map.

