

# Criteria for the Identification of Types of Farming on Aerial Photographs

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**ABSTRACT:** *Geographers, economists, planners, and others who do research in agricultural regions commonly face the task of identifying types of farming for the purpose of delimiting type-of-farming regions. The usual method employed for the task requires field research that is costly in terms of both time and labor. Recent research in the application of aerial photographs to the identification of types of farming indicates that one can expedite the task with aerial photographs and do most of the work in the laboratory.*

*Three sets of criteria that can be read or inferred from aerial photographs serve as indicators of types of farming: (1) farmstead features such as barns, granaries, and silos; (2) crop associations on individual farms; and (3) the uses that are made of corn and hay.*

*Farmstead features are recognized readily on aerial photographs but are frequently unreliable as indicators of types of farming. Farm crops and crop associations are less readily identified on aerial photographs but are more reliable as indicators of types of farming. Still more reliable is the crop association considered in conjunction with the inferred uses that are made of corn and hay. Finally, application of all three sets of criteria is most reliable; and, thereby, aerial photographs can facilitate the task of identifying types of farming.*

GEographers who do research in rural regions commonly face the problem of classifying types of farming on individual farms and sometimes proceed to delimiting type-of-farming regions. Usual methods of gathering data for the classification are: (1) interviewing farmers; (2) mapping and totaling acreages in particular crops; and (3) counting heads of livestock. Recently, attempts have been made to identify types of farming on aerial photographs.

Three sets of criteria that can be read or inferred from aerial photographs serve as indicators of types of farming: (1) farmstead features such as barns, granaries, and silos; (2) crop associations; and (3) the uses that are made of corn and hay.

Of the three sets of criteria, farmstead features are recognized readily on aerial photographs. A large barn or barns with hip roof or gothic arch roof, a silo, and a milk house indicate a dairy farm (Figure 1). A smaller or lower barn or barns with roof ventilators, a

large corn crib, and possibly numerous small pig houses indicate a hog farm. Still smaller barns associated with one or more large granaries indicate a cash grain farm. Criteria of this type were tested by Clyde F. Kohn and associates in a Wisconsin dairy area and in a North Dakota spring wheat area in 1949.<sup>1</sup>

Less readily identifiable on aerial photographs are farm crops and crop associations. A technique developed in Northern Illinois in 1950, however, enables one to identify farm crops at certain critical stages of growth.<sup>2</sup> Accordingly, one can record crop associations and infer types of farming on individual farms. For Northern Illinois, the following generalizations can be made:

<sup>1</sup> Powers, W. E. and Kohn, C. F., *Aerial Photo Interpretation of Landforms and Rural Cultural Features in Glaciated and Coastal Regions*, Northwestern University Studies in Geography, No. 3 (1959), pp. 76-77.

<sup>2</sup> Goodman, Marjorie Smith, "A Technique for the Identification of Farm Crops on Aerial Photographs," *PHOTOGRAMMETRIC ENGINEERING*, (March 1959), pp. 131-137.



FIG. 1. A dairy farmstead with large barn and adjoining silo and small milk house.

1. On dairy farms, approximately half the cropped land is used for hay and pasture. Corn and oats; or corn, oats, and a cash grain occupy the remaining cropped land about equally (Figures 2A and 2B).
2. On hog farms, corn is planted on approximately half of the cropped land. Most of the remainder is in hay and oats. Pastures, especially rotation pastures, are small or nonexistent (Figures 3A and 3B).
3. On farms that combine hog raising with beef fattening, corn and hay account for half or more of the cropped land. The remainder is used for two or three crops such as oats, soybeans, rye, barley, rape, and rotation pasture (Figures 4A and 4B).
4. On cash grain farms, half or more of the cropped land is planted to small grains. Corn and/or soybeans occupy the remainder. Hay and rotation pasture are conspicuously absent (Figures 5A and 5B).

The uses that are made of corn and hay can be inferred from the aerial photo appearance of these crops at definite stages of the growing season. These criteria were tested in Northern Illinois in 1950 and in Southern Michigan in 1956 and 1957. For both regions, the following generalizations can be made:

1. Some hay on dairy farms may be cut during the last ten days in June or the first ten days in July for summer silage. On aerial photographs taken during this

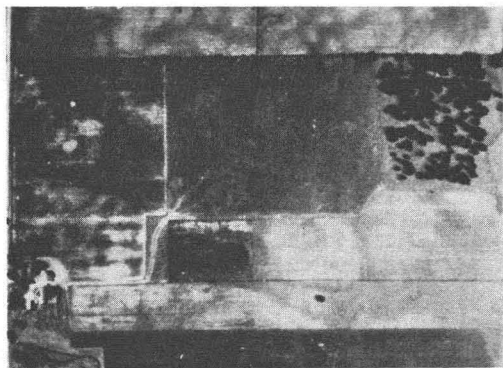


FIG. 2A. Dairy farm in Northern Illinois (July 29).

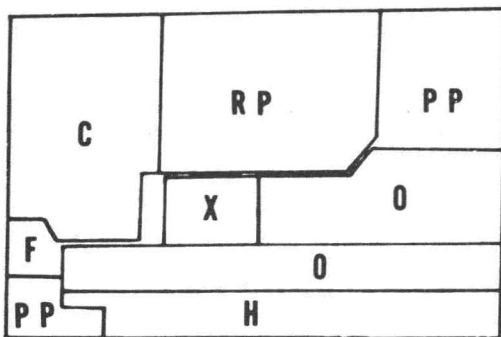


FIG. 2B. Map of dairy farm pictured in Fig. 2A. Crops are C—corn, H—hay, O—oats, RP—rotation pasture, PP—permanent pasture, and X—Sudan grass. F marks the farmstead.

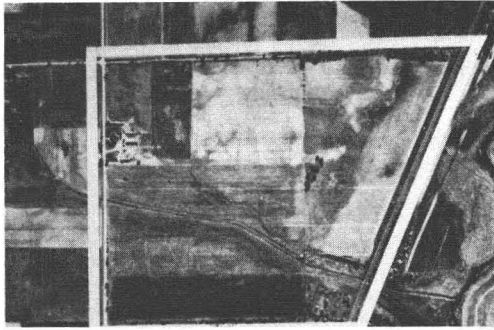


FIG. 3A. Hog farm in Northern Illinois (Oct. 19).

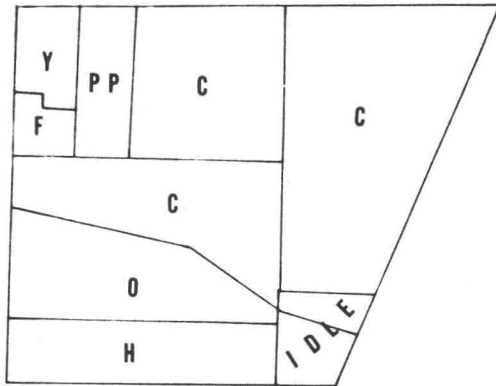


FIG. 3B. Map of hog farm pictured in Fig. 3A. Crops are C—corn, H—hay, O—oats, PP—permanent pasture, and Y—rape. F marks the farmstead. A small patch is idle.

particular period, swath marks around hay fields suggest dairy farming (Figures 6A and 6B).

2. Hay that is cut during the remainder of the summer is dried and stored in a hay mow or is baled and stacked out of doors. Swath marks that appear only on aerial photographs taken after July 10 are not valid indicators of type of farming. The farmer may be practicing dairy farming, beef fattening, or hog farming.
3. A large part of the corn crop on dairy farms is harvested for silage before the first major frost. Cutting begins around September 15 and continues through early October. On aerial photographs taken between mid-September and mid-October, swath marks around corn fields indicate dairy farming (Figure 7).
4. Corn that is cut after the first major frost is ear corn, corn that has reached the hard-ear, dented-kernel stage. Harvest practices vary in connection with ear corn. Some crops are cut and shocked in

the field. Shock corn is fed usually to hogs or beef cattle on the farm. Other crops are husked by machines and stored in corn cribs. Crib corn may be fed to hogs and beef cattle on the farm; or, after a period of drying, it may be sold on the market.

Corn fields that have acquired swath marks on only those aerial photographs that are taken after the first major frost indicate hog farming, beef fattening, or cash grain farming unless other corn



FIG. 4A. Hog and beef fattening farm in Northern Illinois (Oct. 19).

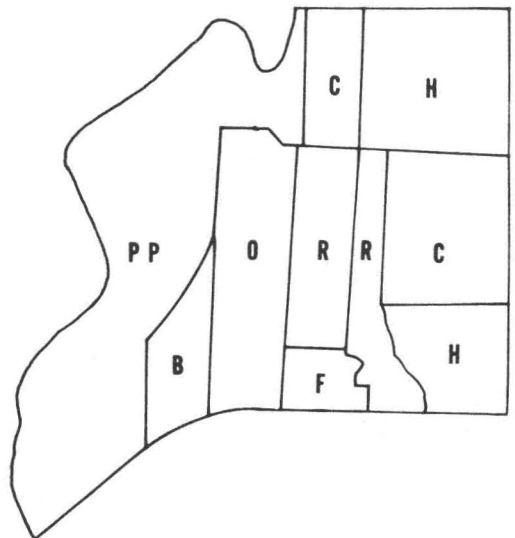


FIG. 4B. Map of hog and beef fattening farm pictured in Fig. 4A. Crops are B—barley, C—corn, H—hay, O—oats, PP—permanent pasture (improved), and R—rye. F marks the farmstead.

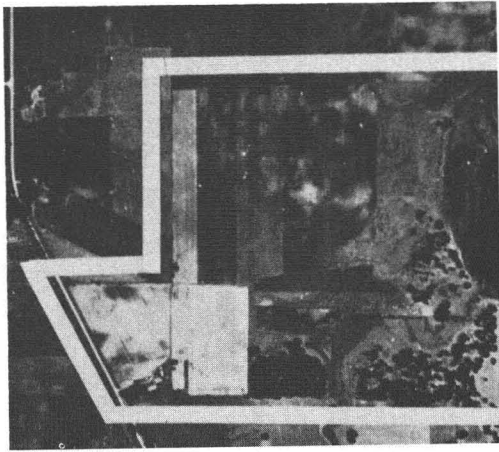


FIG. 5A. Cash grain farm in Northern Illinois (July 21).

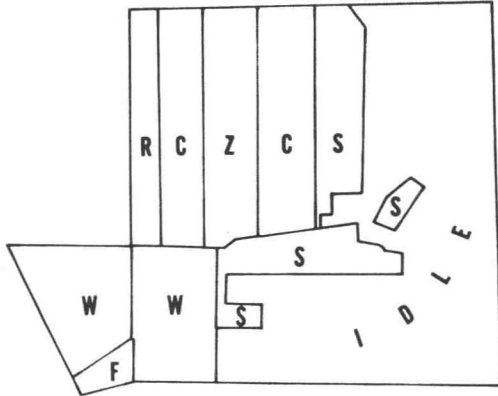


FIG. 5B. Map of cash grain farm pictured in Fig. 5A. Crops are C—corn, R—rye, S—soybeans, W—winter wheat, and Z—spring wheat. F marks the farmstead. A large area is idle and a small area is under water.

fields on the same farm were harvested earlier for silage (Figure 8). On aerial photographs, the swath marks in fields of ear corn may be associated with parallel rows of white dots resembling pin heads created by corn shocks or with a white lacy texture created by scattered sheaves prepared for the shock (Figures 9 and 10).

Reliability varies among the three sets of criteria. Application of all three, however, results in a high degree of accuracy.

Taken separately, farmstead features are frequently unreliable as indicators of types of farming. Farmers shift their basis of operation from time to time without corresponding

alterations in the outward appearance of buildings. The shift may be in response to changes in selling price of farm products, cost of production, labor supply, technology, legislation, or other factors. For example, some of the small-herd dairy farmers in the Michigan Thumb area began to sell their cows and to raise crops for sale to the large-herd dairy farmers during the late 1950's. Other small-herd dairy farmers switched to cash grain farming. The direct cause of the change was legislation that required dairy farmers to in-



FIG. 6A. Dairy farm in Northern Illinois (July 8). One of the hay fields on this farm and a field on an adjoining farm have concentric swath marks.

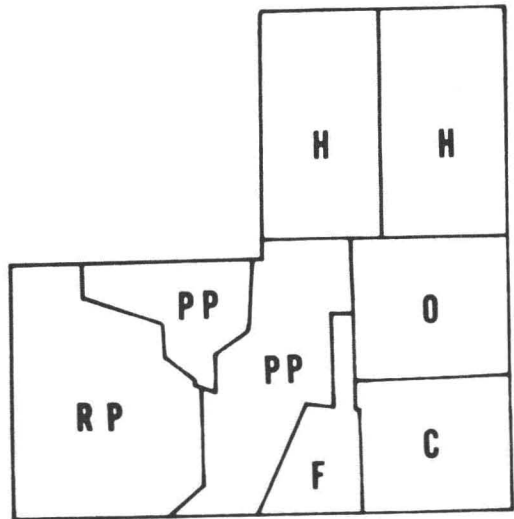


FIG. 6B. Map of dairy farm pictured in Fig. 6A. Crops are C—corn, H—hay, O—oats, RP—rotation pasture, and PP—permanent pasture. F marks the farmstead.

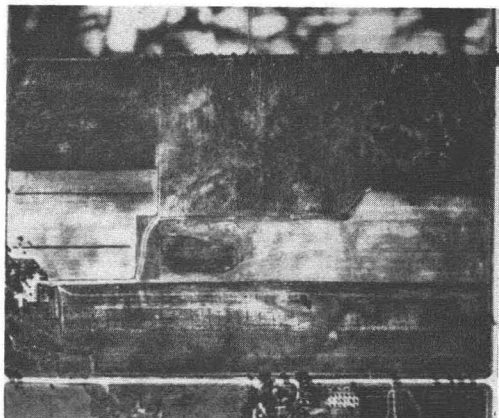


FIG. 7. Another view of dairy farm pictured in Fig. 2A and mapped in Fig. 2B. Photographed on October 5 before frost, parallel swath marks are seen in the corn field suggesting silage rather than ear corn.

stall new, relatively expensive cooling devices for milk. Only those farmers having thirty or more milk cows could bear the increase in cost of milk production.

A huge barn, silo, and milk house, then, do not necessarily indicate dairy farming. The farmer may have changed to beef fattening, hog raising, or cash grain farming.<sup>3</sup>

The crop association is a more reliable indicator of type of farming. Still more reliable is the crop association considered in conjunction with the inferred uses that are made of corn and hay. Finally, the best results are obtained by using all three sets of criteria, as follows:

1. Dairy farming is indicated by a set of dairy farm buildings (Figures 1 and 11), a dairy farm crop association (Figures 2A and 2B), and harvest of a large portion of the corn crop before the first major frost (Figure 7). Harvest of hay in late June or early July is an additional indicator (Figures 6A and 6B).
2. A farm with buildings similar to those of a dairy farm (Figure 12) is classified as a hog farm if the crop association is

<sup>3</sup> A question regarding hierarchical changes in types of agriculture comes to mind. Dairying has been called the most advanced of all types of farming. Apparently one can shift from this most advanced to a lesser advanced type without corresponding changes in the outward appearance of farm buildings. Can a farmer change from a less advanced type of farming to dairying without major changes in buildings? Seemingly, the answer is "no."

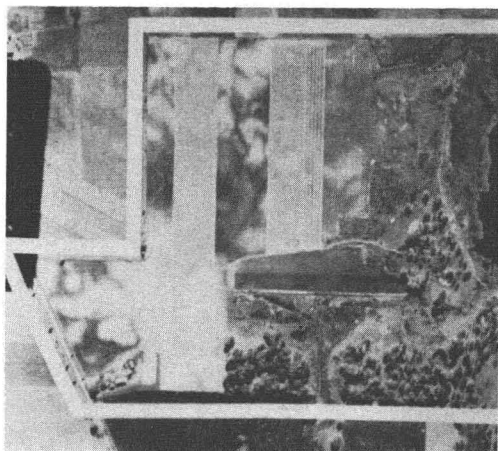


FIG. 8. Another view of cash grain farm pictured in Fig. 5A and mapped in Fig. 5B. Photographed on October 19 after frost, the corn remains uncut suggesting ear corn rather than silage corn. (Parallel lines along the side of one of the two corn fields are made by rows of corn alternating with rows of soybeans.)

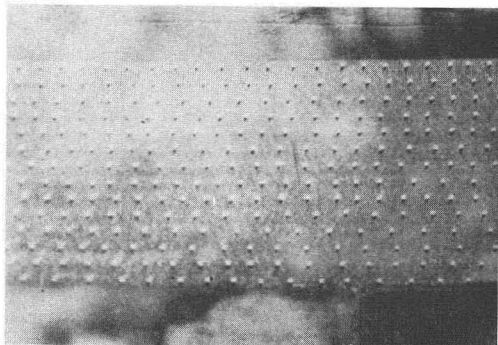


FIG. 9. Field of corn in the shock.

- that of a hog farm (Figures 3A and 3B) and if the corn is harvested after the first major frost (Figure 3A).<sup>4</sup>
3. Another farm with buildings similar to those of a dairy farm (Figure 13) is classified as a hog and beef fattening farm if the crop association is that of a hog and beef fattening farm (Figures 4A and 4B) and if most of the corn is harvested after the first major frost (Figure 4A).
4. Finally, a farm with buildings similar to those of a dairy farm (Figure 14) is classified as a cash grain farm if the crop

<sup>4</sup> In the two areas studied, one in Northern Illinois and one in Southern Michigan, most farmsteads appear to have been built for dairy farming. The type of farming practiced today came as a shift from dairying.

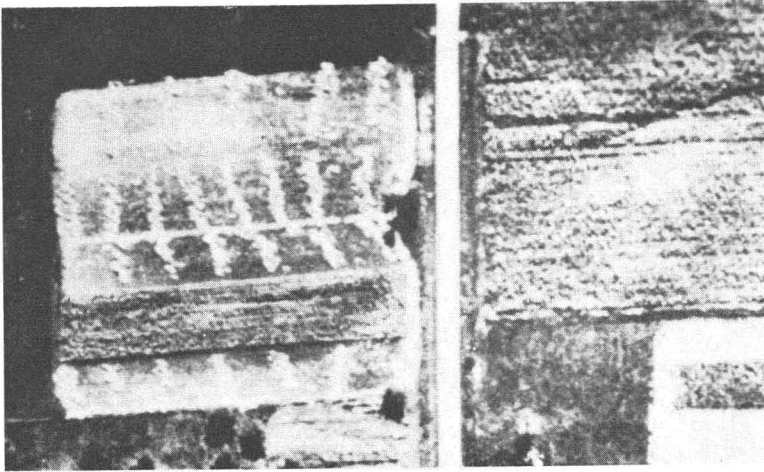


FIG. 10. Two fields of corn. One has a lacy pattern made by scattered sheaves prepared for the shock.

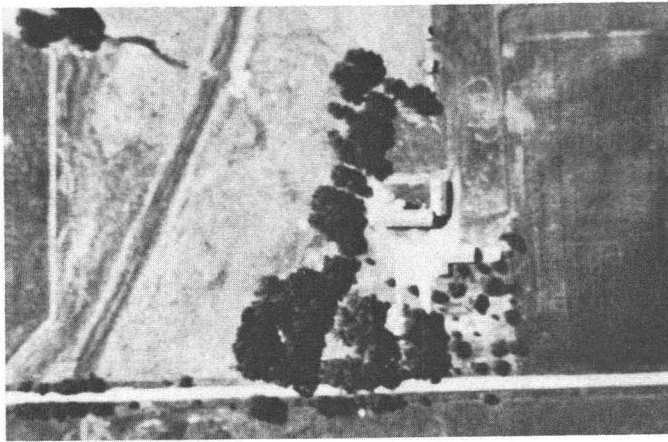


FIG. 11. The farmstead of the dairy farm pictured in Fig. 6A and mapped in Fig. 6B.

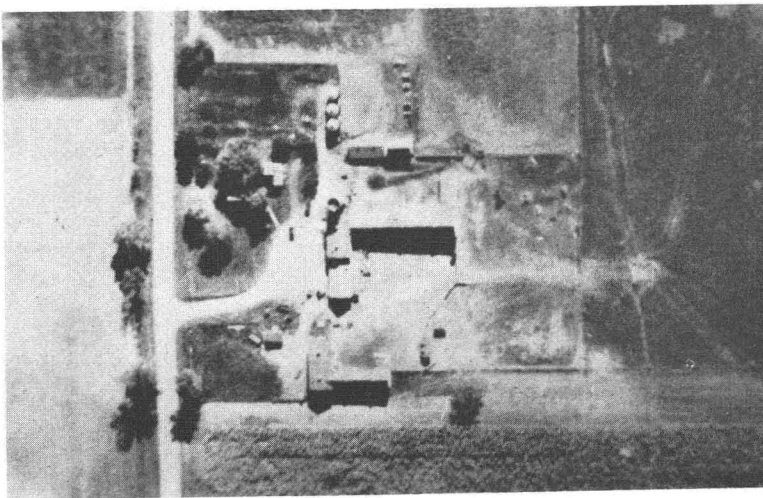


FIG. 12. The farmstead of the hog farm pictured in Fig. 3A and mapped in Fig. 3B. Small pig houses and three cylindrical corn cribs can be seen.

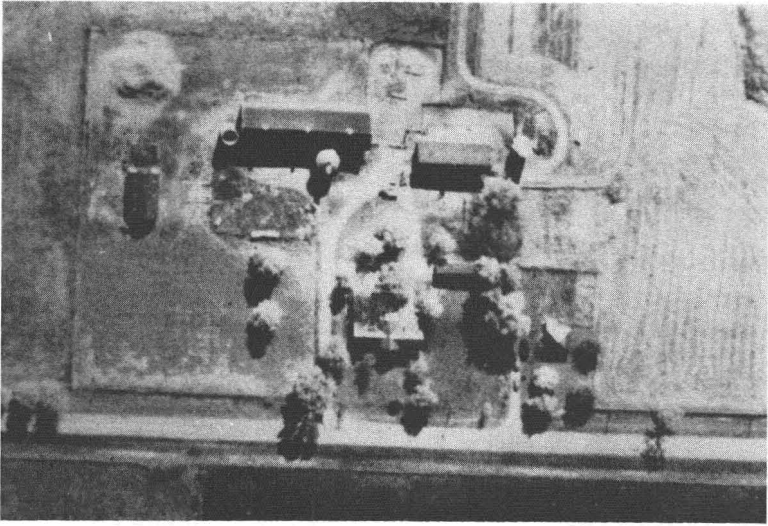


FIG. 13. The farmstead of the hog and beef fattening farm pictured in Fig. 4A and mapped in Fig. 4B.

association is that of a cash grain farm (Figures 5A and 5B) and if most of the corn is harvested after the first major frost (Figure 8).

#### SUMMARY

Aerial photographs can facilitate the task of identifying types of farming in the areas tested, Northern Illinois and Southern Michigan. It would seem, moreover, that the three sets of criteria that serve as indicators of

types of farming on aerial photographs would be equally reliable throughout much of the lower Great Lakes agricultural region. Farmstead features, crop associations on individual farms, and the uses that are made of particular crops, however, vary from one major agricultural region to another. Criteria must be worked out for the other regions, therefore, before aerial photographs can be used generally for the task of identifying types of farming.



FIG. 14. The farmstead of the cash grain farm pictured in Figs. 5A and 8 and mapped in Fig. 5B. A large barn that once stood by the silo is gone and has been replaced by smaller buildings serving as granaries and corn cribs.