

A. Farmyard manure and slurry (waste from animals) is left to rot down then spread over the fields. (FYM contains nitrates which plants need to grow well.)

A. Farmyard manure and slurry (waste from animals) is sold off. (FYM contains nitrates which plants need to grow well.)

B. Different crops grown in each field every year (crops rotation).  
(Clover /peas grown every 3/4 years to "fix" nitrates in soil.  
Plants need nitrates to grow well.)

B. Same crop grown in each field each year.  
(Cereal crops such as wheat, maize grass need nitrates to grow well.)

C. Clover grown with grass for feeding to cows.  
(Clover "fixes" nitrates in the soil. Plants need nitrates to grow well).

C. Grass only grown in fields for cows to eat

D. Chemical fertilisers (made from fossil fuels and transported by road) are often used on most fields.

D. Chemical fertilisers (made from fossil fuels and transported by road) are used only when necessary, and only in small amounts.

E. Large amounts of farmyard manure and slurry (waste from animals) are spread over all the fields all through the year.  
(FYM contains nitrates which can pollute of water sources.)

E. Limited amounts of farmyard manure and slurry (waste from animals) are spread at only certain times of year.

F. Dried food pellets are made in factories and transported to farm and fed to animals.

F. Grass grown on farm to feed cows in summer. In winter cows eat silage made from grass and maize grown on this farm.

G. Soya beans grown in Brazil used as protein source for animal food.

G. Lupin seeds grown in UK used as protein source for animal food.

H. Cows are fed on only grass and maize grown on this farm and produce less milk.

H. Cows are fed on home-grown grass and maize with some extra concentrates (such as lupin or soya etc) so cows produce more milk.

I. All land on the farm is cultivated to grow crops for animals or people to eat.

I. Most of land on farm used to grow crops but some field edges and areas of poorer soil and steeper slopes managed for wildlife habitat.

J. Barbed wire fence put up to separate fields & contain livestock.

J. Hedges planted & maintained between fields.

K. Wildlife (birds, mammals & insects) living in field margins and hedges near crops feed on crop pests.

K. Pesticides are made in factories and transported to the farm and used to kill pests on crops.

L. Dirty water from the fish hatchery drains away into the chalk aquifer deep underground (water source for Winchester).

L. Dirty water from fish hatchery passes through reed bed, which cleans the water, then into fishing lake, then drains underground.

M. All waste water from dairy goes into slurry tank.

M. Some waste water from dairy is reused to clean yard before it goes into the slurry tank.

N. Old tractors used on farm (use diesel - a fossil fuel)

N. New tractors with efficient engines and low emissions used on farm (use diesel - a fossil fuel).

O. Students and visitors encouraged to use coaches and minibuses.

O. Students and visitors encouraged to use their own transport.

P. All waste wood, pallets, plastic, metal from farm is burnt on a bonfire on site.

P. All waste pallets, plastic and metal is sent off site for recycling. Waste wood is burnt in staff stoves for heat.

## Sustainable Farming

### Teachers answers to the introductory activity.

A. Farmyard manure and slurry (waste from animals) is left to rot down then spread over the fields. (FYM contains nitrates which plants need to grow well.)

All the FYM and slurry from pigs, cows etc is allowed to rot on Sparsholt College Farm. It is then spread on the fields on this farm and neighbouring fields where the maize for the cows' food is grown.

A. Farmyard manure and slurry (waste from animals) is sold off. (FYM contains nitrates which plants need to grow well.)

B. Different crops grown in each field every year (crops rotation).

(Clover /peas grown every 3/4 years to "fix" nitrates in soil.

Plants need nitrates to grow well.)

Ideally the crops are rotated each year. However such a small range of crops are now grown on the farm that it is not possible. Most fields are used to grow grass. Currently 3 fields usually grow barley or wheat for seed production. We have records of crop rotation in field F going back nearly 20 years, when a wider range of crops used to be grown to feed the cows.

B. Same crop grown in each field each year.

(Cereal crops such as wheat, maize grass need nitrates to grow well.)

C. Clover grown with grass for feeding to cows.

(Clover "fixes" nitrates in the soil. Plants need nitrates to grow well).

Clover is increasingly being planted with grass seed when meadows are resown, which is about every 3 or 4 years. Clover is a legume and helps to "fix" nitrates and therefore improve soil fertility. It also improves the protein content of the cows' food (and reduces the need for soya).

C. Grass only grown in fields for cows to eat

D. Chemical fertilisers (made from fossil fuels and transported by road) are often used on most fields.

The farm manager used chemical, artificial fertilizers only when necessary. He applies the minimum amount at the right time in the best weather conditions so little will cause pollution. He uses the maximum amount of FYM and slurry, to save money etc, but there are limitations on how much of these he is allowed by Environment Agency. The farm now uses only half of the chemical fertilizer it used to! In 1989 it used 340kg/hectare. In 2007 only 170kg/Ha was used and crop production has been maintained.

D. Chemical fertilisers (made from fossil fuels and transported by road) are used only when necessary, and only in small amounts.

E. Large amounts of farmyard manure and slurry (waste from animals) are spread over all the fields all through the year.

(FYM contains nitrates which can pollute of water sources.)

Limited amounts of FYM and slurry can be used on the fields only at certain times of the year (mainly winter) as this is a Nitrate Vulnerable Zone. (It protects the water resources.) The farm produces more FYM than it is allowed to use! The farmer cannot spread manure and slurry in the summer which limits grass growth.

E. Measured amounts of farmyard manure and slurry (waste from animals) are spread at only certain times of year.

F. Dried food pellets are made in factories and transported to farm and fed to animals.

Pigs are fed dried pellets with a carefully balanced formula to keep them healthy at each stage of growth. There is not enough land on this farm to keep the pigs outdoors, or to grow their food.

The bulk of the cows' food (about 70% by weight) is grown on the farm.

F. Grass grown on farm to feed cows in summer. In winter cows eat silage made from grass and maize grown on this farm.

G. Soya beans grown in Brazil used as protein source for animal food.

Cows need protein in their diet, and fibre. Soya is a very good source of food as it can be digested easily and effectively by cows. However a lot of soya is grown in Brazil. Lupin seeds are grown in UK and are almost as good a food source as soya. The farm has reduced its reliance on soya recently. More clover in the cows' food will reduce it even more.

G. Lupin seeds grown in UK used as protein source for animal food.

H. Cows are fed on only grass and maize grown on this farm and produce less milk. Cows need some concentrated food in order to produce the maximum amount of milk they have been bred to produce. Holstein cows now are selectively bred to produce 8500L a year, an average of 28L/day. This is how the farm earns money. This keeps the cost of milk down due to economies of scale.

H. Cows are fed on home-grown grass and maize with some extra concentrates (such as lupin or soya etc) so cows produce more milk.

I. All land on the farm is cultivated to grow crops for animals or people to eat. There are wildlife habitats, both old and new, on the farm. The pupils will see this from the top of the hill and on the farm map. Farmers are now encouraged to create new habitats (such as 5m field margins) by the government through the Environmental Stewardship Scheme.

I. Most of land on farm used to grow crops but some field edges and areas of poorer soil and steeper slopes managed for wildlife habitat.

J. Barbed wire fence put up to separate fields & contain livestock.

Fence posts will rot eventually and the fence will need replacing. Hedges need maintenance but now a farmer will get "points" and therefore money for looking after hedges. Hedges are a good wildlife habitat.

J. Hedges planted & maintained between fields.

K. Wildlife (birds, mammals & insects) living in field margins and hedges near crops feed on crop pests.

We hope they keep the numbers down! Rotating crops also helps keep pests down. Sometimes moulds or fungus on crops need treating by fungicides.

K. Pesticides are made in factories and transported to the farm and used to kill pests on crops.

L. Dirty water from the fish hatchery drains away into the chalk aquifer deep underground (water source for Winchester).

This is true but it is "cleaned" by the reedbed first so it will not harm the aquifer.

L. Dirty water from fish hatchery passes through reed bed, which cleans the water, then into fishing lake, then drains underground.

M. All waste water from dairy goes into slurry tank.

Because the dairy water is used twice, less clean water is used and this saves the farm money. It also means there is less dirty water to get rid of. It also means that less energy and resources are used in supplying clean water to the farm.

M. Some waste water from dairy is reused to clean yard before it goes into the slurry tank.

N. Old tractors used on farm (use diesel - a fossil fuel)

Three new tractors are leased for cultivating the fields, growing crops, harvesting, feeding the cows etc. They have efficient engines and low emissions. The reduction in artificial fertiliser use means the tractors do less mileage too. This all helps to reduce the carbon footprint of the farm (and costs)

N. New tractors with efficient engines and low emissions used on farm (use diesel - a fossil fuel).

O. Students and visitors are encouraged to use coaches and minibuses.

Yes, they are! This reduces the carbon footprint of the college visitors.

O. Students and visitors encouraged to use their own transport.

P. All waste wood, pallets, plastic, metal from farm is burnt on a bonfire on site.

It used to be burnt but not any more. So the materials are reused, which is probably good. Perhaps some of these materials travel a long way in a truck?

P. All waste pallets, plastic and metal is sent off site for recycling. Waste wood is burnt in staff stoves for heat.