**The Impact on the Environment of Primary Production Management Practices**

**Positive Management Practices**

**Controlling Pests and Diseases**

A pest is essentially an organism that is not wanted in a particular environment. Many NZ pests have been introduced from another country where they are not pests eg gorse, rabbits, possums, (insects like the bee mite, the apple moth etc). Pests and diseases reduce the economic output of the crops and / or stock being farmed.

To control pests we can use **biological control** which is the use of other organisms to control them. They can be bacteria, insects, viruses or fungi and are classified as predators or parasites. While they are very effective because they usually are specific to a particular pest, they must be carefully researched first in case they become a pest in their own right later. Their major benefit to the environment is that they reduce the amount of chemical sprays being applied to crops and plants.

**Companion planting** can also help with pest control ie grow ground cover plants alongside crops that produce chemicals that repel insects eg marigolds in flower gardens do this.

**Pesticides**

This way of controlling pests can be

* less harmful to humans and the environment if the chemicals used are *naturally made from plant materials*
* more harmful if they are artificially made as they may harm animals not being targeted by the pesticide and may not break down as easily

**Crop Rotation**

This is used in both agriculture and horticulture as a means of improving soil fertility and dealing with pests and diseases. By not growing the same or similar crops in the same place year after year, the organism causing the disease may not be able to find a host and the soill will not be depleted of the same nutrients year after year. Using a nitrogen fixing legume plant at regular intervals (eg lucerne) also helps increase nitrate levels in the soil and reduces the need for fertilisers.

Effluent Disposal

Many management methods used in primary production produce wastes and effluent that needs to be treated and recycled rather than just dumped to pollute the environment.

For example, dairy sheds use lots of water which mixes with cow poo. If it is allowed to just run off onto surrounding land and into waterways as is, it can lead to leaching of nitrates and phosphates into major waterways. This can cause rapid weed growth (eutrophication) and clog up waterways making them unsuitable for other water dwelling plants and animals.

To counter this, effluent is put into settling ponds to allow the solid wastes to settle out and then the liquid component is spread onto pasture as liquid manure, returning nutrients to the soil. There are a number of other treatment methods used by agricultural industries ie freezing works, dairy factories, piggeries, poultry farms, orchards etc

**Composting**

Wastes from agricultural practices can often be composted which allows organic matter to be recycled and at the same time diseases and weeds destroyed. The decomposition requires bacteria and fungi and needs to happen under aerobic conditions for complete decomposition to occur. Organic matter is decomposed into simple organic molecules which plants can then in turn use to grow.

**Negative Management Practices**

**Poor Application of Fertilisers**

Fertilisers have been used for thousands of years to promote crop and pasture growth. However, if used inappropriately, excess fertiliser can affect soil pH and soil toxicity, which will reduce productivity and therefore income, can create excess weed and pest infestation because of the increased nutrients, or in some cases can actually reduce the nutrients available, particularly trace elements and can damage the environment through increased leaching and runoff causing eutrophication and pollution of waterways.

**Overcultivation**

Soils need to be cultivated to ensure the best possible production, but sometimes in preparation for cultivation the soil can be over cultivated *damaging soil structure*. This means that the soil can become easily eroded by wind or rain and it can form a hard surface crust when it dries.

**Poor Spraying Techniques**

The spraying of chemicals is used to control pests and diseases, particularly for weeds in pastures and for crops. Indiscriminate spray can result in the building up of chemicals and residue in the soil, pollution of waterways which in turn affects food chains in the waterways, reduction of soil micro-organisms (killed by the chemicals which in turn results in slowing down the nutrient cycles like the nitrogen cycle and carbon cycle), increased resistance to spray by pests which means that the spray loses its effectiveness.

**Chemical Resistance**

There are only a few natural chemicals used to control pests, weeds and diseases. Most are man-made and can cause us problems. For a start many are harmful to humans and actually end up killing useful organisms as well as their target ones. They can also stay in the environment for long periods of time, contaminating the site. In addition, after repeated use, many micro-organisms build a resistance to them and they become ineffective.

As an alternative genetic engineering is finding ways of manipulating plant genes to make them resistant to a wide range of pests and diseases.

**Disposal of Animal manures**

Because most primary products are grown to be sold off the system, they take their minerals and nutrients with them that came from the system. Animal manures if correctly applied can return nutrients and minerals to the system. ie dairy shed effluent, sheep manure from shearing sheds, poultry manure from hen houses etc

This can improve soil fertility, nutrient levels and water holding capabilities of soil.

However, it is costly in terms of time and the practice requires storage of the wastes while they rot ie settling ponds, so often wastes are dumped in a heap and not properly composted, resulting in air and water pollution and high nutrient levels that accompany the leaching.