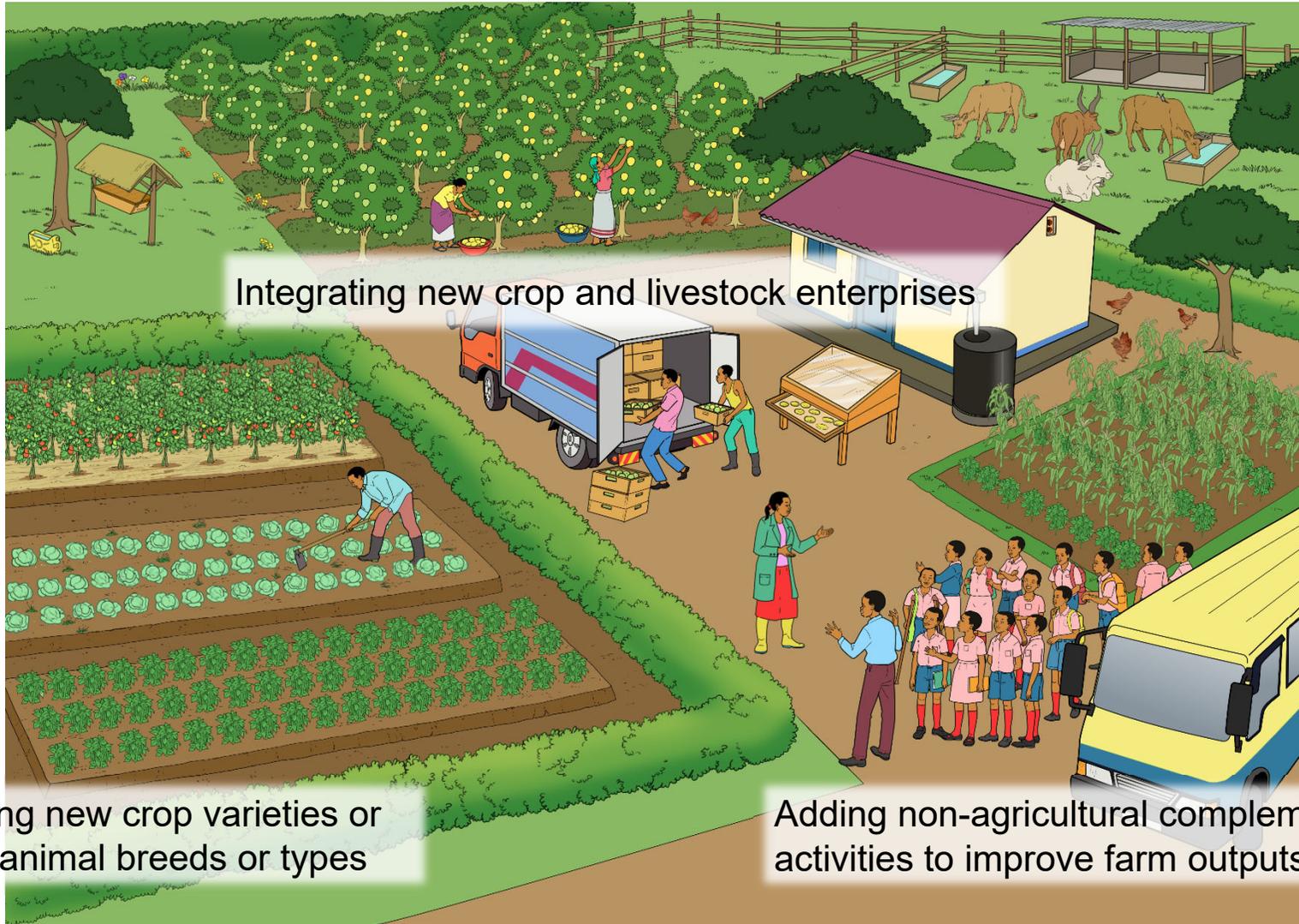


# What farm diversification means



Integrating new crop and livestock enterprises

Adding new crop varieties or new animal breeds or types

Adding non-agricultural complementary activities to improve farm outputs



# Benefits of diversifying a farm

Why should I diversify on my farm?

- Farm diversification ...
- creates a more climate-resilient and self-sustaining farm.
  - increases the number of products from the farm.
  - creates new income sources and employment opportunities including agrotourism.
  - offers opportunities for learning and training.
  - strengthens the farm's ability to meet the family's present and future needs.



# Additional advantages and societal benefits of farm diversification



# Forms of diversifying cropping systems

## Crop rotation



Maize and beans in a cereal - legume rotation

## Intercropping + cover crops



Young cocoa plantation with intercropped banans/plantains

## Tree crops + green manures



Cocoa trees with a legume cover crop

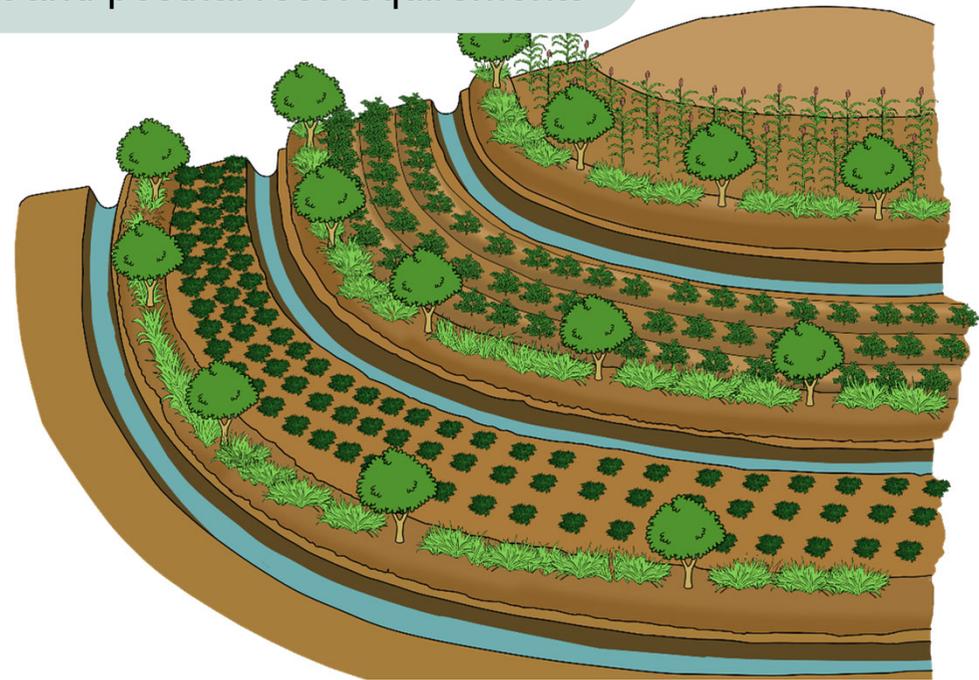


# Guiding questions in crop diversification

What should we consider in diversifying our crop production?

We should consider the following things:

- crop diversification goals;
- sources of seed/planting materials;
- site/field conditions;
- crop requirements;
- harvest and postharvest requirements



# How to diversify the crop rotation based on nutrient needs

Feeding habits	Crop family	Examples
<b>Light feeders</b>	Allium	Onion, Leeks, Shallots, Garlic
	Legume	Beans, Peas
	Amaranthaceae	Amaranth
	Mallow (Malvaceae)	Okra, Jute mallow
<b>Moderate feeders</b>	Umbellifers	Carrots, Fennel, Celery, Parsely
<b>Heavy feeders</b>	Chenopods	Spinach, Beets, Swiss chard
	Composites	Lettuce, Artichokes
	Crucifers	Cabbage, Cauliflower, Kale, Broccoli, Brussel sprouts, Mustard
	Curcubits	Pumpkins, Melons, Squashes, Cucumbers
	Gramineae	Maize, Wheat
	Solanaceaes	Tomatoes, Potatoes, Peppers, Eggplant
	Asparagaceae	Asparagus

Source: ????????????????



# Grouping of crops based on susceptibility to diseases and pests (botanical families)

## Cucurbits

Gourds,  
Cucumber, Melons,  
Pumpkins, Squash

## Brassicas

Broccoli, Cabbage,  
Cauliflower, Mustard,  
Radish, Turnip

## Nightshades

Potato, Tomato, Pepper,  
Eggplant

## Alliums

Chive, Garlic, Leek,  
Onion, Shallot

## Root crops

Cassava, Sweet potato,  
Taro, Yam, Water chestnut

## Carrot family

Carrot, Celery, Dill,  
Parsnip, Parsley

## Grains & Cereals

Corn, Rice, Sorghum,  
Wheat, Oat, Barley, Millet

## Mallows

Cotton, Okra

## Aster

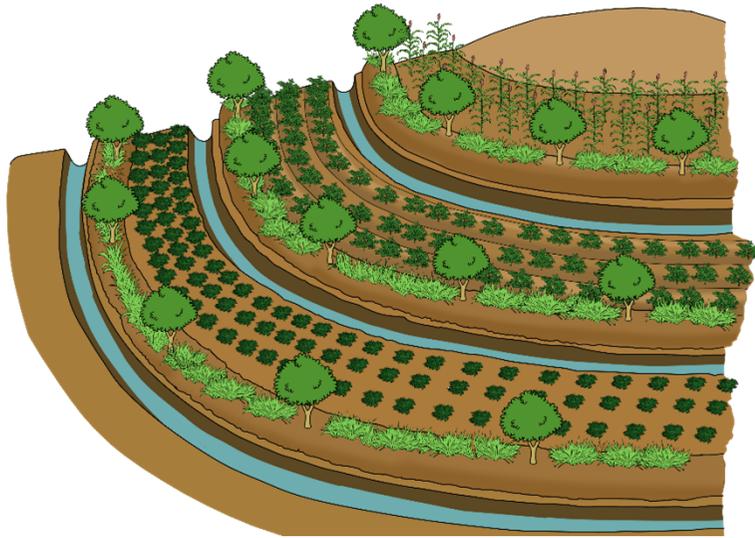
Lettuce,  
Artichoke

## Legumes

Beans, Peas,  
Peanut



# Benefits of alley cropping



Tree row Alley crops Tree row Alley crops

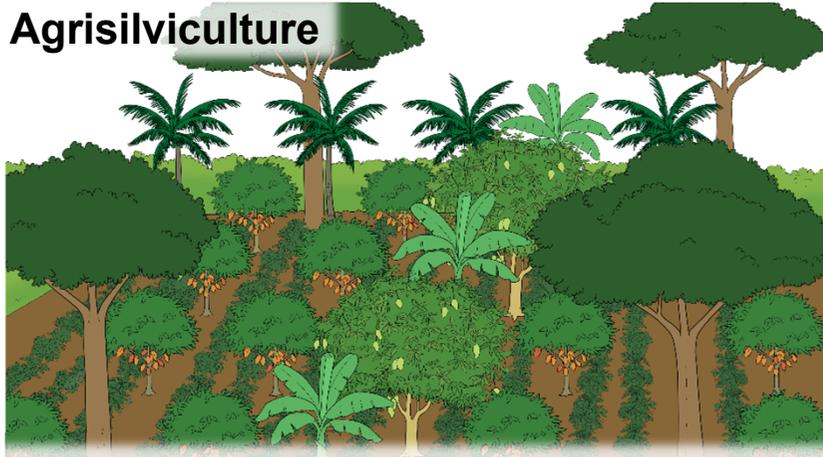
- **Income diversification:** Annual and perennial crops provide the cash flow while the timber trees provide the return on long-term investments on the land.
- **Erosion control:** Trees and grass stabilise the soil along slopes against land slides.
- **Wind protection:** Rows of trees reduce wind speed, thereby controlling wind erosion. They also create sheltered microclimates that improves the yield and quality of crops growing in the alleys.
- **Promotion of biodiversity:** Alley cropping increases the biodiversity of cropland which creates new habitat for wildlife including beneficial organisms.



# Agroforestry: combining trees, crops and animals

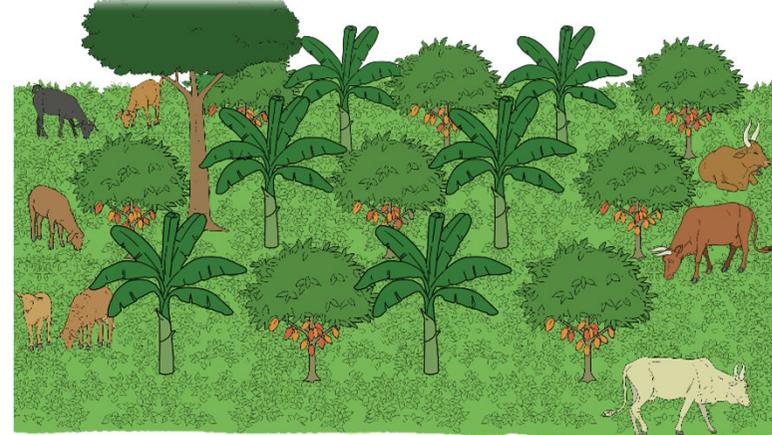
(where compatible with the organic regulation)

## Agrisilviculture



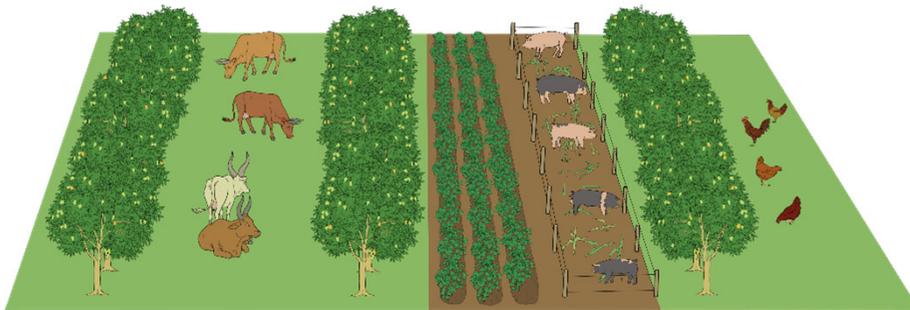
Combining agricultural crops with raised and protected forest crops including alley cropping

## Silvopastoral system



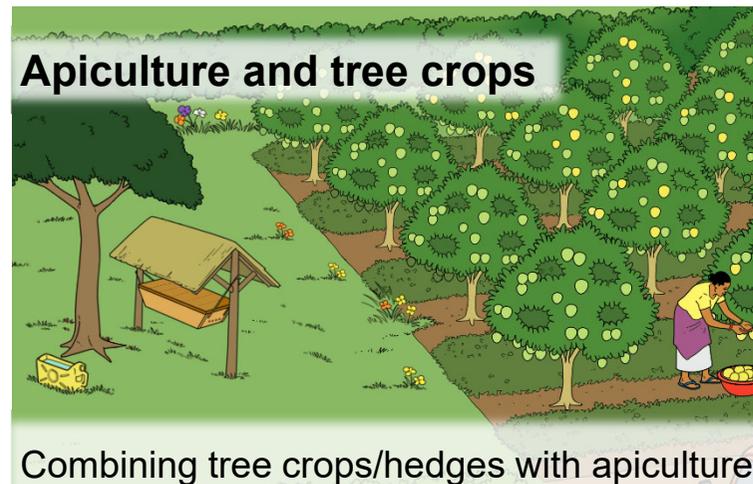
Combining trees/hedges and pasture grazing

## Agrosilvopastoral system



Combining annual crops, trees and pasture grazing

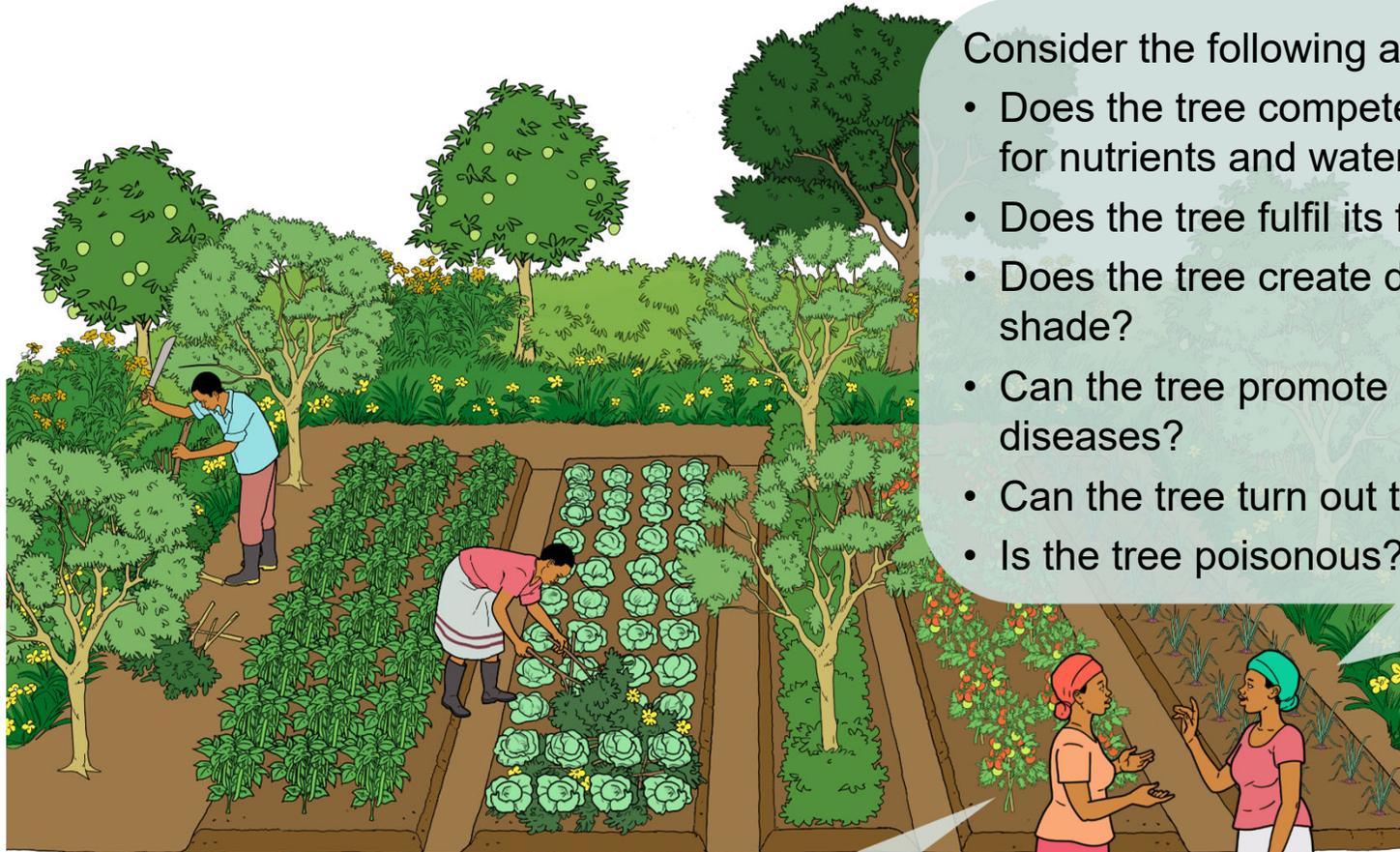
## Apiculture and tree crops



Combining tree crops/hedges with apiculture



# How to select suitable agroforestry trees?



- Consider the following aspects:
- Does the tree compete with the crops for nutrients and water?
  - Does the tree fulfil its function?
  - Does the tree create dense or light shade?
  - Can the tree promote pests or diseases?
  - Can the tree turn out to be a weed?
  - Is the tree poisonous?

How do I select suitable trees?



# What are green manures?

What are green manures?

Green manures ...

- are grown for their large amounts of biomass to improve the soil;
- are incorporated into the soil while still green, with or without cutting;
- serve as cover crops under perennial crops;
- add nitrogen to the soil (if leguminous);
- may also be used for feeding livestock.



# What are the advantages of green manures?

Green manures can ...

- produce large amounts of plant **biomass** to feed the soil;
- bring large quantities of **nitrogen** into the production cycle;
- make **nutrients** available to the crops;
- **protect the soil** from erosion by wind and water;
- preserve **soil moisture** and **soil organic matter**;
- effectively **suppress weeds**;
- **save** on fertiliser **costs**;
- **save on labour** for weeding;
- have **edible parts**, some are highly valuable animal feed.



# Options of integrating green manures in the farming system



Perennial green manures in borders and alleys



Leguminous cover crops in perennial crops



Relay cropped green manures

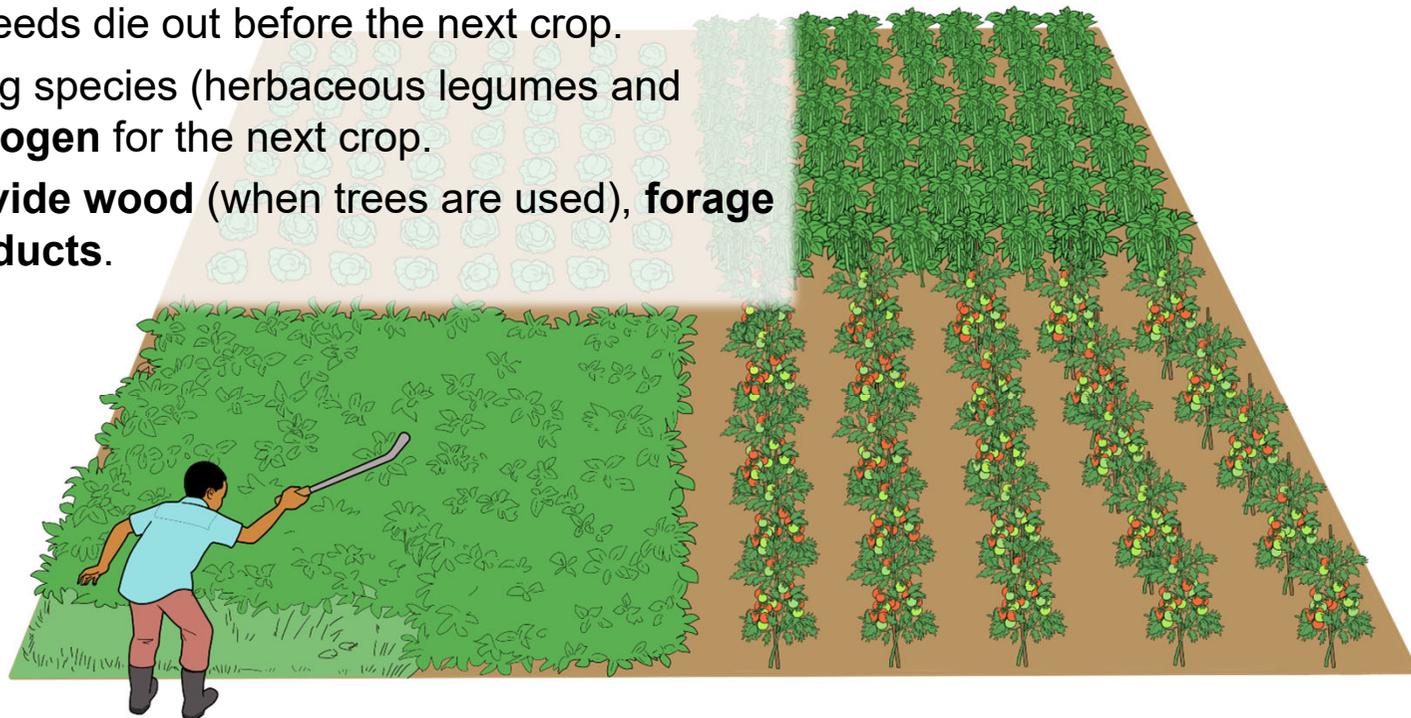


Annual green manures or leguminous trees in rotations or improved fallows

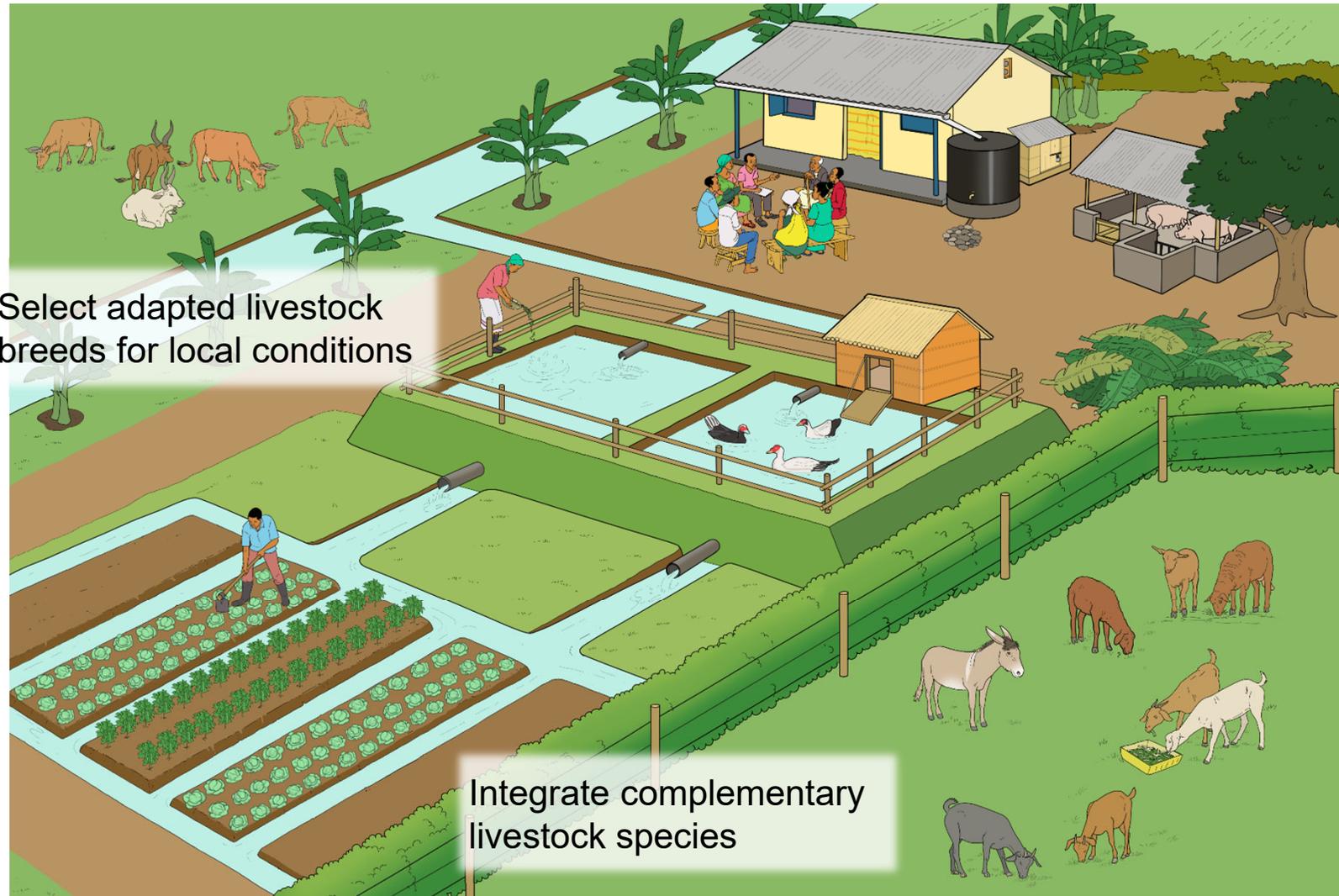


# Benefits of improved fallows

- **Improve soil fertility** by providing organic material, especially species that produce a lot of foliage that decomposes rapidly.
- **Protect the soil** from erosion.
- Grow fast enough to **outcompete weeds**; cast enough shade that weeds die out before the next crop.
- Nitrogen-fixing species (herbaceous legumes and trees) **fix nitrogen** for the next crop.
- Possibly **provide wood** (when trees are used), **forage** or **other products**.



# How to diversify in livestock production



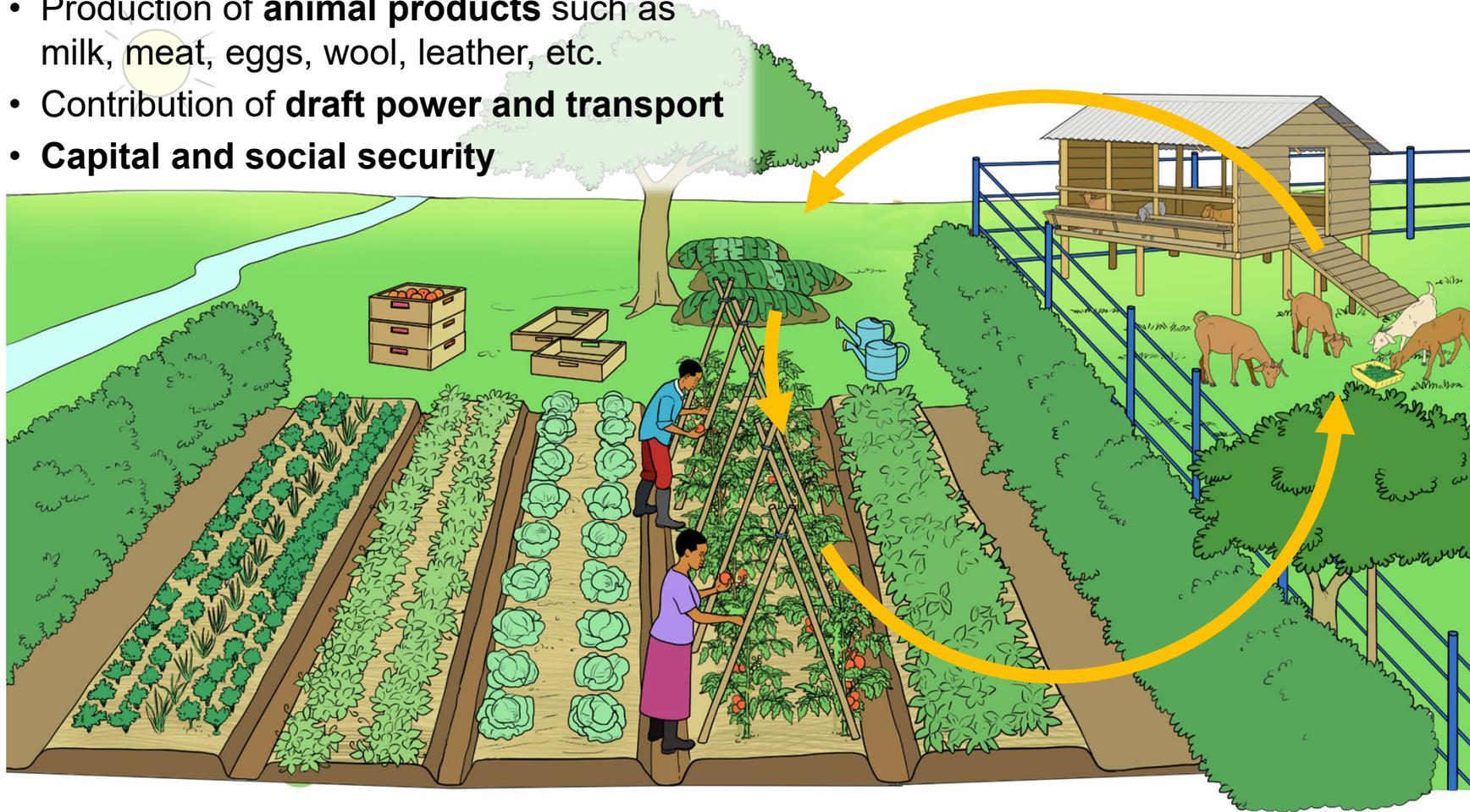
Select adapted livestock breeds for local conditions

Integrate complementary livestock species



# Some benefits of livestock integration

- Provision of **manure** to fertilise crops
- Production of **animal products** such as milk, meat, eggs, wool, leather, etc.
- Contribution of **draft power and transport**
- **Capital and social security**



# How to synergise crops and livestock in a farm

Avoid competition between livestock and crops

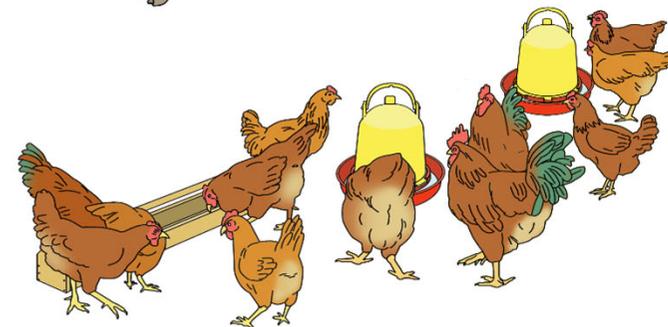
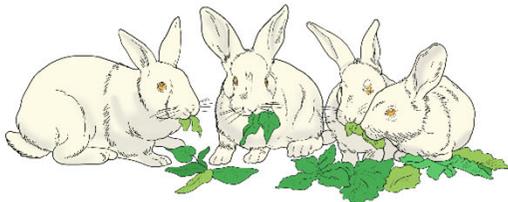
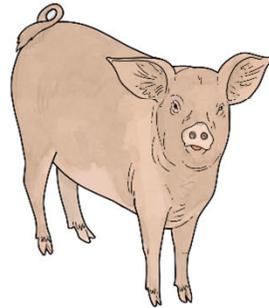
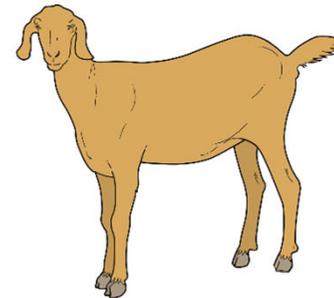
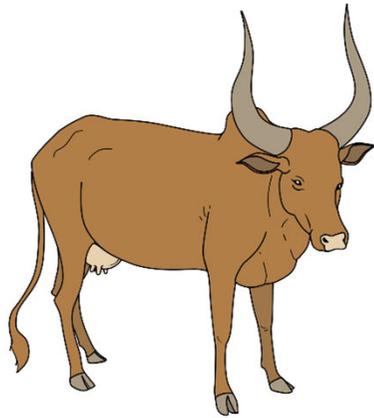


Feed the animals with farm-own feed

Recycle animal manures for the crops



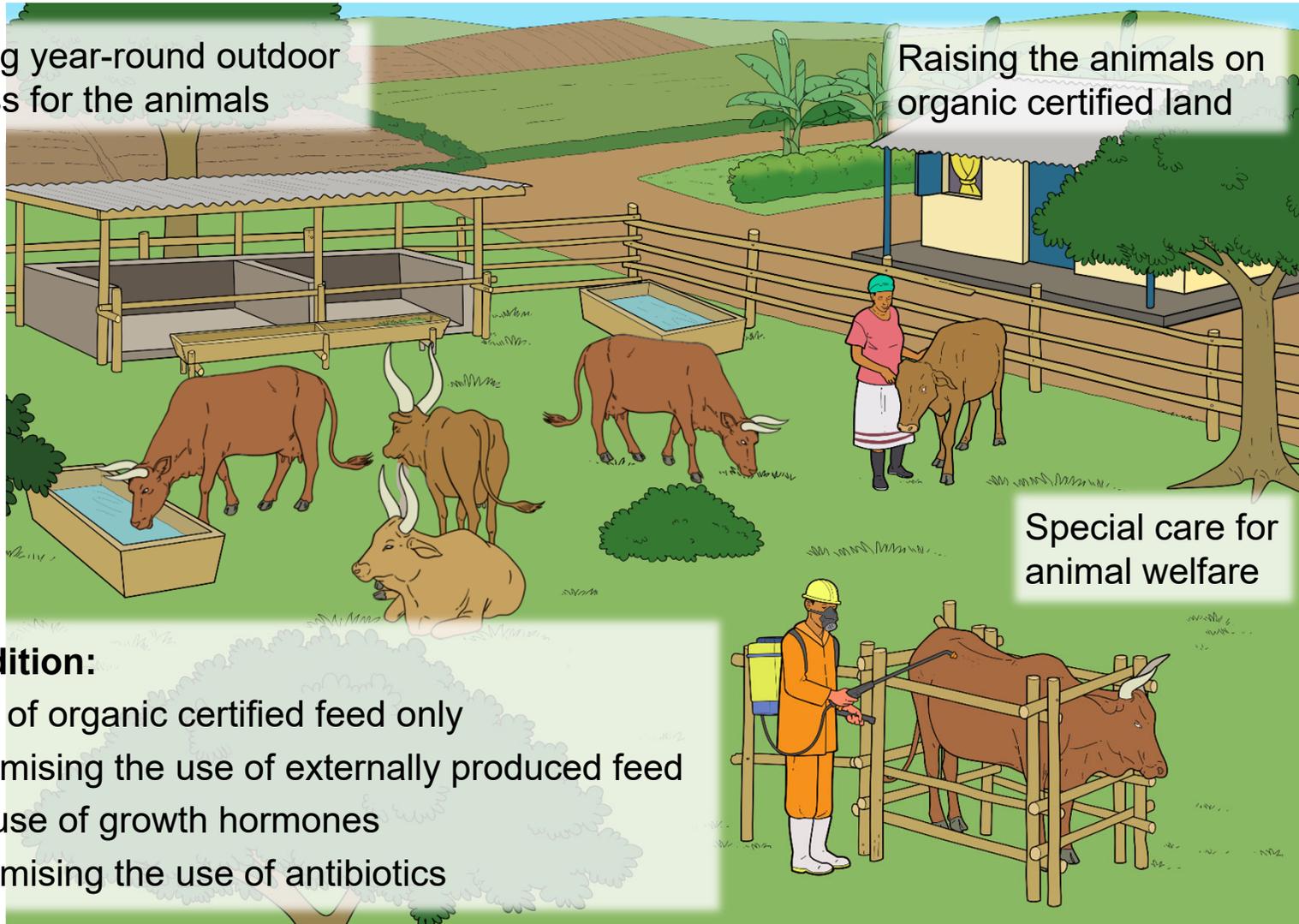
# More examples of animal species diversity



# Requirements for organic livestock production

Having year-round outdoor access for the animals

Raising the animals on organic certified land



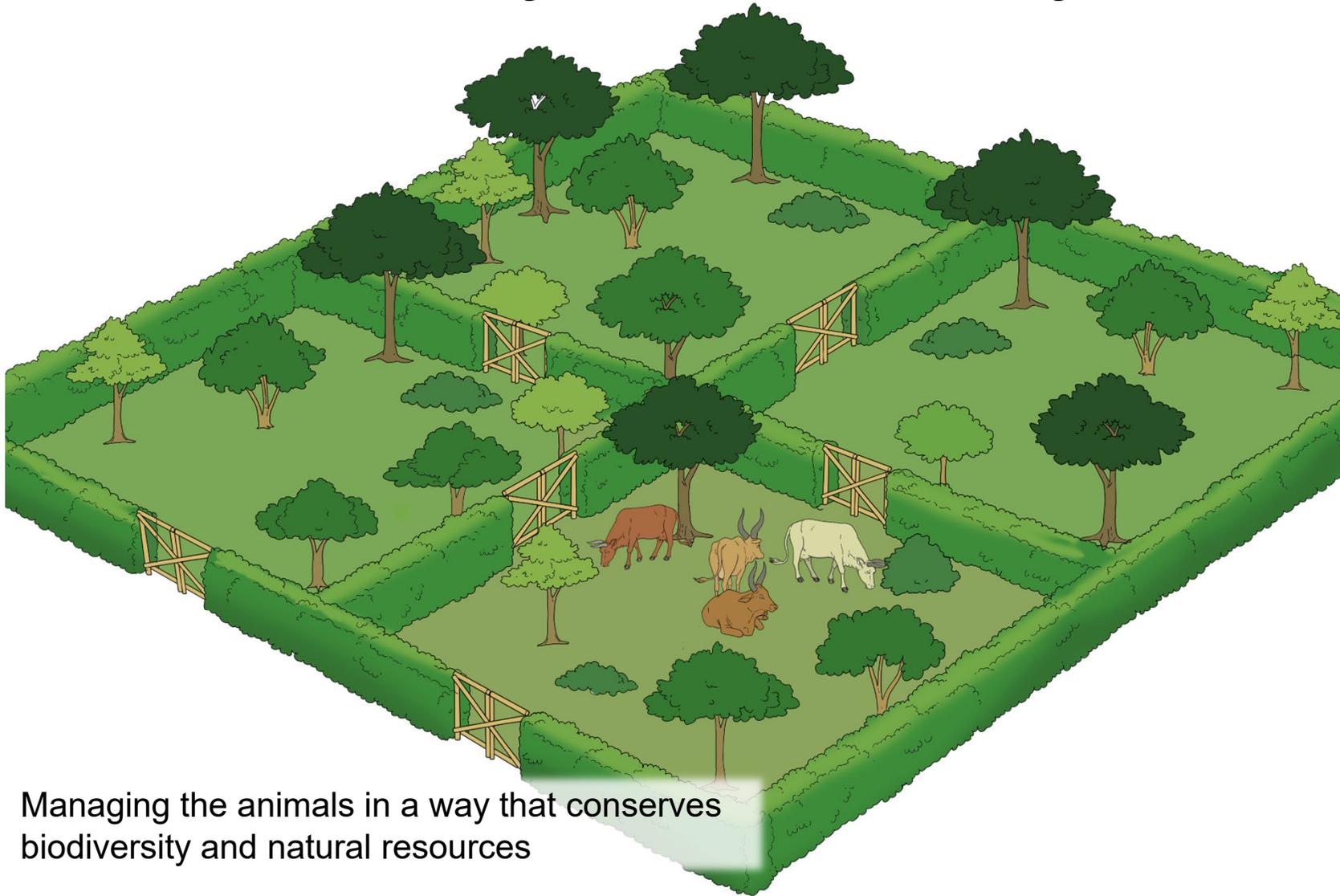
Special care for animal welfare

## In addition:

- Use of organic certified feed only
- Minimising the use of externally produced feed
- No use of growth hormones
- Minimising the use of antibiotics



# Resource-friendly animal husbandry

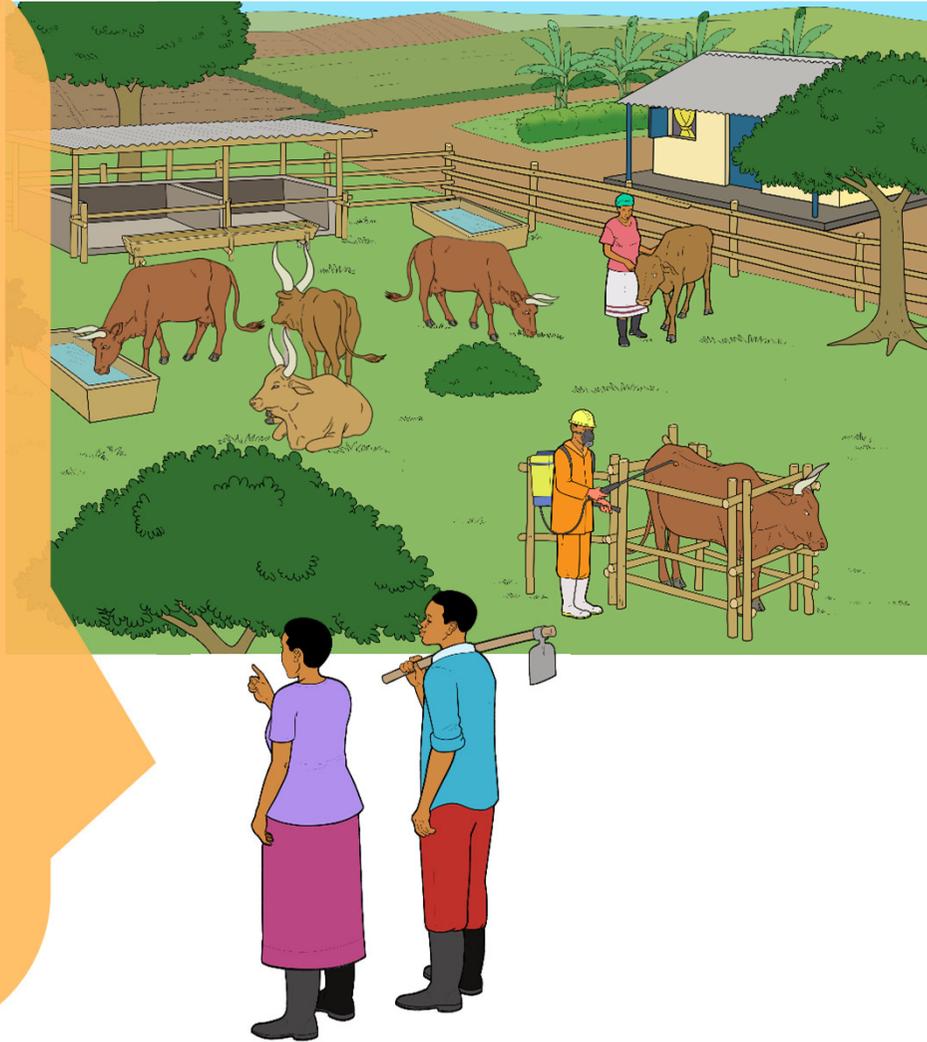


Managing the animals in a way that conserves biodiversity and natural resources

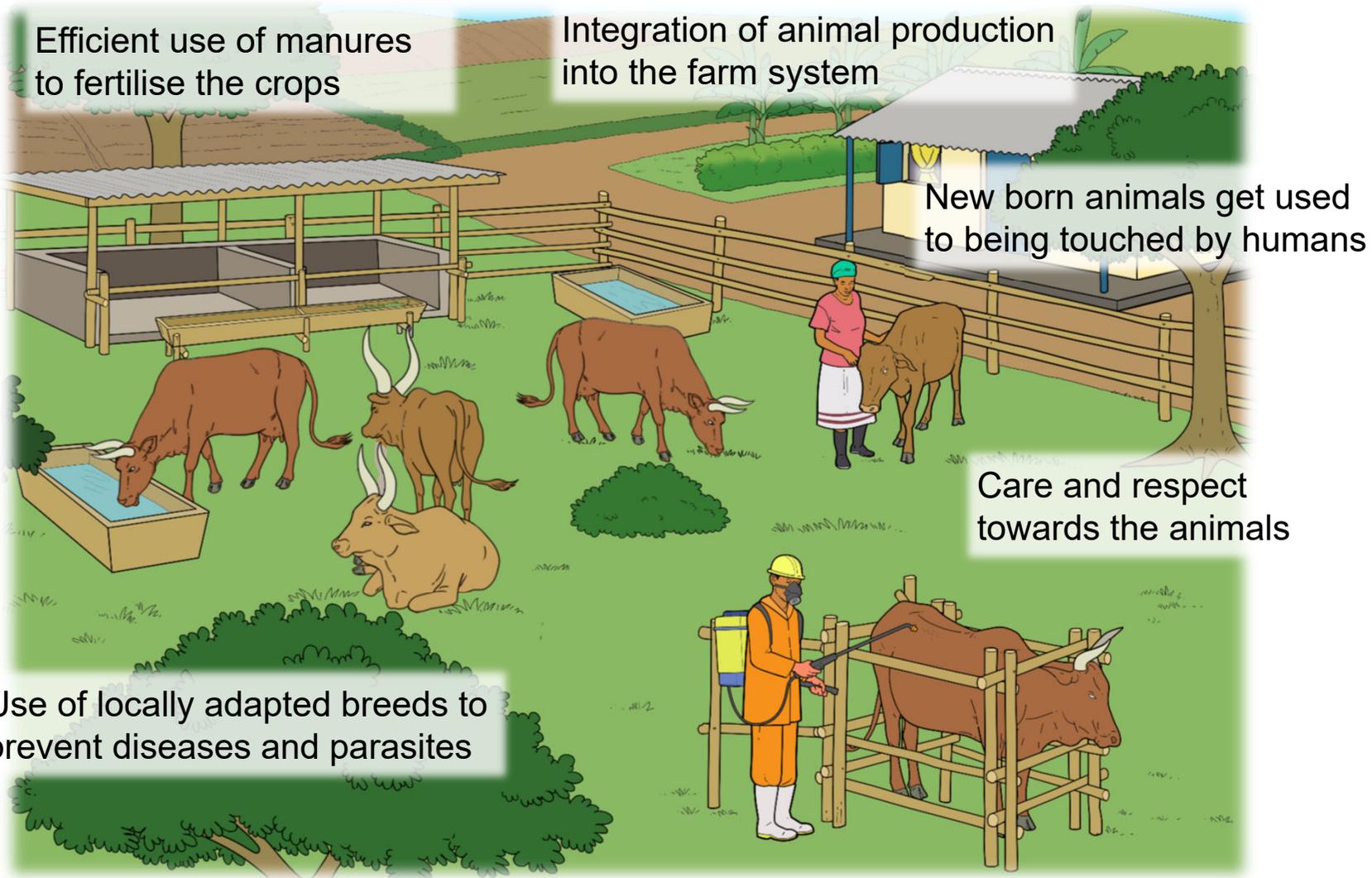


# What to consider before integrating livestock?

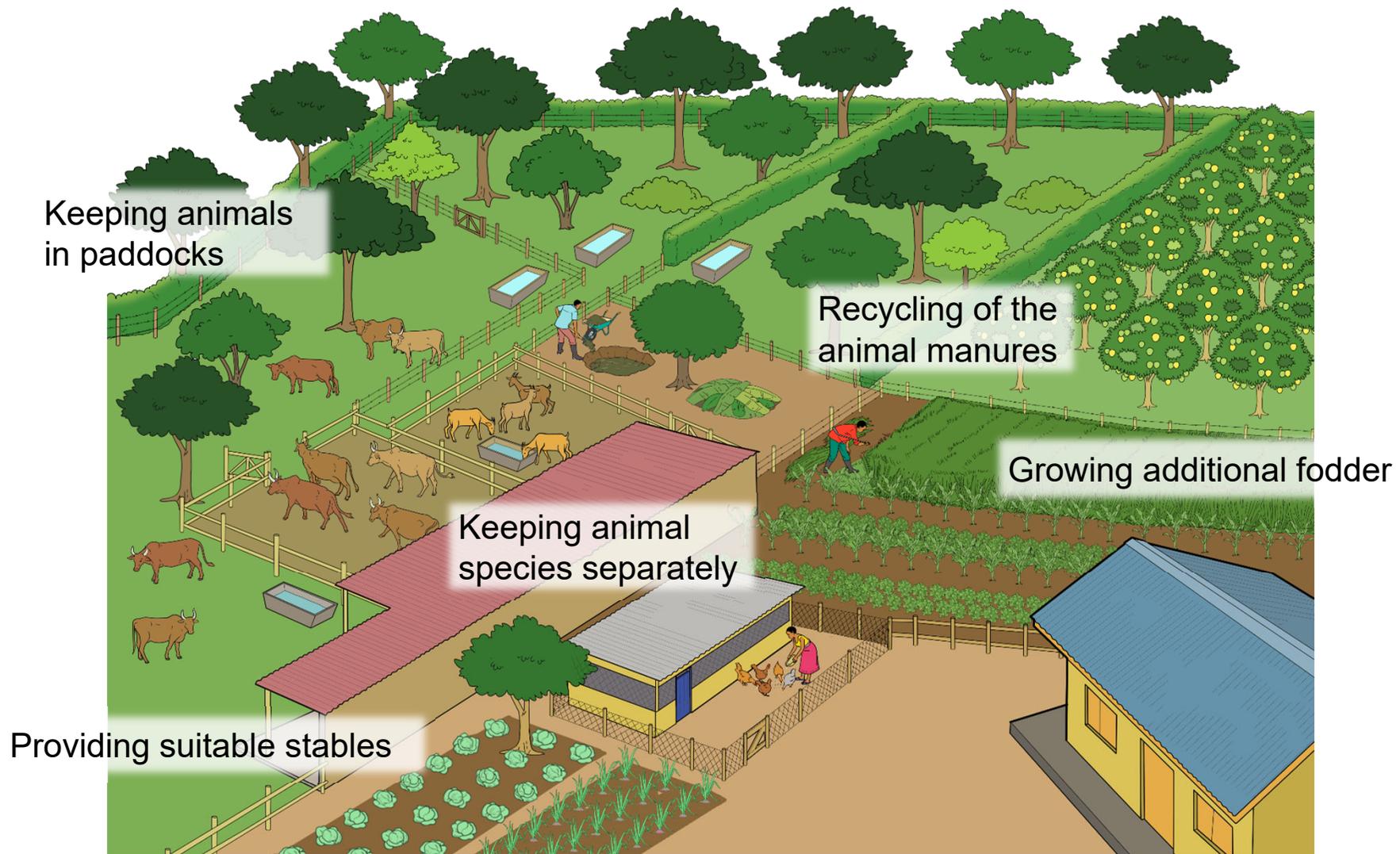
- Do you have the **knowledge** about management of an animal species?
- What **animals and breeds** are the most **suitable** in the situation?
- Are **starter animals** available?
- Does the **land** comply with organic certification?
- Are adequate quantities of **grazing land or free-range areas** available?
- Are there enough sources of **fodder and/or supplementary feed**?
- Are good **housing facilities** for the respective types of animals available or can they be built?
- Are there sources for drinking **water**?
- Are there suitable crops that can be fertilised with the **manure**?
- Is there enough **labour** available to handle the animals adequately?



# General approach to organic livestock management



# Improved crop-animal integration

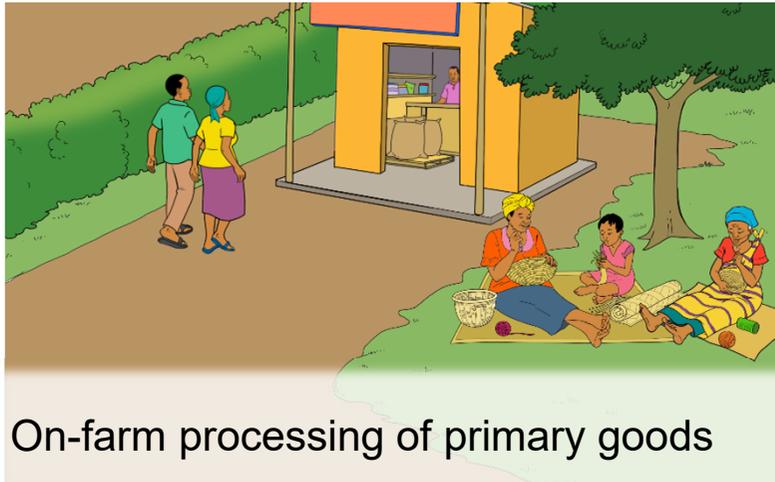


# What to consider for non-agricultural diversification?

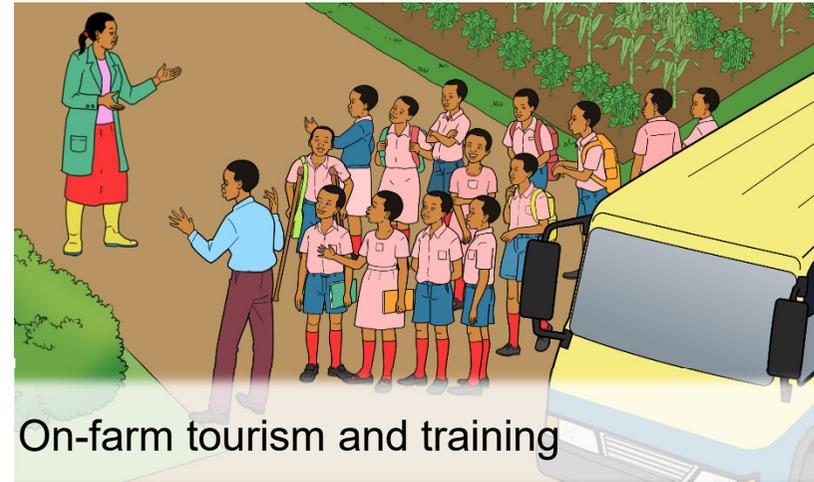
- Knowledge about management of a non-agricultural enterprise
- Rapid market assessment
- Compliance with organic expectations of the farm
- Secure basic farm income for the transition
- Availability of infrastructure, machinery or equipment, or possibility of purchase
- Availability of land
- Availability of skilled labour
- Value increase of the farm



# Options for non-agricultural diversification



On-farm processing of primary goods



On-farm tourism and training



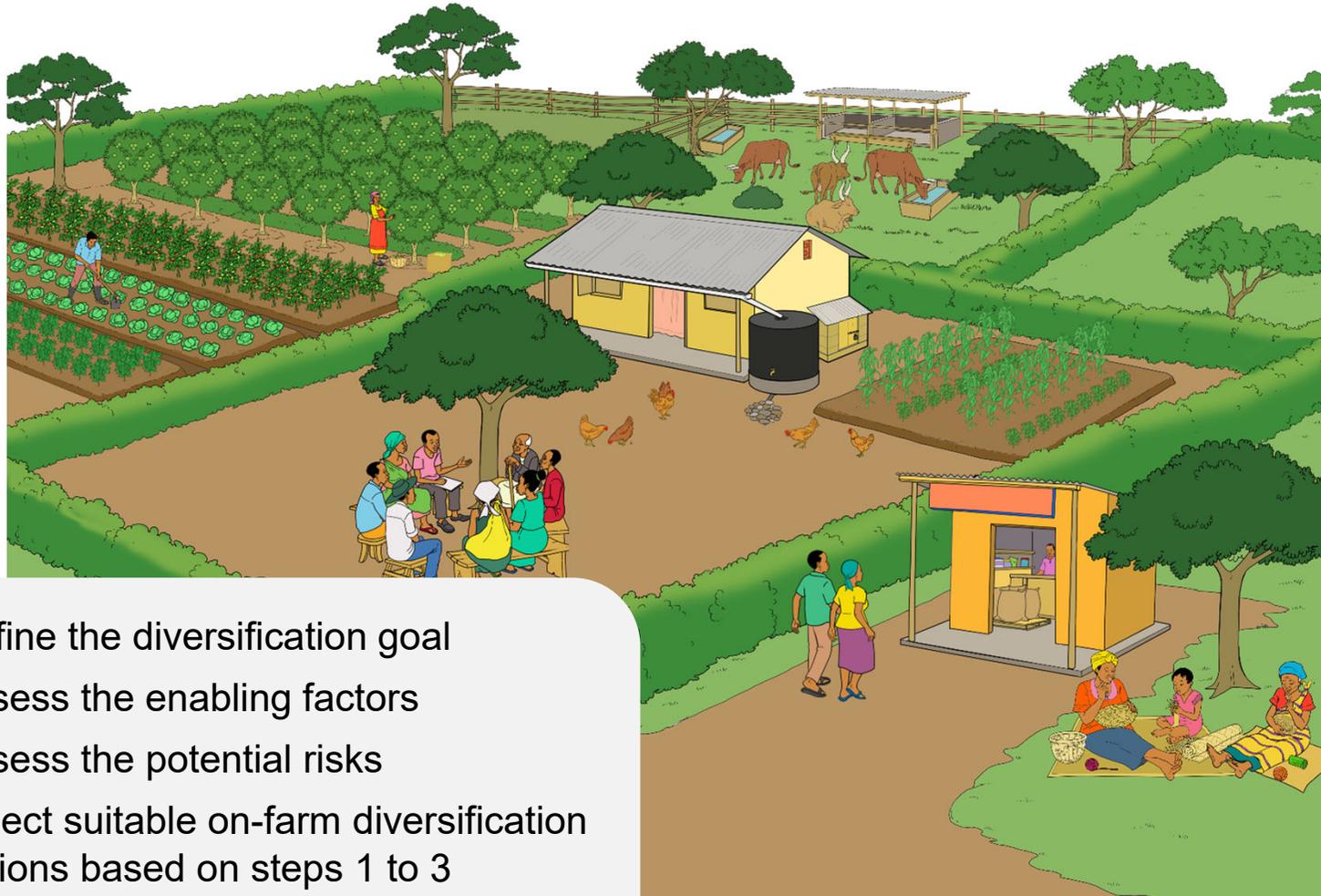
Social services (e.g. Kindergarten or elderly rehabilitation; guesthouse)



Contract labour services outside the farm (building of a house)



# How to proceed with farm diversification



- Step 1.** Define the diversification goal
- Step 2.** Assess the enabling factors
- Step 3.** Assess the potential risks
- Step 4.** Select suitable on-farm diversification options based on steps 1 to 3
- Step 5.** Evaluate and learn



# What is organic agriculture?

No use chemical-synthetic pesticides and fertilisers

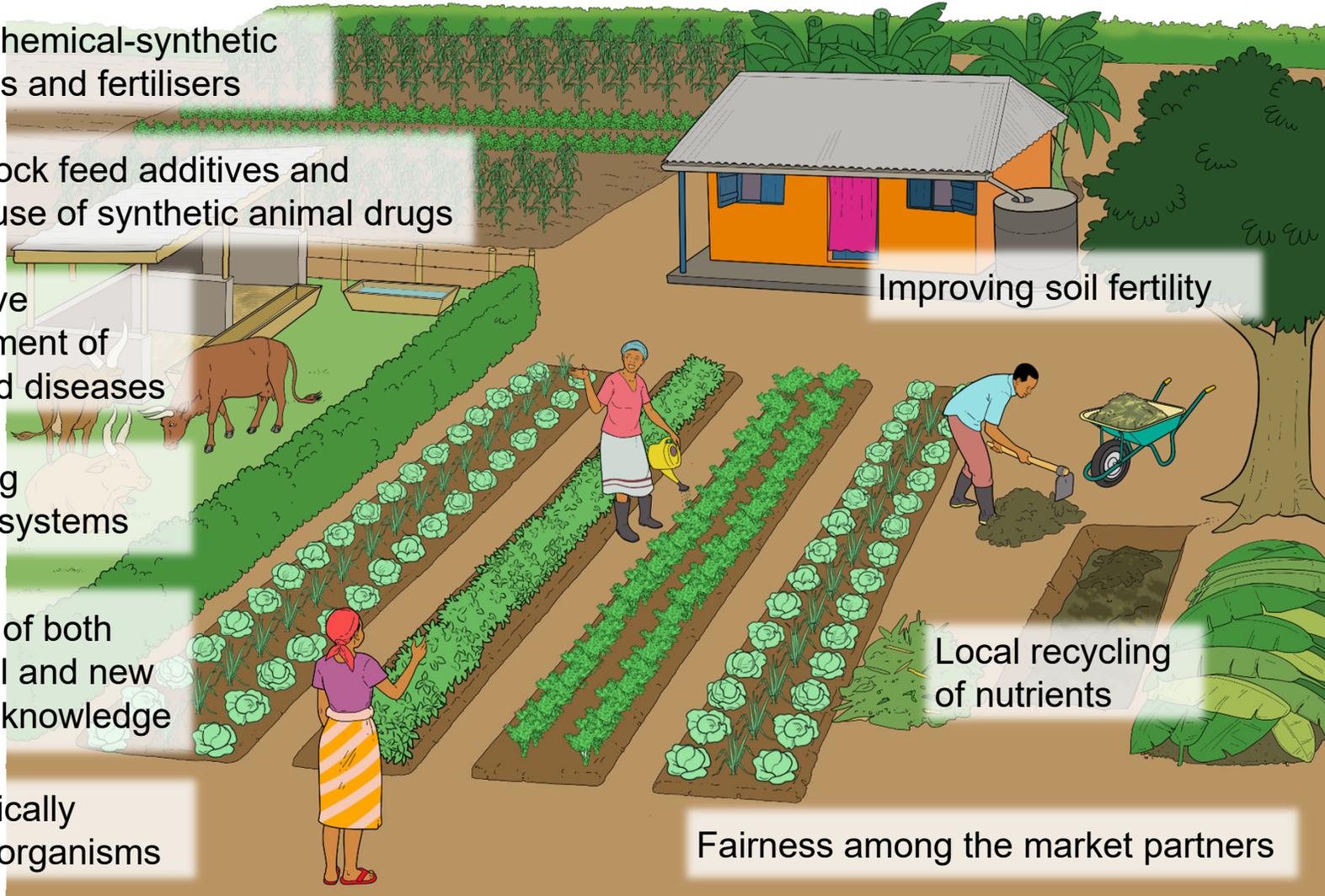
No livestock feed additives and minimal use of synthetic animal drugs

Preventive management of pests and diseases

Stabilising agro-ecosystems

Best use of both traditional and new scientific knowledge

No genetically modified organisms



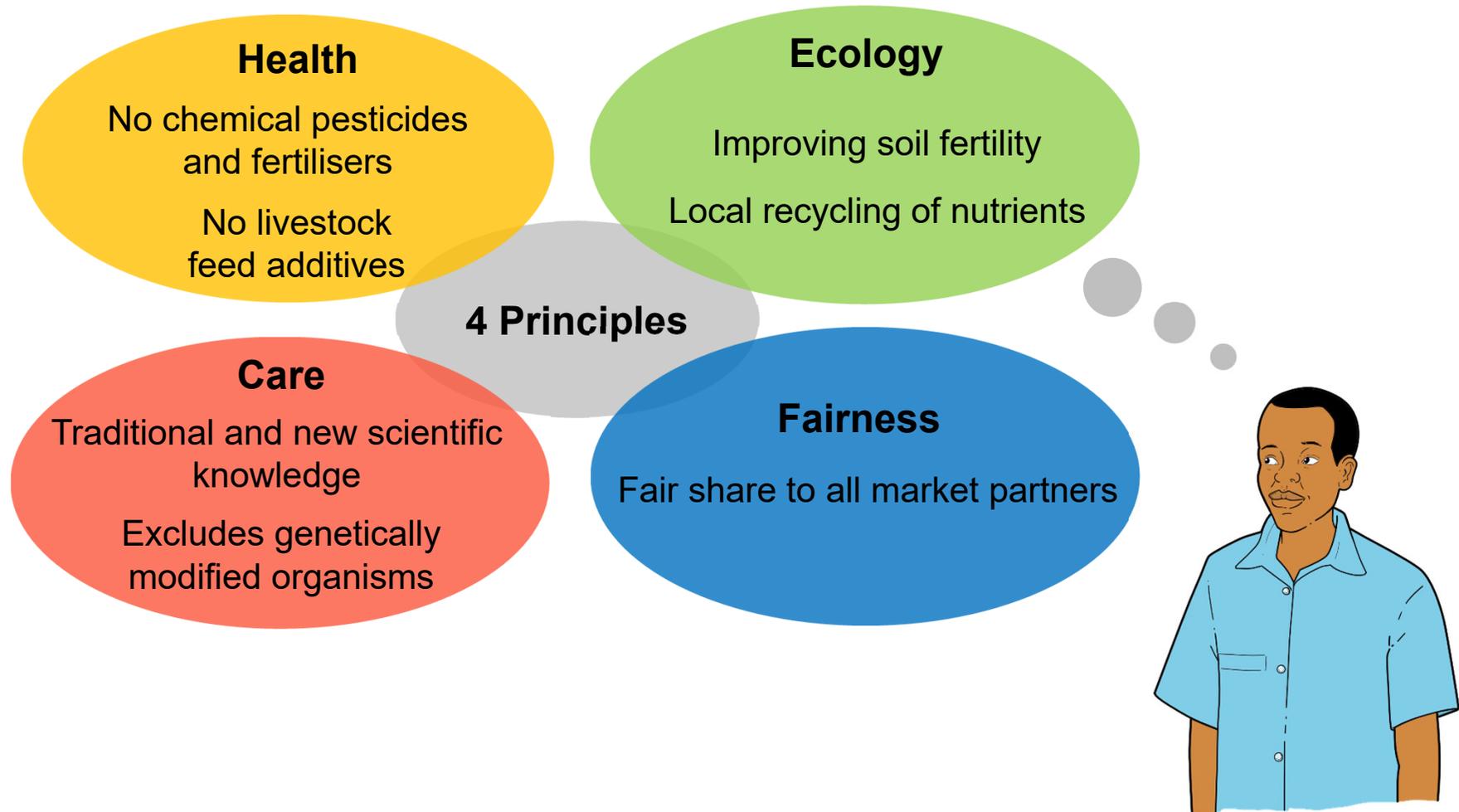
Improving soil fertility

Local recycling of nutrients

Fairness among the market partners



# Principles of organic agriculture

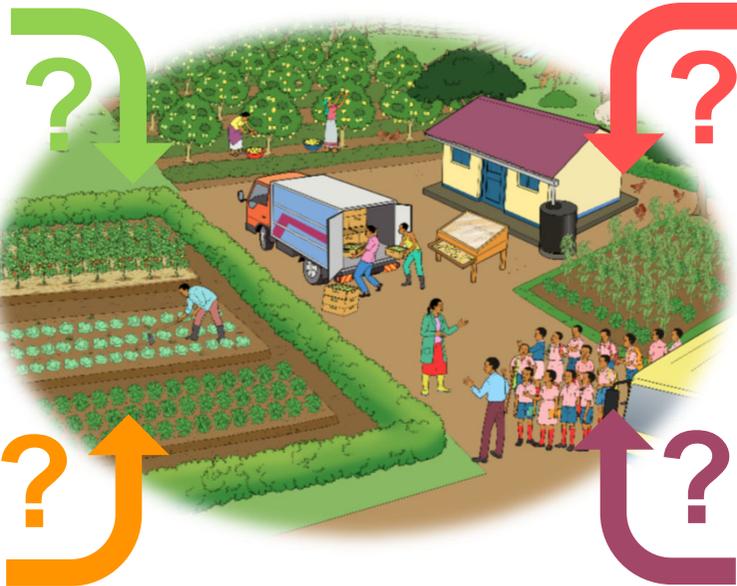


# Diversification decision making process



Enabling factors

Diversification goals



Risks

Diversification options

