

Understanding Agricultural Location

The von Thünen Model - Understanding the Spatial Layout of Agriculture

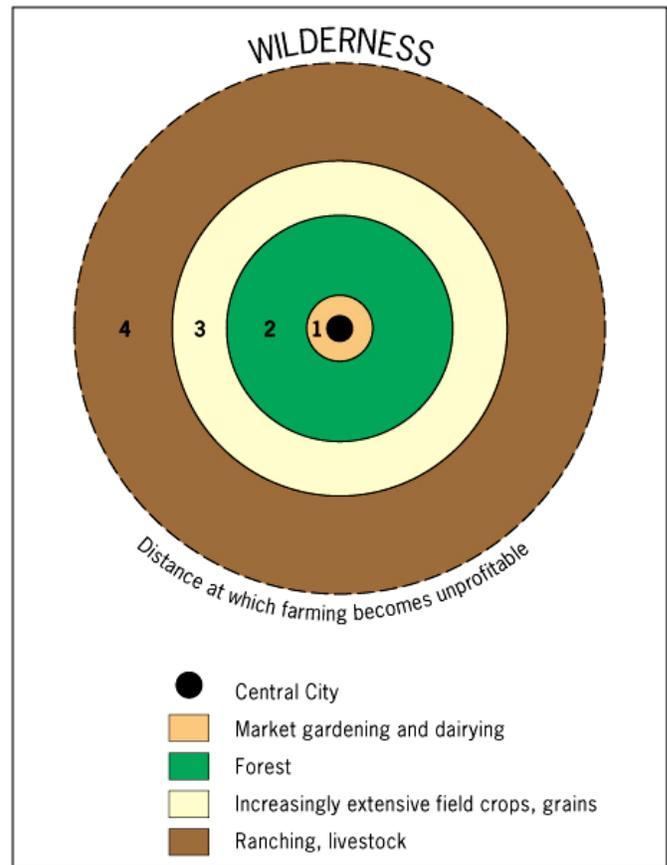
The **Second Agricultural Revolution**, beginning in the latter part of the so-called Middle Ages, involved improved methods of cultivation, production, and storage. Exact points of origin are unknown but it seems certain that the process was gradual and centered in Europe in the 17th and 18th centuries. Tools and equipment were modified (e.g., seed drill). Methods of preparation, fertilization, crop care, and harvesting improved (e.g., crop rotation). The hallmark of this revolution was improved production, storage and organization. Without these changes, the Industrial Revolution would not have been possible and it in turn sustained the changes that were taking place in agriculture. Tractors and other machines took over the work that for so long had been done by animals and humans (mechanization).

Farming obviously is not possible everywhere. Vast deserts, steep mountain slopes, frigid polar zones, and other environmental obstacles prevent farming in many parts of the world. Where farming is possible, the land and soil are not put to the same uses everywhere. So, what factors have combined to produce the spatial distribution of farming systems? Agriculture is influenced by transportation costs or the friction of distance. The major variable of bio-climatic influences is modified by the accessibility factor. It has been observed many times that on areas of seemingly homogeneous landscape, a pattern of land use will have developed that is dependent upon transportation costs.

The most fundamental model that considers the location of agriculture in a systematic way was developed by Johann Heinrich von Thünen (1783-1850) in the nineteenth century to describe and explain land uses on the north German plain (where he grew up and worked as a farmer). Von Thünen witnessed the Second Agricultural Revolution firsthand, and noticed that one commodity or crop gave way to another without any visible change in the soil, climate, or terrain.

The name of the model was "**The Isolated State**" and was based on the following limiting assumptions:

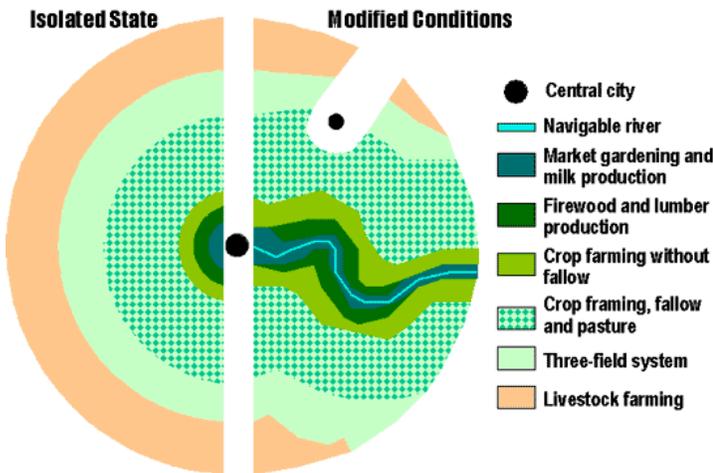
- The city is located centrally within the "Isolated State" which is self sufficient and has no external influences.
- The city is surrounded by an unoccupied wilderness.
- The land is completely flat and has no rivers or mountains to interrupt the terrain.
- The soil quality and climate are consistent throughout the State.
- Farmers transport their own goods to market via oxcart, across land, directly to the central city. Therefore, there are no roads.
- Farmers act to maximize profits.



In an Isolated State with the foregoing statements being true, von Thünen hypothesized that the following pattern of agricultural activity would develop around four concentric rings:

- Dairying and intensive farming occur in the ring closest to the city. Since vegetables, fruit, milk and other dairy products are highly perishable, they must get to market quickly. These products they would be produced closest to the city in the first ring (remember, they don't have refrigerated oxcarts!).
- Timber and firewood would be produced for fuel and building materials in the second ring. Before industrialization (and coal power), wood was a very important fuel for heating and cooking; not to mention construction. Wood is very heavy and difficult to transport so it is located as close to the city as possible.
- The third ring consists of extensive field crops such as grains for bread. Since grains last longer than dairy products and are much lighter than fuel, reducing transport costs, they can be located further from the city.
- Ranching and livestock-raising are located in the final ring surrounding the central city. Animals can be raised far from the city because they are self-transporting. Animals can walk to the central city for sale or for butchering.
- Beyond the fourth ring lies the unoccupied wilderness, which is too great a distance from the central city for any type of agricultural product.

Even though the Von Thünen model was created in a time before factories, highways, and even railroads, it is still an important model in geography. The Von Thünen model is an excellent illustration of the balance between land cost and transportation costs. As one gets closer to a city, the price of land increases. The farmers of the Isolated State balance the cost of transportation, land, and profit and produce the most cost-effective product for market. Of course, in the real world, things don't happen as they would in a model.



Today, **Thunian patterns** are discerned in many parts of the world. Consider the hinterland of Chicago. If you take the train to Denver, you cannot miss a certain concentric zonation that puts dairying and market gardening nearest the city, cash grains such as corn (or soybeans) in the next "ring," more extensive grain farming and livestock raising beyond, and cattle ranching in the outermost zone. This clearly has something to do with von Thünen's ideas, but it also reflects soil quality and climate changes. We can attribute these patterns to a more global scale as well. Dairying occurs in the economic core, since it requires refrigeration and transportation technology, considerable investment, and access to markets. A great deal of cattle ranching occurs in more peripheral locations like Argentina or rural areas in Australia. It is less expensive to grow certain fresh flowers in the Caribbean and ship them to New York City than it is to grow them in other locations.

Decisions made by colonial powers in Europe led to the establishment of plantations from Middle America to Malaysia. These plantations grew crops for European markets; similarly, U.S. companies founded huge plantations in the Americas. The end of colonial rule did not signal the end of the agricultural practices and systems long-established. In fact, even food-poor countries find themselves continuing the growth of commercial crops for export. This is yet another example of the core-periphery concept at work.

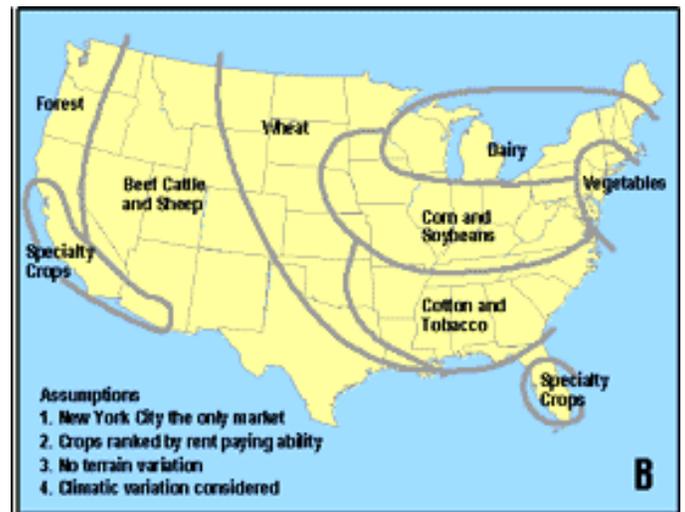


Figure A represents what the agricultural land use would be if the most basic assumptions were applied, namely the market located at New York (or Bosnywash), crops being ranked by comparative rent paying abilities and considering ubiquitous geographical characteristics. Although this representation has some level of concordance with reality, it inaccurately portrays agricultural land use in the United States.

Figure B includes one supplementary assumption that considers climate variations, where the north is colder than the south. This constraint has a significant impact on agricultural land use as even if for a location a crop would have a higher rent paying ability, another crop would be grown because climatic conditions forbids it. The resulting agricultural land use has a much higher level of correspondence with reality.