

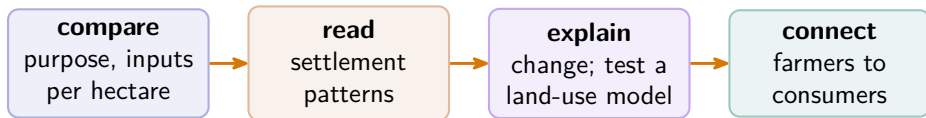
Agriculture and Rural Land-Use

AP Human Geography ■ Unit 5

AP Human Geography



From farming evidence to explanations



Distinguish **higher yield** from **higher income**, and **food supply** from **access**.

1

Introduction to Agriculture

Purpose and intensity are different dimensions

Dimension	Evidence to collect
Agriculture 农业	Deliberate growing of crops and raising of animals.
Subsistence agriculture 自给农业	Mainly supplies household needs; some output may also be sold.
Commercial agriculture 商业农业	Mainly produces for sale, at many farm sizes and income levels.
Intensity	Compare labour or capital inputs per unit of land. Total machinery or total area alone is insufficient.

Mechanisation: what can we establish?



Combine harvester cutting wheat

The photograph shows a harvesting method.

Sales records establish commercial purpose. Labour hours and hectares establish labour intensity.

The photograph alone cannot establish yield, income or inputs per hectare.

A hand tool does not establish subsistence



Farmer using a hoe

Hand cultivation can produce food for use or sale.

Ask where the harvest goes. To measure intensity, also ask how much labour is used over what area.

A tool is evidence of a method, not a complete farm classification.

Classifying farms: original attempt

Farm A

much **hand labour** on **2 ha**
keeps most rice for **household consumption**

Farm B

machines across **1,000 ha**
sells its grain; fewer labour
hours per hectare than A

Your turn

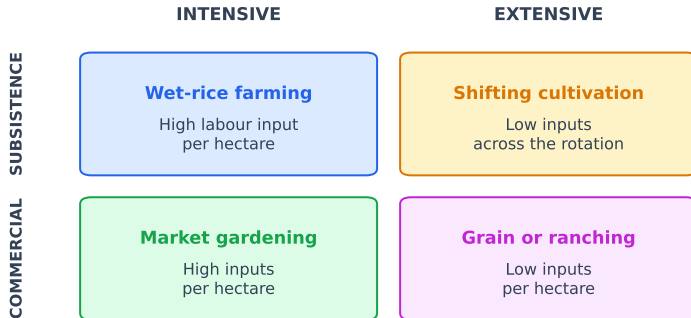
- 1 Classify each farm's **purpose** and compare **labour intensity**.
- 2 Can these facts also establish which farm uses more **capital per hectare**?

Classifying farms: worked check

Evidence	Conclusion
A retains most output	Subsistence purpose in this scenario; commercial sales can still occur.
B sells grain	Commercial purpose, independent of its size.
Labour per hectare	A is more labour-intensive; B is more labour-extensive in the comparison.
Capital intensity	Not established. Divide relevant capital inputs by area; total machinery alone is insufficient.

intensive 集约 and **extensive** 粗放 concern inputs per land area.

Two dimensions of farming



Examples depend on actual inputs and destination of output.

These are common examples, not automatic classifications of every farm using the named method.

2

Settlement Patterns and Survey Methods

Settlement: where homes are located

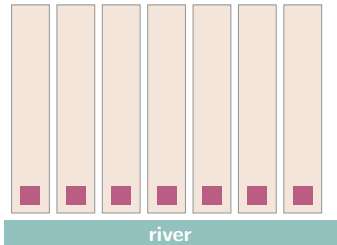
Pattern	Spatial evidence
Clustered (nucleated) 集聚式	Homes grouped near a shared centre such as a village.
dispersed 分散	Homes spread across the farmland they serve.
Linear	Homes follow a road, river or canal.
Different question	Settlement describes homes; a survey system describes how land parcels are divided and recorded.

Survey systems: what the boundaries record

System	Evidence and limit
Metes and bounds	Measured distances, bearings and natural or artificial landmarks; parcels can be irregular.
Township and range	Rectangular survey grid, prominent in parts of the United States.
Long-lot	Narrow parcels extending back from a river or road; frontage does not ensure identical soil or legal rights.

Houses and parcels: original attempt

long, narrow fields behind a row of homes



Aerial view

A row of **homes beside a river**; **long, narrow fields** extend behind them.

Your turn

- 1 Describe the settlement pattern; suggest a compatible **survey system**.
- 2 What evidence would confirm the **legal parcel history**?
- 3 Why can the view not prove equal **soil quality** or **water rights**?

Houses and parcels: worked check

✓ homes in a row: a **linear settlement**; narrow parcels with river frontage fit a **long-lot** arrangement

to confirm: survey maps and property records show how parcels were established

- Appearance alone does **not prove** the legal system
- Soil measurements and water-rights records answer **different questions**: common frontage does not make parcels equivalent

3

Agricultural Origins and Revolutions

Domestication, hearths and diffusion

Domestication selecting and breeding plants or animals **over generations**; importing a crop or harvesting a wild plant is not necessarily first domestication.

agricultural hearths

Fertile Crescent

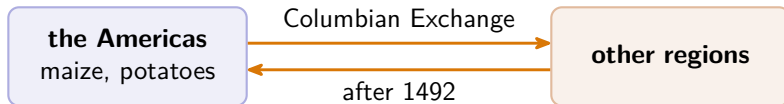
Indus region

Southeast Asia

Central America

- Different species have **different histories**
- The **First (Neolithic) Agricultural Revolution** 新石器农业革命 developed in **multiple places**; communities did not all settle simultaneously

Movement of crops: a historical mechanism



- Crops, animals and other organisms moved **both ways**
- Trade, migration and cultural preferences spread cultivation further: explain a **route or connection**, not automatic diffusion

A crop grown today far from its hearth does **not** change where it was first domesticated.

Agricultural hearth: actual exam demand

2023 AP Human Geography, Set 1, Q2(A)

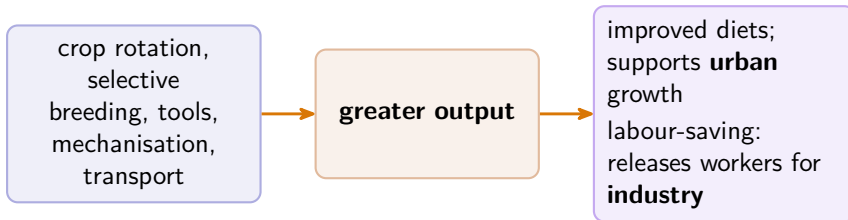
Describe the concept of an **early hearth of domestication**.

Possible response “A place where a plant or animal was **first domesticated**.”

- The official scheme accepts **several descriptions**
- It does not require both origin and subsequent diffusion in every accepted response

Avoid inventing a universal command-word checklist.

Second Agricultural Revolution: connections



The **Second Agricultural Revolution** 第二次农业革命 was connected to **industrialisation**; effects varied by place and access to land and technology.

Green Revolution: inputs and uneven outcomes

Change	Mechanism or condition
Higher-yield varieties	Can increase output with suitable water, nutrients and management; not automatically genetically modified.
Irrigation and chemicals	Can support yields but raise costs and environmental pressures.
Access to investment	Credit, water and infrastructure affect who can adopt the package.
Assessment	Separate yield, income, food access and environmental effects.

Green Revolution 绿色革命: higher output does not guarantee higher net income.

Higher yield: original data task

Annual measure	Old system	New system
Yield (tonnes/ha)	3	5
Sale price (dollars/tonne)	200	150
Nonland costs (dollars/ha)	250	600

Fictional figures; other costs are excluded. Calculate gross sales per hectare, then return after the stated costs. Does higher yield guarantee a larger return?

Gross sales: formula and worked check

$$G = Yp$$

G gross sales, Y yield, p sale price

$$G_{\text{old}} = (3 \text{ tonnes/ha})(200 \text{ dollars/tonne}) = 600 \text{ dollars/ha}$$

$$G_{\text{new}} = (5 \text{ tonnes/ha})(150 \text{ dollars/tonne}) = 750 \text{ dollars/ha}$$

Gross sales rise even though the sale price falls. Gross sales do not subtract production costs; this is not yet net income.

Return after stated costs: worked check

$$N = G - C$$

N return after stated costs, C stated costs

$$N_{\text{old}} = 600 \text{ dollars/ha} - 250 \text{ dollars/ha} = 350 \text{ dollars/ha}$$

$$N_{\text{new}} = 750 \text{ dollars/ha} - 600 \text{ dollars/ha} = 150 \text{ dollars/ha}$$

Yield and gross sales rise, but return after stated costs falls. Both prices and costs changed; these data do not isolate technology as the sole cause.

4

Agricultural Production Regions

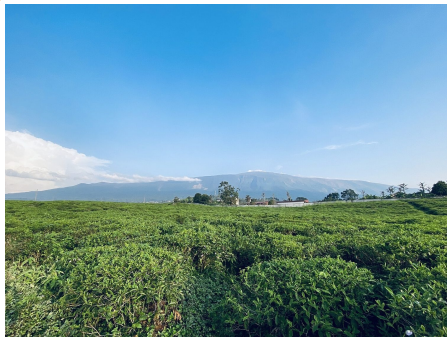
Production regions: interacting conditions

Condition	How it can matter
Climate and soils	Temperature, rainfall and soils constrain suitable crops; irrigation can change water access.
Labour and capital	Available workers, credit and machinery affect methods and costs.
Markets and policy	Transport, prices, trade rules and subsidies influence choices.
Culture and land access	Preferences, tenure and household needs also shape production; national income alone does not decide the system.

Different methods: mechanisms and limits

Method	Conditions and effects
shifting cultivation 迁移农业	Fields are used and then left fallow while cultivation moves. Outcomes depend partly on fallow length and pressure on land.
pastoral nomadism 游牧	Herd movement follows access to pasture and water. Herd products may be used or sold.
Mixed crop–livestock	Crops and animals can provide feed, manure and diversified output.
Monoculture	Specialisation can simplify production but increase exposure to one crop's pests or price changes.

A plantation: visible pattern and missing evidence



Tea **plantation** 种植园

Rows show a planted crop landscape.

Ownership, labour conditions, export destination and profit require records.

Climate helps explain suitability, while markets, policy and transport also influence where commercial crops are grown.

One crop, different intensity: exam preparation

2023 Set 1 Q2(F)

Why may the same crop be farmed **intensively** in a less developed country and **extensively** in a more developed country?

household plot: **more
manual labour per hectare**

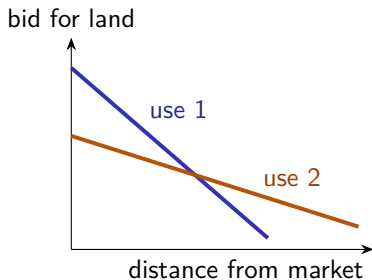
mechanised grain: **fewer
labour hours per hectare**

Explain the relevant **inputs and circumstances**; do not turn the comparison into a rule that all farms in either country type are identical.

5

Spatial Organization and the Von Thünen Model

Bid rent and competing land uses



Bid-rent theory 竞租理论 how much users can pay for land at different locations.

- Agricultural bids depend on expected **revenue, production costs** and **transport costs**
- Near a market, lower transport costs can support **higher bids** for some products

Expensive land does not itself make every intensive crop profitable: compare the competing uses and their **cost structures**.

Von Thünen: assumptions before predictions

The simplified **von Thünen model** 冯·杜能模型 assumes:

Assumptions

one **isolated market**

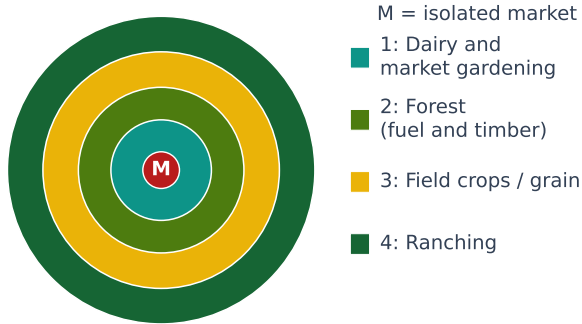
uniform land

a simplified **transport** system

- Farmers **compete for land** under those conditions
- **Transport costs** and **perishability** help explain the historical arrangement: dairy and market gardening, forest, field crops, ranching

The rings are a **model prediction**, not a map that every modern city must match.

Historical land-use rings



Schematic: uniform land and transport; not a modern city map.

Read the rings under the stated assumptions; do not predict land use from distance alone.

Original two-crop model: attempt

Annual bid available for land rent:

$$R = M - td$$

Crop	M (dollars/ha/year)	t (dollars/ha/year/km)
A	600	10
B	360	2

M : margin before transport and land rent; t : transport cost per distance; d : distance in km.
Compare bids at 10 and 50 km. The numbers are invented, not observed dairy-farm data.

Bids at 10 kilometres: worked check

$$R = M - td$$

M margin, t transport cost per km, d distance

$$R_A(10) = 600 u - (10 u/\text{km})(10 \text{ km}) = 500 u$$

$$R_B(10) = 360 u - (2 u/\text{km})(10 \text{ km}) = 340 u$$

u = dollars per hectare per year. At 10 km, A can bid more for land. R is the amount available for land rent, not actual profit after paying that rent.

Bids at 50 kilometres: worked check

$$R = M - td$$

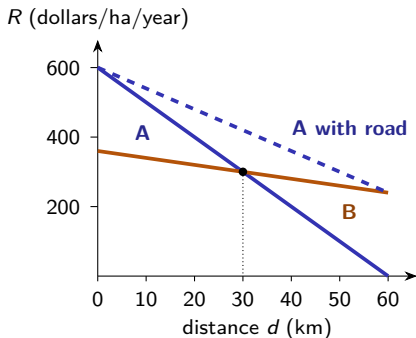
M margin, t transport cost per km, d distance

$$R_A(50) = 600 u - (10 u/\text{km})(50 \text{ km}) = 100 u$$

$$R_B(50) = 360 u - (2 u/\text{km})(50 \text{ km}) = 260 u$$

u = dollars per hectare per year. B can bid more at 50 km because its transport cost rises more slowly with distance. A's larger initial margin does not guarantee the highest bid everywhere.

Changing transport changes the prediction



- A road lowers A's t : its bid **declines more slowly** with distance
- A could **outbid B over a wider area**, other conditions unchanged

Solid: deck values (lines cross at 30 km).

Dashed: an **illustrative** lower $t = 6$.

Refrigeration, rivers, several markets, uneven soils and policies can alter patterns: state the **assumption**, the **mechanism** and the possible **spatial effect**.

Consolidation and economies of scale

Economies of scale larger production spreads some **fixed costs** over more output, reducing **average cost**.



lower average cost



market concentration;
barriers for smaller producers



extra transport,
management or
environmental costs

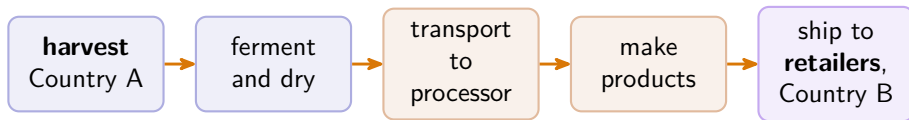
- Technology can raise **carrying capacity** under particular conditions; consumption and environmental limits still matter
- A family farm can be commercial: **ownership**, **size** and **purpose** are separate questions

6

The Global System of Agriculture

Trace a crop from producer to consumer

original cocoa example



Global supply chain 全球供应链 links production to consumption through specific **processing, storage, transport and selling** steps.

Identify **what happens and where**: “globalisation” alone does not explain the connection.

Agribusiness and export dependence

Agribusiness 农业综合企业 connected **input, farming, processing and marketing** businesses; a farmer is one participant.

reliance on a few
export commodities
出口商品



income and foreign
exchange exposed to
world prices, harvests,
transport access

A country can export a crop and import processed food: investigate **prices, quantities and costs** before inferring who gains most.

Fair trade and value added: test the claim

Fair trade 公平貿易 aims to improve trading conditions and producer returns; it does **not guarantee** every farmer an adequate income.

✓ processing
adds sales value

≠

added **profit**:
machinery, energy,
transport, marketing
cost money

2023 Set 1 Q2(G): name a supply-chain step such as **processing or storage** and explain the **international movement** to consumers abroad.

7

Consequences and Challenges of Agriculture

Environmental effects: explain the pathway

Change	Possible mechanism
Fertiliser runoff	Nutrients enter water, encourage algal growth and can contribute to oxygen depletion.
Irrigation without drainage	Evaporation can leave salts in soil and reduce productivity.
desertification 荒漠化	Dryland degradation can involve land pressure and climatic conditions; not every dry place is degraded.
Land-cover change	Deforestation and wetland drainage can reduce habitat and change water flows; assess the place and practice.

Land management: benefits with conditions

Practice	Mechanism and limit
Terracing	Can reduce downslope runoff and erosion; needs suitable design and maintenance.
Conservation tillage	Can retain cover and reduce erosion; effects depend on soil and management.
Shifting cultivation	Adequate fallow can support recovery; shortened fallow may increase pressure.
Suburban expansion	Can remove farmland near markets. Do not assume every affected parcel was the most productive.

Food security: four connected dimensions

Dimension	Question
Availability	Is enough food supplied?
Access	Can people obtain suitable food physically and economically?
Utilisation	Do safe food, health and care allow adequate nutrition?
Stability	Are these conditions maintained over time?

food security 糧食安全 is not measured by harvest size alone.

Full warehouses, hungry households: attempt

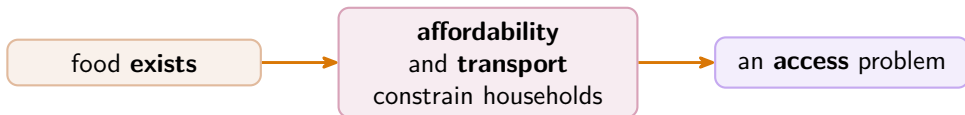
✓ **full** grain
warehouses

✗ low-income households
cannot afford safe,
nutritious food; **costly**
transport to shops

Original scenario

- 1 Identify the problem that increased **national production** alone may fail to solve.
- 2 Suggest an **intervention** and explain its mechanism.

Food access: worked reasoning



- Income support or affordable distribution can improve access through **purchasing power** or **lower travel costs**; check it reaches affected households

Food desert limited access to suitable food outlets in context: location, affordability and transport all matter.

Biotechnology and aquaculture: assess specific effects

Practice	Benefits and risks to investigate
GMOs 转基因生物	Effects depend on the specific trait, crop and management. Assess chemical use, resistance, biodiversity and costs.
Aquaculture	Can supply food and jobs, while feed demand, waste, disease and water management create trade-offs.
Evidence	Compare the actual system and alternatives rather than treating all biotechnology or all fish farming as identical.

Changing food networks and consumer choices

Approach	Mechanism and limit
Urban agriculture / CSA	Can connect consumers and growers; land access, participation and scale limit reach.
Organic / local food	Change production or supply arrangements; neither label guarantees low environmental impact or affordable prices.
Specialty diets / value added	Can shift demand and processing choices; assess inputs, costs and who benefits.
Processing location	Markets, infrastructure, scale and policy affect where food businesses locate.

8

Women in Agriculture

Women's roles: identify place and measure

production

processing

marketing

household food provision

- Women participate across these roles; roles **vary** between places and types of farming
- Unequal access to **land**, **credit**, **training** and **decision-making** can limit opportunities: identify the institution and evidence

Do not claim women perform a fixed majority of farm labour everywhere, or that land access automatically changes fertility.

Training access: original data task

Fictional group	Managers	Trained
District A: women	40	10
District A: men	60	30
District B: women	20	15
District B: men	80	40

Calculate training participation within each group. Compare women and men in each district. Why are raw trained counts insufficient? These data concern managers, not all farm workers.

Training participation in A: worked check

$$q = \frac{T}{N} \times 100$$

T trained count, N all managers in the group

$$q_{A,\text{women}} = \frac{10}{40} \times 100 = 25\%$$

$$q_{A,\text{men}} = \frac{30}{60} \times 100 = 50\%$$

T is the trained count; N is all managers within the same group. Women have lower participation in district A; the denominator differs between groups.

Training participation in B: worked check

$$q = \frac{T}{N} \times 100$$

T trained count, N all managers in the group

$$q_{B,\text{women}} = \frac{15}{20} \times 100 = 75\%$$

$$q_{B,\text{men}} = \frac{40}{80} \times 100 = 50\%$$

Women have higher participation in B despite fewer trained women than men.
Compare proportions, not raw counts.

Training comparison: what remains unknown?

- The observed gender gap **reverses** between districts
- These counts describe **participation among managers**; they do not measure labour hours or land ownership

investigate before explaining the cause

eligibility rules

care demands

travel

access to information

A difference in one sample is not proof of a **global pattern** or a causal effect of gender itself.

9

Exam tips

Agriculture: retrieval

- 1 What additional evidence classifies a photographed farm's purpose and intensity?
- 2 Why can yield rise while return after costs falls?
- 3 Which assumption would a refrigerated transport network change?
- 4 Why might full warehouses coexist with food insecurity?

Agriculture: retrieval checks

Question	Reasoning
Farm classification	Use destination of output and inputs divided by land area.
Yield and income	Prices and costs also affect financial returns.
Transport model	Lower spoilage or transport cost changes competing bids and spatial predictions.
Food security	Access, utilisation and stability matter alongside availability.

Check yourself

Original transfer task

A **new road** reduces transport costs for vegetable growers near a city. **Harvests rise**, but some households still **cannot afford** nutritious food.

Your turn

- 1 Explain one possible change in competing **land bids**.
- 2 Identify the **model assumption** affected.
- 3 Why does greater output not by itself establish improved **food security** for every household?