



Agroecology

Ecologically-smart farming

Agroecology is the study of ecological processes that affect agriculture and may refer to a science, movement or practice. It looks at the interaction between flora and fauna (including humans) in the environment. It aims to create stable, sustainable, resilient and productive farms. By integrating ecological principles into agricultural systems, novel approaches and techniques may be found that could benefit both ecology and agriculture.

Mimicking nature, not industry

Compared with agro-ecological farms, intensive systems maintain animal health by routine use of veterinary medicines, including antibiotics. This contributes to antibiotic resistance and is therefore not sustainable nor resilient.

Good farm animal welfare is key to creating an agro-ecological farm because good animal health is essential for a productive, stable, healthy and sustainable farm.

A proper agro-ecological system will develop good animal health without the need for regular medication. It will instead build good veterinary health by strengthening animals' immunity. This involves avoiding the stress produced by overcrowding, excessive group sizes and inability to perform natural behaviours.

Because of the huge quantity of plants needed as animal feed in industrial systems, feed crops tend to be grown intensively in monocultures with substantial use of environmentally damaging agro-chemicals. Decreasing the inputs needed for production is key to ensuring a sustainable agro-ecological farm. Feeding animals grass and crop residues, which are inedible to humans, is a more

agro-ecological way of using resources. Grassland systems also have a high potential for good animal welfare.

Ecological sustainability can only be achieved with minimal pollution in the form of leached fertilisers, ammonia, antibiotics and fine particulate matter; these problems are more common in industrial agriculture than in more extensive systems

A circular economy

One example of an agro-ecological livestock farming system is an integrated crop-livestock system. This uses crop residues as animal feed and recycles animal manures - rich in nutrients and energy for micro-organisms in the soil - as crop fertiliser. Rather than being a pollutant, manure becomes a key resource. By growing nitrogen-fixing crops such as legumes, external nitrogen inputs can be reduced. Diverse grasslands can also reduce nitrogen leaching by complementary uptake of water and nitrogen.

Another agro-ecological example comes from Cuba, which uses horses to graze a grass-legume mixture within citrus trees. The horses act as weed controllers and natural fertilisers, with the result being a more productive and economical farm.

In France, agro-ecological dairies reduce fodder input as mixed grass-legume pastures provide forage and allow for extended grazing seasons. This creates lower nitrogen pollution and also reduces pesticide and energy use. The lower productivity is compensated for by higher added-value products and reduced input costs.

Integrated pest control is another aspect of agroecology, for example where chickens eat



cutworms and sheep keep the weeds down. Cover crops like alysium and clover prevent erosion and can be grazed on by the sheep.

For people, animals & the planet

By allowing livestock to exhibit their natural behaviours, such as egg-laying hens foraging on clover and peas, health and production can be maintained, so high animal-welfare can be an indicator of a sustainable system. Allowing natural behaviours also reduces stress, which improves health and creates a more productive and less antibiotic-dependent system.

Soils can be enhanced on agro-ecological farms by using nitrogen-fixing legumes such as Lucerne in perennial grassland. Diverse crops, grasses, livestock breeds and grazing management practices enhance resilience against adverse weather changes, disease and market price fluctuations, whilst also improving self-sufficiency. Economic sustainability can be maintained by reducing input costs through focusing on feeding livestock on grasses rather than feed crops.

Food for thought

By combining proposals from two recent reports we have devised the following recommendations for agro-ecological livestock production:

1) Adoption of management practices aimed at improving animal health e.g. applying integrated disease and parasite control, rotational grazing, balanced feeding, adapted housing, hygiene, traditional breeds, mixed grazing of different livestock

species, disease treatment with plant extracts or essential oils to replace chemicals, and use of tannin-rich forage species for parasite control;

2) Decrease the inputs needed for production, particularly by giving priority to locally-produced feed (e.g. fresh grass, hay, silage) rather than human-edible food (e.g. cereals, pulses);

3) Decrease pollution by producing manure from pasture-fed cows to fertilise field rather than creating polluting slurry from industrial farms and using energy-intensive manmade fertilisers;

4) Enhance diversity to strengthen resilience, e.g. by using locally-adapted breeds for maximising grassland use whilst reducing concentrate feed;

5) Preserve wild biological diversity in agroecosystems by adapting management practices.

The potentially high capital investment and financial risk in changing to an agro-ecological farm can be mitigated by highlighting the reduced input costs, increased market prices and environmental outcomes.

Good animal welfare is closely related to: the production of healthy food; reduced incidence of antibiotic resistance, and diseases; beneficial environmental outcomes (e.g. reduced ammonia emissions and water pollution); and reduced competition for grain, which might potentially lower grain prices and increase food security.