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# Assessment of 'Win Win' Case Studies of Resource Management in Agriculture

Appendix of Case Studies



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# 1. Pigs

# 1.1 Installation of energy saving systems in a pig farm.

Pigs

CASE STUDY

68

Enterprise:

Region: Country:

Berkshire

England

Source Farmex

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£0.66/head/year	Payback:	<3 months
Date of	2003	Audited	0
Confidentiality:	Farmex Energy Saving Systems.		

#### Background

-This case study is the result of comparative trials of energy systems by Farmex.

#### Size and type

-Pigs

-15 flat decks with suspended radiant heaters and two stage extraction fan ventilation systems

#### Objectives

-To reduce the energy costs on a pig farm -To reduce the environmental impact of pig farms -To maintain high standards of conditions (heating and ventilation) in pig weaning units

# Resource Management Activities

-Installation of the Farmex Energy Saving System

#### Comments

-The data covers the first 50 days of each batch of pigs.

-The average ventilation rate is changed little, but heating use is greatly reduced, the Energy Saving System rooms are better at maintaining temperature especially during the early stage of the production cycle when heat use is greater.

The cost of providing a controlled environment in Standard rooms is from 0.50 to 2.9p per pig per day (average is 1.49). In ESS rooms, environmental costs 0.1p to 0.7p (average 0.18p). Financial figures are based on 4.3 pence per kWh (unit of electricity)/ The base line cost of 75.4 pence per pig over this period is consistent with data from other farms. Financial costs do not include the cost of the Energy saving system, this is estimated at 10-15% of the saving.

# 1.2 Modification of piggy boxes

CASE STUDY 15 Enterprise: Pigs

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Region: Lancashire
Country: England
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#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

### **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£2.1/Head/Year	Payback:	<9 months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

### Size and type

-170ha grass, 580 sows plys progeny to 30kgs, 5 members of staff.

#### Objectives

-Reduction in manufacturing inputs and feed wastage.

#### **Resource Management Activities**

-Conversion of boxes from a tier system to floor pens with new feeders.

#### Comments

-Highly applicable, demonstrates a rapid payback rate.

# 2. Cattle

# 2.1 Hill farm dirty water and slurry management.

Cattle

CASE STUDY

Enterprise:

Region: South West Country: England

Source Westcountry Rivers Trust

37

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption		Medium		
Financial savings:	£20/head		Payback:	2 Years
Date of	2003		Audited	0

Confidentiality:

#### Background

-This is a worked example casestudy from West Countries River Trust.

#### Size and type

-A hill farm with an annual rainfall of 1200 mm on a roof of 600m<sup>2</sup> produced 720m<sup>3</sup> (160,000 galls) of water **Objectives** 

-To segregate clean water and prevent it mixing with slurry contamination

- -To minimise water consumption through maximising the value of natural inputs
- -To capture the nutrient value of the slurry contaminated water through application to the land
- -To minimise the risk of fresh water contamination through slurry souces.
- -To manage water and reduce the risk of flooding on the farm

#### **Resource Management Activities**

-Diversion of water: included renewing 30m of guttering @  $\pounds 20/m = \pounds 600$ , two downspouts @  $\pounds 80$  each =  $\pounds 160$ , 30m of clean water drainage @  $\pounds 25/m = \pounds 750$ ; a total of  $\pounds 1510$  using farm labour. -Dirty water is irrigated to land @  $\pounds 0.5/m^3$ .

#### Comments

-This is an easily adopted and low cost management activity, with good financial paybacks and a multitude of benefits for the farmer. Maximising resource useage, minimising consumption and managing pollution risks.

-The diversion of water saved £180/year. A similar quantity collected in the slurry system and spread to

# 2.2 Integration of farm manure nitrogen supply within commercial farming

Cattle

CASE STUDY 35 Enterprise:

Region: Worcestershire Country: England

#### Source Defra

## **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£52/head/Year	Payback:	Immediate
Date of	1998	Audited	0

Confidentiality: This report was commissioned by MAFF and is freely available - 'making better use of

#### Background

-This study comprises part of a larger programme of work conducted by MAFF to investigate the improved application of manure on first cut silage. The work is summarised in the series 'making better use of manure' - booklet 2.

#### Size and type

-Dairy Farming Enterprise, 170 dairy cows, 100 heifers.

#### Objectives

-To investigate the benefits of improved manure applications on silage.

#### **Resource Management Activities**

-Revision of procedure, rather than applying manure in May via a broadcast method the manure was applied using a trailing shoe. The results proved that ammonia losses were 25% lower using the improved method rather than the standard broadcast technique. Therefore, more nitrogen was available for the crop.

The environmental benefits that resulted were reduced diffuse pollution to water and air. Additionally, the

#### Comments

-This is a good report that has been verified and scientifically researched. The technique is universally applicable and easily adopted by farms in this sector. There is little capital outlay and an immediate return in investment.

# 2.3 Adoption of an Integrated Fertiliser and Livestock Waste Management Plan.

CASE STUDY 4 Enterprise: cattle

Region: Lancashire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Biodiversity
Improved soil quality
Reduced risk of flooding
Enhanced Landscape

Ease of adoption	High		
Financial savings:	£4.6/Head/Year	Payback:	8 months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996

#### Size and type

-A tenanted dairy and sheep farm of 71 ha Grassland, supporting 70 Cows (50 dairy youngstock)+ 240 Breeding Ewes and employing 3 members of staff.

#### Objectives

-To derive more benefit from farm slurry by concentrating applications on silage production rather than grazing areas.

-To reduce the applications of phosphate and potash.

#### **Resource Management Activities**

-Reallocation of slurry application to targeted areas used for silage production rather than general grazing land. The application of slurry will have environmental benefits of improved soil structure and reduced applications of artificial fertilisers.

Additional benefits stem from increased grass production. If this grass production is not required further savings in fertiliser costs are anticipated.

#### Comments

-This scheme is widely applicable, with obvious cost benefits and universally available resources.

# 2.4 Cattle slurry used on first cut silage.

CASE STUDY

42 Enterprise:

cattle and sheep

Region: Country: England

#### Source ADAS

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£52/head/Year	Payback:	Immediate
Date of	2003	Audited	0

Confidentiality:

#### Background

-This is an ADAS, Manures worked example.

- An application of 40m<sup>3</sup>/ha of cow slurry supplies sufficient P (48kg/ha) and K (125kg/ha) and some N

#### Size and type

-Cattle Farming Enterprise.

# Objectives

-To improve soil structure.

-To improve silage yields.

-To reduce organic waste.

-To reduce the risk of water pollution.

-To reduce fertiliser costs.

#### **Resource Management Activities**

-Summer application of slurry with 6% DM content on first-cut silage ground. This has a nutrient value of N 0.6kg/m<sup>3</sup>, P 0.6kg/m<sup>3</sup> and K 3.2kg/m<sup>3</sup>. -Reducing the NPK fertiliser inputs (at typical costs) for this crop by £37/ha

#### Comments

-This is an easily adopted strategy using readily available inputs with good cost benefits. -Allowing for extra total P and K in soil reserves, the total saving on NPK fertiliser inputs for second and

later cuts is up to £52/ha

# 2.5 Management of livestock farm leaks.

CASE STUDY 36 Enterprise: cattle and sheep

p Region: South West

Country: England

#### Source Westcountry Rivers Trust

## **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£2788/Enterprise	Payback:	1 year
Date of	2003	Audited	0
Confidentiality:			

#### Background

-This is a worked example casestudy from West Countries River Trust

#### Size and type

-Livestock Farming Enterprise

#### Objectives

- Improved management of farm water usage.

-To reduce unnecessary resource consumption.

-To reduce contamination of water producing sources of dirty runoff on the farm.

-To reduce instances of water pooling and flooding.

#### **Resource Management Activities**

-Leak detection and repairs by the farmer ( $\pm$ 7/hour)

-Commercial leak detection (£130/day) -Repair of a surface water pipe leak of 50 litres/hour which drained to the slurry storage system, as well as a mains leak of  $1m^3$ /hour (for 3 months) which soaked away.

#### Comments

-This strategy is easily adopted and good farm management. The payback is considerable and rapid. -The surface water leak of 50 litres/day is some  $430m^3$ /year at £0.81/m<sup>3</sup> = over £350. 430m<sup>3</sup> spread with slurry @ £1.80/m<sup>3</sup> = £775. This is a total of over £1000/year for the surface water leak and £1788

over 3 months for the mains water: a total of over £2788.

# 2.6 Improved storage and handling of grain and silage.

CASE STUDY

44 Enterprise:

cattle and sheep

Country: England

Region:

#### Source ADAS

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Luse of udoption	riigii		
Financial savings:	£10/Head/Year	Payback:	1 Year
Date of	2003	Audited	0
Confidentiality:			

Hiah

connucritianty.

Ease of adoption

# Background

-This is an ADAS, Manures worked example.

- Size and type
- -350 Head of Cattle.

# Objectives

- -To reduce wastage of animal feed.
- -To reduce costs.
- -To reduce soil poaching.
- -To enhance stock well-being.

#### **Resource Management Activities**

-Improving storage conditions and handling of grain and triple covering of silage by reusing cleaned plastic sheets to reduce aeration minimised wastage.

-Providing a feeder on well drained and hardened ground.

#### Comments

-This strategy is easily adopted, however, the costs and savings will be highly site specific.

-5% saving is made in feed wastage for outwintered beef cattle with an average 18 month feed cost of  $\pounds$ 200.

-Other benefits include reduced soil poaching and lameness which will improve stock well-being and

# 2.7 Integrated fertiliser and livestock waste management plan.

CASE STUDY 11 Enterprise: cattle and sheep

Region: Shropshire Country: England

## Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£3.1/h/year	Payback:	4 Months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-A 121 ha farm with 61 ha grass, 12 ha forage maize, 75 suckler cows, 120 ewes, employing 1.5 members **Objectives** 

-To maximise the benefits from Farmyard Manure, reducing the applications of phosphate and potash in compound fertilisers.

#### **Resource Management Activities**

-Adoption of an intergrated fertiliser and livestock waste management plan, saving up to 8 tonnes of fertiliser and £1258 P.A. without any reduction in crop yield. -Reducing the the use and manufacture of artificial fertilisers, the pollution risk of N&P and the amount of waste (sacks) generated by the farm.

#### Comments

-Integrated fertiliser plans may be widely adopted, with good pay back and minimal initial costs.

# 2.8 Reducing nutrient losses by timely application of fertilisers.

CASE STUDY 57 Enterprise:

cattle and sheep

Region: South West Country: England

#### Source Westcountry Rivers Trust

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£35.1/head/year	Payback:	Immediate
Date of	2000	Audited	0
Confidentiality:	Westcountry Rivers Trust		

#### Background

-This case study was developed from data derived from an economic review of the Westcountry Rivers Trust's Tamar 2000 Project undertaken in August 2000

#### Size and type

-82.9 ha

-120 Cattle

# Objectives

-To minimise fertiliser inputs

-To minimise loss of fertiliser inputs

-To minimise pollution risk

#### **Resource Management Activities**

-Timely application of fertiliser to 5 ha of 'hams' (broad wetland floodplain areas) to avoid 50% loss of N during wet conditions

#### Comments

-This practise prevented an estimated loss of 50% of N inputs: a saving of £35.1 per ha on the costs of N inputs

-This case study is specifically applicable to wetland and floodplain areas. However, all farms have the potential to benefit from timely application of nutrients. The adoption rating is therefore 'Medium'.

# 2.9 Soil testing to optimise nutrient applications.

CASE STUDY

Enterprise: cattle and sheep

Region: South West Country: England

#### Source Westcountry Rivers Trust

63

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£24.83/ha/year	Payback:	<1 year
Date of	2004	Audited	0
Confidentiality:	Westcountry Rivers Trust.		

#### Background

-This case study was developed from information provided by a farmer participating in the Cornwall Rivers

### Size and type

-35ha

-Cattle and Sheep (some arable)

-Approximately 80 suckler cows and followers plus calves.

#### Objectives

-To optimise accuracy of fertiliser applications in order to reduce inputs and losses.

- -To minimise mineral fertiliser applications and increase use of FYM and clover
- -To improve soil structure and reduce the risk of erosion

-To reduce the risk of watercourse pollution

# **Resource Management Activities**

-Soil testing of 28ha on a 4 yearly basis in order to optimise nutrient inputs

#### Comments

-The cost of soil testing was £90 (£6 per sample for 15 samples, plus 4 hours' labour at an average farm worker's cost of £7.25 per hour (Nix 2004). The samples were taken by the farmer and sent away for analysis. If the soils are tested on a 4-year basis the annual cost is £1.06 per ha.

The farmer estimated a 50% reduction in mineral fertiliser needs due to improved targetting of applications and increased use of slurry and clover. The mineral fertiliser saving was estimated to be 5 tonnes per annum at a cost of £145 per tonne. The overall annual saving in terms of mineral fertiliser costs was therefore estimated to be £25.89 per ha, minus the costs of soil testing (£24.83 per ha).

# 2.10 Clean and dirty water separation: yard cover.

CASE STUDY

60 Enterprise:

cattle and sheep

Region: South West Country: England

#### Source Westcountry Rivers Trust

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£4/head/year	Payback:	<1 year
Date of	2004	Audited	0
Confidentiality:	Westcountry Rivers Trust.		

#### Background

c . ..

-This case study was developed from information provided by a farmer who was participating in the Cornwall Rivers Project.

#### Size and type

-140 Cattle

#### Objectives

-To reduce the quantity of dirty water and associated management costs

- -To improve the stock health
- -To reduce feed waste
- -To reduce the risk of watercourse pollution

#### **Resource Management Activities**

-Covering the yard area (30m by 30m) and diverting water to clean drains

#### Comments

-The cost of covering the yard and diverting the water to clean drains was estimated to be 12K spread over a 10 year period at 6% interest the annual capital charge is  $\pounds$ 11.7 per head.

-The covered yard area is 900m2 and the average annual rainfall is 1.2m. An annual average of 1080m3 of rainwater is therefore excluded from the dirty water system- an annual saving of £756 (MAFF 2000) or  $\pounds$ 5.4 per head. In addition, annual savings of an estimated 10% for reduced veterinary bills and feed wastage were £1.4 per head and £8.9 per head respectively (Nix 2004). The total annual saving was therefore estimated to be £15.7 per head, minus the cost of the capital works I.e. £4 per head.

# 3. Poultry

# 3.1 Adjustment of feeding equipment to minimise wastage.

Poultry

CASE STUDY

18

Enterprise:

Region: Herefordshire Country: England

Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£0.21/Head/Year	Payback:	Immediate
Date of	1996	Audited	0
Confidentiality:	This case study was funded by I	MAFF (now defra) and as su	ch is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-223 ha combinable crops, 123 ha grass, 56ha forage maize, 130 cows + followers, 28,000 turkeys per **Objectives** 

-To reduce wastage of animal feed.

#### **Resource Management Activities**

-Minimisation of feed wastage by fine tuning of feeding equipment, saving 12 tonnes of feed.

## Comments

-A highly applicable waste management procedure with low effort but large rewards.

# 3.2 Reduction of light levels in turkey houses.

CASE STUDY 19 Enterprise:

nterprise: Poultry

Region: Herefordshire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£0.08/Head/Year	Payback:	Immediate
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-223 ha combinable crops, 123 ha grass, 56ha forage maize, 130 cows + followers, 28,000 turkeys per **Objectives** 

-To reduce energy consumption and improve stock welfare.

#### **Resource Management Activities**

-Reduction in light levels after 12 weeks of the 18 week turkey production period, reduces bird activity and thereby avoids injury and loss of market value of stock.

#### Comments

-An easily implimented and cost efficient strategy.

#### Conversion to compact fluorescent light bulbs. 3.3

CASE STUDY 14 Enterprise:

Poultry

Region: Yorkshire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£0.05/Head/Year	Payback:	<3 Months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

### Size and type

-42 ha arable, 31,000 broilers X 5 crops per annum.

# Objectives

-Improved energy efficiency.

#### **Resource Management Activities**

-The conversion of the two buildings from ordinary tungsten bulbs to compact fluorescent bulbs.

#### Comments

-Highly applicable, with a quick payback period.

# 4. Dairy

# 4.1 Dairy farm dirty water control

CASE STUDY 1

Enterprise:

Region: Country: South West

England

Source Westcountry Rivers

# **Resource Management Activities Addressed in this Case Study**

Dairy

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption Financial savings:	High £5.83/head/year	Payback:	Immediate
Date of	2003	Audited	0
Confidentiality:	Case studies from the Westcountry Rivers T	rust/BDB Associa	ites

Background

-The parlour is washed down with a pressure hose. Some roof water also mixes with the dirty water and drains into the collection system.

### Size and type

-Dairy farm in the south west with 120 cows has 1500m<sup>2</sup> of open yard area and silos.

#### Objectives

-To explore means of water savings

- -To reduce the quantity of dirty water
- -To reduce water management costs.
- -To reduce the risk of water pollution

## **Resource Management Activities**

-Review of the sources of dirty water

- -Repair of gutters and downspouts, diverting some clean yard water.
- -Careful use of the pressure hose to reduce the quantity of dirty water by 1000m<sup>3</sup> (37%)

#### Comments

-Savings resulted from the reduced costs of water, electricity and labour, as well as wear and tear on the irrigation system.

-The total saving was estimated at  $\pm$ 700/year. In addition, the risk of water pollution was significantly reduced.

# 4.2 Composting of Farm Yard Manure.

CASE STUDY 39	Enterprise:	Dairy	Region:
Country:England	b		
Source Seale Hayne/D	Defra		

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£3.60/Head/Year	Payback:	1 Year
Date of		Audited	0

Confidentiality:

#### Background

-Composting is a small cost to farmers. If the heaps are turned once it costs 20-30p/tonne of FYM (total £240-£360), and if turned three times £1.20-1.30/tonne of FYM. -Some nutrients are lost in the process. -Particularly applicable to Organic Farms.

# Size and type

-100 Milking Cows and Followers.

# Objectives

-Reduced muck spreading effort. -Improved incorporation of manure to the sward -Reduced pollution potential

#### **Resource Management Activities**

-Composting 1200 tonnes of FYM from 100 milking cows and followers. -Additional labour requirements to turn manure heaps when drying.

#### Comments

-This strategy is most cost efficient for organic farms. There is an additional cost involved in generating compost from manure, but payback results from the improved incorporation of this material into the sward and the more even spread of the material.

# 4.3 Adoption of an Integrated Fertiliser and Livestock Waste Management Plan

CASE STUDY 2 Enterprise: Dairy

Region: Lancashire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£14.90/ha/year	Payback:	3 Months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and is available from ADAS

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-A tenanted dairy and sheep farm of 71 ha Grassland, supporting 70 Cows (50 dairy youngstock)+ 240 Breeding Ewes and employing 3 members of staff.

#### Objectives

-To derive more benefit from farm slurry by concentrating applications on silage production rather than grazing areas.

-To reduce the applications of phosphate and potash.

#### **Resource Management Activities**

-Reallocation of slurry application to targeted areas used for silage production rather than general grazing land. The application of slurry will have environmental benefits of improved soil structure and reduced applications of artificial fertilisers.

Additional benefit stem from increased grass production. If this grass production is not required further savings in fertiliser costs are anticipated.

#### Comments

-This scheme is widely applicable, with obvious cost benefits and universally available resources.

# 4.4 Integration of farm manure nitrogen supply within commercial farming

CASE STUDY	3	Enterprise:	Dairy	Region:

gion: various Country: England

Source Defra

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High			
Financial savings:	£83/head/year		Payback:	Immediate
Date of	1998		Audited	-1
		· · · · · · · · · · · · · · · · · · ·		

Confidentiality: This case study was funded by MAFF (now defra), 'Making better use of manures on

#### Background

-This case study was completed for MAFF in 1996

#### Size and type

-102 ha Grassland, supporting 130 Cows + followers and employing 2 members of staff

#### Objectives

-To reduce artificial fertiliser usage and maximise the utilisation of natural sources. Enhancing the Farmer's perception of the fertiliser value of organic manure.

-To reducing the enrichment of soil N and P status.

-To reduce the loss of nutrients to ground water and through surface run-off.

-To minimise the non-natural waste generated (Polypropylene bags) on the farm.

#### **Resource Management Activities**

-The adoption of an ADAS Fertiplan reduces the farm's applications of phosphate and potash and makes better use of slurry as a fertiliser. A programme revising the timing and application rates of fertiliser maximises the effectiveness of inputs, improves soil management and minimises the negative environmental consequences of runoff.

-The adoption of the new programme potentially results in an increase in grass production and inherent cost benefits and reduces artificial frertiliser use by 6.2 tonnes.

#### Comments

-The cost benefits and availability of resources render this approach highly applicable to the majority of farms in this sector.

# 4.5 Management and monitoring of land damage from outwintered stock.

	CASE	E STUDY	56	Enterprise:	Dairy		Region:	Devon
							Country:	England
Sou	irce	Westcount	ry Riv	ers Trust				
Res	ouro	e Manage	emen	t Activities A	ddressed	in this Ca	ise Study	У
Wato	r Man	agement				Post Manago	ment	

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£61/Head/Year	Payback:	1 Year
Date of	2002	Audited	0
Confidentiality:	Case Study published by Westcountry River	rs Trust.	

#### Background

-A case study from West Country Rivers Trust.

#### Size and type

-5 ha grassland supporting out-wintered stock

### Objectives

-To protect the grass and soil from serious damage in wet weather

-To reduce costs of reseeding damaged grassland

#### **Resource Management Activities**

-Regular inspection of soli and sward

-Movement of stock to better drained land in wet conditions before serious poaching occurs.

#### Comments

-This approach is highly replicable, it is cost neutral and the results were good, 10% less grass needed to be restored and the recovery of the grass resulted in an early spring 'bite'.

# 4.6 Fencing of riverbanks to prevent stock breakout.

CASE STUDY

Enterprise:

Dairy Region: South West

Country: England

Source Westcountry Rivers Trust

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# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£0.5/head/year	Payback:	<4 years
Date of	2004	Audited	0
Confidentiality:	Westcountry Rivers Trust		

#### Background

-This case study was developed from information provided by a farmer who had participated in the Tamar 2000 Project.

#### Size and type

-121.4 ha -250 Cattle

#### Objectives

-To control stock breakout across a boundary river in order to eliminate the need for stock retrieval, increasing farm business efficiency and managing the quality of the river habitat.

#### **Resource Management Activities**

Fencing of 500m of river frontage using permanent post and wire and electric fencing.

Comments

-The cost of fencing is estimated to be £1 per m (ABC 2004) a total cost of £500. It is assumed that farm labour was used to erect the fence and was absorbed into the farm's running costs. -An estimated annual saving of £130.50 is based on an average of 6 stock breakouts per year of 3 hours' duration each, at an average farm worker's hourly cost of £7.25 (Nix, 2003)

-Additional savings may be realised in association with:

-Improved stock health

-Improved water and fishery quality and reduced risk of pollution

-Maintainance of farm capital value via reduced loss of agricultural land to erosion e.g. the cost of grade 3 agricultural land is  $\pm$ 7878 per ah (Nix 2003) the long run cost of bank erosion is therefore  $\pm$ 7.9 per m2 with the annual saving dependent on the rate of erosion.

#### 4.7 Soil testing to optimise fertiliser inputs to grass silage.

CASE STUDY Enterprise: 61

Dairy

Region: South West Country: England

#### Source Westcountry Rivers Trust

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£13.70/ha/year	Payback:	<1 year
Date of	2004	Audited	0
Confidentiality:	Westcountry Rivers Trust.		

#### Background

-This case study was developed from information provided by a farmer participating in the Cornwall Rivers

- Size and type
- -34ha
- -Dairy

#### Objectives

-To optimise accuracy of fertiliser application in order to reduce inputs and losses

-To improve soil structure and reduce the risk of erosion

-To reduce the risk of watercourse pollution

#### **Resource Management Activities**

-Soil testing of 9.3 ha of grass silage on a 4 year basis in order to improve efficiency of fertiliser inputs.

#### Comments

-The cost of soil testing was £60, the samples were taken by the farmer and sent off for analysis. If soils are tested on a four year basis the annual cost is £1.61 per ha.

-The farmer estimated a 25% reduction in fertiliser costs as a result of soil testing. An estimated annual saving of £13.70 per ha is based on a 25% reduction in a total average fertiliser cost of £61.27 per ha for grass silage (Nix, 2004) minus the costs of soil testing.

-Additional savings may be realised in association with reduced costs of labour and machinery.

#### 4.8 Installation of a dairy heat recovery unit.

CASE STUDY 5 Enterprise:

Dairy

Region: Lancashire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£30.2/head/Year	Payback:	<3 Years
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-A tenanted dairy and sheep farm of 71 ha Grassland, supporting 70 Cows (50 dairy youngstock)+ 240 Breeding Ewes and employing 3 members of staff.

#### Objectives

-Reducing energy use by 50%, therefore saving the farmer electricity costs with environmental benefits of reduced resource useage and air emissions.

#### **Resource Management Activities**

-Installation of unit utilising gas from bulk milk tank to heat water. The recycling of heat to warm water will reduce the farms overall electricity useage which has environmental benefits geographically removed from the farm, measured in reduced CO2 emissions and reduced resource consumption.

#### Comments

-The uptake of this scheme may be limited by the need for considerable financial investment with a long pay back period.

# 5. Crops

# 5.1 Reduction in Potato waste generation and disposal.

Crops

CASE STUDY

6

Enterprise:

Region: Nottinghamshire Country: England

Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	MEDIUM		
Financial savings:	£40/ha/Year	Payback:	15 Months
Date of	1996	Audited	0
	1990	Audited	U

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-A 530 ha farm with 72 ha potatoes, employing 8 members of staff.

#### Objectives

-To reduce the quantity of waste (damaged/green/bruised potatoes) and to improve disposal methodology via segregation of organic and inorganic waste streams.

#### **Resource Management Activities**

-A TQM approach, examining methodology to reduce process induced damage to potatoes. Involving a review of grading and waste segregation equipment to improve segregation and reduce waste. -30 tonnes of waste minimised P.A., this intern reduces the amount of leaching of effluent from waste (substandard potatoes) and the potential for disease transmission/Viral propogation from the dumped

#### Comments

-The scheme generates substantial cost benefits however uptake may be limited by the high upfront capital costs.

# 5.2 Application of broiler litter on potatoes.

CASE STUDY 41 Enterprise:

nterprise: Crops

Region: Country: England

#### Source ADAS

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings: £120/Ha/Ye	ar	Payback:	Immediate
Date of		Audited	0
Confidentiality:			

# Background

-This is an ADAS, Manures worked example.

Size and type

-Potato Growers.

#### Objectives

-Improved resource efficiency

- -Decreased water contamination risk
- -Decreased artificial farm inputs
- -Decreased costs

-Improved soil structure

# **Resource Management Activities**

-Broiler litter applied in spring and incorporated within 24 hours. Applied at a rate of 8t/ha this supplies 108 kg/ha of N, 120 kg/ha of P and 130 kg/ha of K for the following potato crop.

-The crop requirements are 220 kg/ha of N, 180 kg/ha of P and 300 kg/ha. However, making allowance for soil reserves and the broiler manure , only 112 kg/ha of N, 60 kg/ha of P and 170 kg/ha of inorganic fertilisers are needed.

#### Comments

-This is an easily adopted strategy making good use of readily/cheaply available inputs with a good payback rate.

-The saving against the nutrient requirements of potatoes reduces the NPK fertiliser inputs (at typical costs) for this crop by £87/ha. The total saving on NPK fertiliser inputs over the crop rotation is about

# 5.3 Reduction in sugar beet wastes.

CASE STUDY 7 Enterprise: Crops

Region: Nottinghamshire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

#### **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£16/ha/Year	Payback:	13 months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-A 530 ha farm with 55 ha sugar beet, employing 8 members of staff.

#### Objectives

-To reduce crop losses due to dirty crops and poor cleaning while loading.

#### **Resource Management Activities**

-Improved harvester operation through participation on training courses, potentially saving the 25 tonnes of beet currently wasted P.A.

-Cleaner beet will result in reduced disease in the live beet and disease stemming from on-farm dumping. The minimisation of dumping will enhance the landscape value of the farm and reduce the potential risk for run off water pollution.

#### Comments

-The level of priority and profile of this issue to the farmer may limit uptake of this approach.

# 5.4 Reduction in Potato waste generation and disposal.

CASE STUDY

8 Enterprise:

Crops Region: Nottinghamshire

Country: England

Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium			
Financial savings:	£24/ha/Year	Payback:	<2 Years	
Date of	1996	Audited	0	

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

## Background

-This case study was completed for MAFF in 1996.

### Size and type

-A 570 ha farm with 85 ha Potatoes, employing 5 members of staff.

## Objectives

-To reduce the accumulated waste generated in harvesting and processing potatoes. -Reducing the possibility of disease carry over from dumped potatoes (possibly saving on disease control programmes).

## **Resource Management Activities**

-Examination of equipment and grading decisions to reduce the accumulated waste from the current level of 4% by weight (30 tonnes P.A.).

-Sorting and removal of stones from reject sample.

Currently outgrades are sold for stockfeed.

## Comments

-The high capital costs of this action may limit uptake.

# 5.5 Improved machine operation/processing of sugar beet harvesting.

CASE STUDY 9 Enterprise: Crops

Region: Nottinghamshire Country: England

### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£27.2/ha/Year	Payback:	11 Months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-A 570 ha farm with 45 ha sugarbeet, employing 5 members of staff.

#### Objectives

-To reduce the harvesting losses through improved monitoring , cleaner loader adjustment and

#### **Resource Management Activities**

-Through improved machine operation less rogue beet is found in subsequent crops, therefore reducing opportunities for disease development and the need for spray programmes. -Cleaner loaders ensure that less beet and material is dumped, reducing the risk of disease and effluent

#### contamination of water.

#### Comments

-The actions are highly applicable and result in good pay back figures.

# 5.6 In-situ grading and trimming of salad and vegetable crops.

CASE STUDY 25 Enterprise: Crops

Region: Derbyshire Country: England

### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£95/ha/Year	Payback:	10 months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now Defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-157ha cropped twice with leeks, carrots, lettuce, stick beans and some cereals. Employing 65+ seasonal

# Objectives

-Reduction in odour from decayed concentrated waste, reduced energy consumption in transport, improved nutrient cycling to the soil, reduced disease spreading and reduced organic waste disposal

#### **Resource Management Activities**

-The use of field rigs for grading and trimming of excess material, leaving it in the field. The material deposited at the pack house is relatively clean, minimising the use of wash water and the concentration of BOD entering the sewage system.

#### Comments

-High capital costs may limit the uptake of this strategy however there are considerable environmental and cost benefits.

# 5.7 Removal of small potatoes from field to reduce the number of volunteer

Organic material

CASE STUDY	21	Enterprise:	Crops	Region:	Shro	oshire
				Cou	ntry:	England
Source ADAS CSA3174						
Pesource Manageme	nt Ac	tivities Addres	sod in th	is Case	Stud	v
Resource Manageme		civicies Addres	seu in th	is case	Stuu	Y
Water Management			Pest Ma	anagement	:	
Soil Management			Nutrier	nt Managen	nent	
Energy Management			Non-na	tural Wast	е	
Air Emmissions			Infrast	ructure		

# **Environmental benefits**

Natural Resource

Improved Biodiversity
Improved soil quality
Reduced risk of flooding
Enhanced Landscape

Ease of adoption	High		
Financial savings:	£40/ha/Year	Payback:	Immediate
Date of	1996	Audited	0
Confidentiality:	This case study was funded by	MAFF (now Defra) and as su	ch is available from

# Background

-This case study was completed for MAFF in 1996.

#### Size and type

-265 ha cereals, 123 ha potatoes, 90 ha sugarbeet, 30 ha grass, 220 sows plus progeny to bacon weight. **Objectives** 

-Reduction of the use of agrochemicals and improvement of harvest efficiency.

#### **Resource Management Activities**

-Removal of small potatoes from the field using the early potato lifting web throughout the harvesting period. Avoiding the use of agro-chemicals to control the growth of volunteer potatoes and providing a market for small potatoes (an extra income of up to £5000).

#### Comments

-Highly applicable with multiple paybacks and minimal expenditure.

# 5.8 Operation of machinery dictated by soil conditions.

CASE STUDY 47 Enterprise:

erprise: Arable

Region: Country: England

#### Source ADAS

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£60/Ha/Year	Payback:	Immediate
Date of	2003	Audited	0
Confidentiality:	ADAS		

#### Background

-This is an ADAS, Manures worked example.

Size and type

#### -Mixed Farm

Objectives

-Protection of soil structure, compacting and runoff losses

-Reduction in labour time

-Reduction in resource consumption

-Improve farm efficiency

-Reduction in costs.

## **Resource Management Activities**

-To ensure machines are not operated under wet or unsuitable soil conditions

#### Comments

This management activity is easily adopted with no additional outlay. The strategy requires some culture change, but in this example it saved the farmer 40% of fuel costs and considerable man hours.

# 5.9 Minimum tillage for wheat.

CASE STUDY	52	Enterprise:	Arable	Region:	Devon
				Country:	England

# Source Westcountry Rivers Trust

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£80/Ha/Year	Payback:	Immediate
Date of	2002	Audited	0
Confidentiality:	Westcountry Rivers Trust		

#### Background

-A case study from West Country Rivers Trust.

# Size and type

-Arable farm, Devon.

-10ha of the steepest fields.

-Wheat production.

## Objectives

-Reduction in run-off.

-Reduction in soil erosion and nutrient losses. -Reduction in crop damage from gullies and rills.

-Reduction in need to reinstate eroded soils and clean dirty ditches.

-Reduction in labour costs

-Reduction in machinery running costs

-Reduction in herbicides and fungicides useage

#### **Resource Management Activities**

-Use of minimum tillage for wheat in 2001 on 10Ha of steep fields rather than conventional cultivation.

# Comments

-This strategy offered considerable financial paybacks, rewarding the farmer in labour savings on tasks such as ditch and highway cleaning and repair of rills and gullies.

# 5.10 Re-seeding with Clover.

CAS	e study	53	Enterprise:	Arable	Region:	South West
					Country:	England
Source	Westcount	ry Riv	ers Trust			

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£123/ha/Year	Payback:	2 Years
Date of	2003	Audited	0
Confidentiality:	Westcountry Rivers Trust		

#### Background

-A case study from Westcountry Rivers Trust.

Size and type

# -38 Ha Grassland.

Objectives

-Enhancement of soil nutrient value.

-Reduction in cost of mineral fertiliser applications.

-Reduction in bare earth state therefore reducing soil erosion potential.

# **Resource Management Activities**

-Review of grassland management practice to diverge from the standard practice of applying N at 375kg/ha.

Comments

-This management practice is easily adopted with good financial returns and considerable benefits for the environment, enhancing soil status and reducing soil erosion and water pollution.

# 5.11 Integrated Crop Management.

CASE STUDY	54	Enterprise:	Arable	Region:	Essex
				Country:	England
Source Bayer Cro	opScier	ice			
Resource Manag	geme	nt Activities	Addressed i	n this Case Stud	у

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£200/Ha/Year	Payback:	
Date of	1995	Audited	0
Confidentiality:	This casestudy is reported in 21st Century Consumer.	n 'Food for Thought' Sustainable	Food Production for the

#### Background

-The Boarded Barns Farm Study is a long-term evaluation of the wider impact and viavility of alternative farming systems

#### Size and type

-24 ha Arable farm on deep, acid clay loam in lowland Britain

#### Objectives

-Valuation of Integrated Crop Management

-To satisfy the demands for reliable and economic production and enhance the biodiversity and fabric of the countryside

#### **Resource Management Activities**

- -Integrated Crop Management of wheat
- -Optimisation of the use of resources, a 30% reduction in the use of crop production products.
- -The use of minimum tillage techniques
- -20% reduction in overal inputs.

#### Comments

-The use of ICM generated good cost benefits, through the reduction in tillage energy costs, and the increase in wheat yields (topped 8t/ha), this strategy is highly applicable, though it will require considerable culture change in farming.

# 5.12 Spatial targeting of fertilisers.

CASE ST	UDY 5	5 E	Enterprise:	Arable	Region:	Devon
					Country:	England
Source We	estcountry	River	rs Trust			
Resource Management Activities Addressed in this Case Study						

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£101/ha/Year	Payback:	2 Years
Date of	2002	Audited	0
Confidentiality:	Case Study published by Westcountry Rivers	s Trust	

#### Background

-A case study from West Country Rivers Trust.

#### Size and type

-6.7 ha of grassland including some wetland areas

#### Objectives

-To reduce the impact of fertiliser on non-targeted areas such as boundaries and hedgerows.

-To prevent fertilisers from encouraging unwanted weed species in hedgerows.

-To protect hedgerow plants which are intollerant of high levels of N and the insects they harbour.

#### **Resource Management Activities**

-Restricted application of 268:0:40 (high impact) fertiliser to within 10m of field boundaries

#### Comments

-This strategy is highly applicable to a large number of enterprises, the farmer saves considerable fertiliser costs and labour time in fitting prill guards onto spreaders.

# 5.13 Application of livestock manures on arable crops.

CASE STUDY 40

Enterprise: Arable

Region: Country: England

#### Source ADAS

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£100/Ha/Year	Payback:	Immediate
Date of	2003	Audited	0
Confidentiality:	ADAS		

#### Background

-This is an ADAS, Manures worked example.

### Size and type

-300ha of combinable crops roots and 100 dairy cows

# Objectives

-Improved resource efficiency

-Reduction in artificial inputs and costs

-Recycling of farm wastes

-Improved soil structure, reducing the potential for soil erosion

-Maximisation of crop yields

### **Resource Management Activities**

-Utilisation of farm yard manure.

-Development of a farm nutrient management plan.

-Monitoring of soils on a 3yr cycle to identify any potential problems, previous problems involving low sugars and high amino acids occurred in sugar beet, whilst the potato crop suffered from excess nutrients

#### Comments

-This is an easily adopted strategy, utilising readily available inputs, with good cost benefits. The monitoring of nutrients is a sensible approach to ensure an improvement in farm performance and maximum crop yield benefits.

# 5.14 Good soil management.

CAS	e study	49	Enterprise:	Arable	Region:	South West
					Country:	England
Source	Westcount	ry Rive	ers Trust			

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£244/Ha/Year	Payback:	Immediate
Date of	2003	Audited	0
Confidentiality:	Westcountry Rivers Trust		

#### Background

-A case study from West Country Rivers Trust

Size and type -5 Ha forage Maize

# Objectives

-Reduce soil compacting to enhance yields.

-Improvement of the soils capacity to hold water and nutrients.

-Reduction in damage and runoff.

-Enhancement of soil's ability to breakdown pesticides.

-To enhance crop yield.

#### **Resource Management Activities**

-To avoid compaction of the wet clay soil, slurry was not spread during the winter months. -To achieve this flexibility to spread when conditions were suitable, the farmer ensured that he had sufficient slurry storage.

#### Comments

-This is a low cost strategy and good farming practice, with good financial pay backs.

-The production of maize at 33% dry matter (DM) was 13 tonnes of DM per ha. At £975 per ha, the crop was worth £4875. It is estimated that soil compaction would have reduced yields by 25%. Good practice therefore saved the farmer £244 per ha, a total of £1220.

# 5.15 Soil management to reduce erosion and loss of inputs.

CASE STUDY 62

Enterprise: Arable

Region: South West Country: England

#### Source Westcountry Rivers Trust

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£26.3/ha/year	Payback:	<3 years
Date of	2004	Audited	0
Confidentiality:	Westcountry Rivers Trust.		

#### Background

-This case study was developed from information provided by a farmer who was participating in the Cornwall Rivers Project.

#### Size and type

-69ha

-Beef and arable

#### Objectives

-To reduce soil damage, soil erosion and soil loss

-To reduce losses of inputs

-To maintain yields and productivity

-To reduce the risk of watercourse pollution.

### **Resource Management Activities**

-3.2 ha of arable land (barley, forage peas, stubble turnip rotation) was undergoing severe erosion due to gully and plough pan development, with reductions in yield and productivity due to losses of inputs and topsoil. The area was ploughed using a vintage tractor in order to improve soil structure and infiltration capacity. Crop cover was subsequently maintained to protect the soil from future erosion.

#### Comments

-Deep ploughing the 3.2 ha to remove the pan and gullies took one day and was estimated to cost £63 per ha- a total of £201.60 (Nix 2004).

-Improved soil management saved losses in yield estimated at 5% per annum and losses in productivity estimated at 25% over a 50 year period. The annual savings were estimated to be £25.2 per ha, £0.6

# 5.16 Minimum Cultivation.

CASE STUDY	69	Enterprise:	Arable		Region:	Leicestershire
					Country:	England
Source Farmcare:	Hydro	Agri				
Resource Management Activities Addressed in this Case Study						
Water Management				Pest Manager	ment	

Water Hanagement	rescrianagement
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£19/ha/year	Payback:	
Date of	2002	Audited	0
Confidentiality:	Focus on Farming Practice managed by Farm	ncare Stoughton	Estate.

#### Background

-One of the most comprehensive farm scale comparisons of 'Conventional' and 'integrated' farm practices was carried out at Focus on Farming Practice. This project was sited and managed by Farmcare Stoughton Estate. Work began in 1993 and continues.

#### Size and type

-Integrated farming

### Objectives

- -To reduce the nitrate concentration in drainage water
- -To reduce energy costs of cultivation
- -To enhance the aeration of soil
- -To enhance the biodiversity of the site.

#### **Resource Management Activities**

- -Minimum cultivation and direct drilling in integrated plots.
- -Blackgrass was controlled on the heavy soil by a two year grass ley in the rotation.
- -Slugs were controlled through seedbed consolidation and targetted seed treatment.

#### Comments

- -Over a nine year period from 1993
- -the number of cultivations and the cost of cultivations were lower for the integrated (3 cultivations/year,
- £75/ha) than the conventional plots (4 cultivations/year, £90/ha)
- -Herbicide costs were lower for the integrated (£36/ha) than the conventional (£40/ha) plots.

# 5.17 White clover understorey and direct drill.

CASE STUDY 75

Enterprise: Arable

Region: Devon Country: England

#### Source IGER

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£138/ha/Year	Payback:	
Date of	2003	Audited	0
Confidentiality:	Institute of Grassland and Env funded by a Defra grant and I	/ironmental Research. Work EU Money.	c conduceted by R O Clements,

#### Background

-This case study was developed by RP Clements of IGER and funded by a Defra and subsequent EU grant.

Key principles

-White clover can be used as an understorey in arable (Whole crop) Silage to fix N, reduce weed infestation and provide a haven for predatory insects that eat pests. Foliar fungal diseases are also

#### Size and type

-White clover understorey and silage crop

-Plots grown in conjunction with control plots using conventional practice

#### Objectives

- -To reduce nitrogen fertiliser use
- -To obviate the need for insecticides and fungicides
- -To reduce the need for herbicides
- -Create more beneficial conditions for wildlife
- -To control erosion

#### **Resource Management Activities**

-Sow white clover understorey into a cereal nurse crop.

-After harvest the white clover remains and winter wheat is direct drilled into this.

-Three-Four successive crops are grown.

#### Comments

-Yields in this instance were only slightly lower than conventional cropping using standard farm practice No.:-This practice resulted in a large reduction in N fertiliser and agrochemical usage. -The dense understorey creates a haven for beneficial invertibrates was created including predatory

beetles and spiders which feed on pests. The permanent crop cover is also likely to promote small mammal : and birdlife.

-The maintainance of soil cover controlled erosion.

:-The changes in crop architecture reduced the likelyhood of foliar fungal attack on the cereal and reduced

# 5.18 White clover understorey and direct drill.

CASE STUDY 76

Enterprise: Arable

Region: Devon Country: England

#### Source IGER

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium			
Financial savings:	£163/ha/Year	Payback:	:	
Date of	2003	Audited	0	
Confidentiality:	Institute of Grassland and E funded by a Defra grant and	nvironmental Research. V I EU Money.	Nork conduceted	by R O Clements,

#### Background

-This case study was developed by RP Clements of IGER and funded by a Defra and subsequent EU grant.

Key principles

-White clover can be used as an understorey in arable (Whole crop) Silage to fix N, reduce weed infestation and provide a haven for predatory insects that eat pests. Foliar fungal diseases are also

Size and type

-White clover understorey and silage crop

-Plots grown in conjunction with control plots using conventional practice

### Objectives

- -To reduce nitrogen fertiliser use
- -To obviate the need for insecticides and fungicides
- -To reduce the need for herbicides
- -Create more beneficial conditions for wildlife
- -To control erosion

#### **Resource Management Activities**

-Sow white clover understorey into a cereal nurse crop.

-After harvest the white clover remains and winter wheat is direct drilled into this.

-Three-Four successive crops are grown.

#### Comments

-Yields in this instance were higher than conventional cropping using standard farm practice No.:-This practice resulted in a large reduction in N fertiliser and agrochemical usage. -The dense understorey creates a haven for beneficial invertibrates was created including predatory beetles and spiders which feed on pests. The permanent crop cover is also likely to promote small mammal : and birdlife.

-The maintainance of soil cover controlled erosion.

:-The changes in crop architecture reduced the likelyhood of foliar fungal attack on the cereal

# 5.19 Undersowing of crops to avoid bare ground nutrient loss.

CASE STUDY 51 Enterprise:

Arable

Region: South West Country: England

#### Source Westcountry Rivers Trust

## **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

### **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£79/Ha/Year	Payback:	Immediate
Date of	2003	Audited	0
Confidentiality:	Westcountry Rivers Trust		

#### Background

-A case study from West Country Rivers Trust

Size and type

# -5 Ha Maize crop.

# Objectives

-To avoid bare ground after maize harvest from October until the following May, on soils which often cannot be autumn ploughed.

-To reduce weed growth

-To reduce soil erosion and loss of nutrients through run off.

-To provide winter cover for wildlife.

#### **Resource Management Activities**

-5 Ha Maize crop undersown with herbicide tolerant Italian Rye Grass for worm-free ewe/lamb winter and spring grazing. The undersown crop produced six tonnes DM/ha with a Relative Feed Value (RFV) of £12/tonne. This was worth £360 plus the value of the nutrient retention of £35 (estimated value of nitrogen mopped up at £7/ha), a total of £395.

#### Comments

-This strategy affords good financial pay backs for the farmer and additional uncosted benefits of reduced soil damage and productivity loss associated with untimely operations, runoff and soil erosion.

# 5.20 Application of pig slurry to winter wheat.

CASE STUDY

38

Enterprise: Arable

Region: Country: England

#### Source ADAS

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High		
Financial savings:	£85/ha/Year	Payback:	Immediate
Date of	2003	Audited	0

Confidentiality:

### Background

-This is an ADAS, Manures worked example.

### Size and type

-Mixed Enterprise with Pigs and Winter Wheat.

# Objectives

-Reduce consumption of artificial fertilisers

- -Improve utilisation of on-farm sources of nutrients
- -Manage waste

-Improve soil structure and nutrient value

-Reduce risk of water contamination from pig slurry.

-Reduce costs

#### **Resource Management Activities**

-Application of pig slurry to land to provide N, P, K inputs for winter wheat production.

#### Comments

-This is an easily adopted strategy, presenting a win-win scenario for the farmer. Reducing sources of pollution, improving soil structure and fertility and reducing overhead costs.

-The total saving on NPK fertiliser over the crop rotation allowing for extra total P and K in soil reserves is up to  $\pounds$ 85/ha

-Allowing for the soil reserves a pig slurry application of  $50m^3/ha$ , supplies about half the N (90kg/ha) and sufficient P (100kg/ha) and K (125kg/ha).

# 5.21 Reduced edge effect of broadcast fertiliser by use of fixed width spray

CASE STUDY 23 Enterprise: Arable

Region: Derbyshire Country: England

### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£44/ha/Year	Payback:	< 1 year
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now Defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-157ha cropped twice with leeks, carrots, lettuce, stick beans and some cereals. Employing 65+ seasonal **Objectives** 

# -Reduction in fertiliser useage, reducing the impacts on non target habitats and the possible leaching into

the water system. The improved coverage improves crop quality, reducing organic wastage.

#### **Resource Management Activities**

-The use of liquid fertiliser through a fixed width spray boom. This reduces wastage beyond crop boundaries and uses 10% less fertiliser, saving £4000. Liquid fertiliser reduces the quantities of non-oraganic waste to be disposed of, saving on 250 plastic fertiliser sacks and gives a more even coverage with benefits in overall crop quality.

-The more precise application reduces fertiliser consumption and therefore limits the capacity for leaching

#### Comments

-Requires investment and a management change, but offers good cost benefits.

# 5.22 Use of air assisted sprayer in pesticide application.

CASE STUDY 24 Enterprise:

Arable

Region: Derbyshire Country: England

#### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

#### **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£82/ha/Year	Payback:	5 months
Date of	1996	Audited	0

Confidentiality: This case study was funded by MAFF (now Defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-157ha cropped twice with leeks, carrots, lettuce, stick beans and some cereals. Employing 65+ seasonal Objectives

-Reduction in pesticide useage and limitation of non-target habitat disruption.

#### **Resource Management Activities**

-The use of an air assisted sprayer limiting the amount of pesticide spray drift into non-target habitats. Reducing overall pesticide useage and the impact it has on the environment, verges, hedgerows and

#### Comments

-This method requires some investment and a change in practice, but offers good financial rewards.

# 6. Horticulture

26

# 6.1 On-sale of vegetable pack house waste.

CASE STUDY

Enterprise:

Horticulture

Region: Derbyshire Country: England

Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High			
Financial savings:	£118.15/Ha/Year		Payback:	Immediate
Date of	1996		Audited	0
		• • • • • • • • • • • • •		

Confidentiality: This case study was funded by MAFF (now Defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996

#### Size and type

-157ha cropped twice with leeks, carrots, lettuce, stick beans and some cereals. Employing 65+ seasonal

# Objectives

-Reduction in odour from decay of concentrated waste

- -Reduction in effluent emptying into the sewage system.
- -Reduction in energy inputs to transport waste and spreading it to the fields.

#### **Resource Management Activities**

-The recycling of packhouse vegetable waste for reuse as beef cattle feed.

-The waste is collected in skips and taken to neighbouring farms, 320 tonnes of waste is minimised per

#### Comments

-This strategy offers a win-win scenario for the farmer, a reduction in costs and a financial gain from sales of waste.

# 6.2 Re-use of floating polythene crop cover.

CASE STUDY 22

Enterprise: Horticulture

Region

Region: Derbyshire Country: England

### Source ADAS CSA3174

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	High			
Financial savings:	£39/ha/Year	Payback:	Immediate	
Date of	1996	Audited	0	

Confidentiality: This case study was funded by MAFF (now Defra) and as such is available from

#### Background

-This case study was completed for MAFF in 1996.

#### Size and type

-157ha cropped twice with leeks, carrots, lettuce, stick beans and some cereals. Employing 65+ seasonal **Objectives** 

-Reduction in non-biodegradable inputs and waste.

#### **Resource Management Activities**

-A proportion of the polythene crop cover is recovered each season for re-use. This reduces the need to purchase new polythene by 37%, saving £6259 per annum and reducing the landfill disposal cost by £922 and saving 30 tonnes of waste.

#### Comments

-This is easily adopted and offers good financial incentives to do so.

# 6.3 Rainwater recycling and computer controlled VPD watering system.

CASE STUDY 31 Enterprise: Horticulture

Region: Kent Country: England

### Source Environment Agency Water Efficiency Awards 2003

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality		Improved Biodiversity	
Improved Air Qual	ity	Improved soil quality	
Energy Manageme	Energy Management Reduced risk of f		ooding
Reduced Resource		Enhanced Landsc	ape
Ease of adoption	Medium		
Financial savings:	£758/ha/Year	Payback:	5 Years
Date of	2003	Audited	0
Confidentiality:	Environment Agency Water Efficiency Awa	ards 2003	
Background			
Size and type			
Objectives			
Resource Manag	ement Activities		
Comments			

# 6.4 Garden Centre Pond for collection and recovery of irrigation water.

CASE STUDY 29 Enterprise: Horticulture

Region:

Country: England

#### Source Environment Agency Water Efficiency Awards 2003

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Biodiversity
Improved soil quality
Reduced risk of flooding
Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£3500/ha/Year	Payback:	14 months
Date of	2003	Audited	0

Confidentiality: This case study was published in the Water Efficiency Awards 2003 for the Environment

#### Background

-This casestudy was entered as an example of good practice in the Environment Agency Water Efficiency Awards 2003.

#### Size and type

-Garden Centre with an irrigated plant area of 1 ha.

### Objectives

-To reduce water consumption through collection and recycling of irrigation water.

#### **Resource Management Activities**

-Construction of a pond for collection of surplus irrigation water and rainwater from warehouse roof and glasshouses and storm water from roads and yards. Pumping of water to a storage tank for irrigation uses.

#### Comments

-This is a sensible and efficient measure for a nursery/garden centre where water losses from irrigation systems are high.

# 6.5 Reservoir capture of water and installation of VPD irrigation.

Horticulture

CASE STUDY 67 Enterprise:

Region: Kent Country: England

Source Water UK and Environment Agency Water Efficiency

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emissions	Infrastructure
Natural Resource	Organic material

## **Environmental benefits**

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Ease of adoption	medium		
Financial savings:	£758/ha/year	Payback:	<5 years
Date of	2001	Audited	0
Confidentiality:	Water UK and Environment Agency.		

#### Background

#### Size and type

-Nursery producing 1,000,000 container grown shrubs for the amenity market

#### Objectives

-Water minimisation through: Water recycling and re-use to enable expansion of the business

-To reduce water costs, managing water use.

-To reduce labour costs

-To improve plant quality

### **Resource Management Activities**

-Construction of drainage to collect water from buildings (polythene tunnels, outdoor beds, buildings)

-Storage of water in a holding lagoon

-Pump system to transfer this from the holding lagoon to a reservoir

-Construction of a 6,000,000 gallon reservoir

-Irrigation control using a Vapour pressure deficit system (VPD) to ensure plants are only watered when needed and in the right quantities.

#### Comments

-The project has high initial capital costs £73,000 to install the reservoir and pumps, £18,000 for the V.P.D, £19,000 for the drainage recycling and installation. Against the high water consumption costs the payback period for this work is between 4 and 5 years. The VPD and drainage recycling schemes can be repaid between 18 months and two years.

Water shortages are a threat to such a business, therefore developing a self sufficiency in supply was of high importance. However considerable construction and initial costs are incurred leading the adoption rating to be considered 'low'.

#### 6.6 Recycling Water for Bean Sprout Production.

CASE STUDY 77 Enterprise: Horticulture

Region: Norfolk Country:

England

Source The Environment Agency Water Efficiency Awards

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Date of	2003	Audited	0
Financial savings:	£35,806/ha/year	Payback:	3 Years
Ease of adoption	Low		

Confidentiality: The Environment Agency Water Efficiency Awards 2003.

#### Background

-NFU Agriculture and Horticulture Category of the Environment Agency Water Efficiency Awards 2003 held in partnership with the NFU.

#### Size and type

-Market Gardens cropping strawberries, raspberries, blackberries, rhubarb and bean sprouts on farmland. -Employing 63 full time staff and approximately 600 seasonal pickers.

-This case study focusses on the bean sprout production which was identified as the crop with the highest water consumption following a review of the water use on the whole site.

#### Objectives

-To save water and maintain the high level of yield, quality and quantity

#### **Resource Management Activities**

-Review of the water use by monitoring on-site meters.

-Consultation with a filtration and separation systems specialist and a microbiologist to advise on the development of a re-circulation systems to capture excess water in the irrigation process for re-use. -Collection, filtration and recycling of irrigation water.

#### Comments

-The project has resulted in impressive water savings and enabled the company to demonstrate its commitment to water efficiency and wider environmental issues to both staff and customers. -Since its introduction in 2001 a 38% reduction in water requirements for bean sprout production has been achieved.

-The company calculate that £12,2000 of water costs are saved annually.

-This case study focuses on a highly intensive form of production, the financial savings have been

# 6.7 Rainwater Capture and Long Term Storage/Treatment.

CASE STUDY 78

Enterprise: Horticulture

Region: Kent Country: England

Source The Environment Agency Water Efficiency Awards

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Courfiel and in lite of	The Furthermore Area and Mater Efficiency (		
Date of	2003	Audited	0
Financial savings:	£931.5/ha/Year	Payback:	4 years
Ease of adoption	Low		

Confidentiality: The Environment Agency Water Efficiency Awards 2003.

#### Background

-NFU Agriculture and Horticulture Category of the Environment Agency Water Efficiency Awards 2003 held in partnership with the NFU.

#### Size and type

-Retail nursery producing on-site 65% of all plants sold equating to over one million plants per year -Employing 55-60 staff

#### Objectives

-To reduce reliance on mains water supply

-To reduce the amount of water flowing across the site causing flooding and irritation to neighbours

- -To collect the water running from greenhouse and other structures (2 acres of buildings)
- -To reduce the amount of pollution from fertilisers running off the site

#### **Resource Management Activities**

-Construction of a rainwater capture system

-Construction of a reservoir capable of storing 2.2million litres of harvested rainwater and irrigation run-off from a large proportion of the Production Nursery.

-Installation of two 10ft filtration tanks that between them hold 30 tonnes of specially selected sand and gravel layers.

-Development of a 200ft long gravel reed bed containing Norfolk Reeds (phragmites australis)

-Watering controlled by computer carried out at night to reduce evapotranspiration.

-Installation of drip irrigation to ensure exactly the right amount of water is put directly onto plants.

#### Comments

# 6.8 Sealed climate controlled facilities for horticultural production (Unigro).

CASE STUDY 80 Enterprise: Horticulture

Region: Kent Country: England

#### Source The Environment Agency Water Efficiency Awards

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Date of	2003		Audited	0
Financial savings:	£12,000		Payback:	5 years
Ease of adoption		medium		

Confidentiality: The Environment Agency Water Efficiency Awards 2003.

#### Background

-NFU Agriculture and Horticulture Category of the Environment Agency Water Efficiency Awards 2003 held in partnership with the NFU.

-Unigro, a private limited company developed a sealed climate controlled facility to make its operation more

#### Size and type

-Pesticide-free fruit, vegetables and herbs

#### Objectives

-To ensure maximum yields per hectare

- -To control the use of water resources
- -To develop economic cultivation of Class A crops for 12 months of the year.
- -To gain independence from the climate
- -To economise on energy and labour
- -To eliminate the use of pesticides

#### **Resource Management Activities**

-Development of a tunnel providing a controlled environment and suitable for fully commercial operation -Computer controlled environments managing temperature, humidity, light, co2 and irrigation

-Redesign of the irrigation system to give precise delivery and volumes of water and nutrients

-Introduction of the Aquacell water storage system beneath the building, together with rain harvesting

this reduces the dependency on mains supply water. This system enables a single storage area to provide water for irrigation, cooling and collection and storage of recovered heat energy.

#### Comments

-During an 18 month trial period the growing conditions were recorded and evaluated on a database to establish a balanced cultivation protocol

:-The system resulted in the lowest possible water use to maximise crop yield, 30% less than conventional growing.

:-Water use has reduced from 18,000m3 per year to 9,000 m3 with associated savings of  $\pm$ 12,000 per annum.

-A major requirement of all Greengro sites is the provision of land for the 'Wilderness Project', this scheme requires an acre of land for each growing room on the site to be set aside for restoration to natural habitat and the enhancement of biodiversity.

# 6.9 Irrigation water minimisation, filtration and recycling.

CASE STUDY 81

Enterprise: Horticulture

Region: Surrey Country: England

Source The Environment Agency Water Efficiency Awards

# **Resource Management Activities Addressed in this Case Study**

Water Management	Pest Management
Soil Management	Nutrient Management
Energy Management	Non-natural Waste
Air Emmissions	Infrastructure
Natural Resource	Organic material

# **Environmental benefits**

Improved Water Quality	Improved Biodiversity
Improved Air Quality	Improved soil quality
Energy Management	Reduced risk of flooding
Reduced Resource	Enhanced Landscape

Ease of adoption	Medium		
Financial savings:	£267/ha/year	Payback:	<1 year
Date of	2001	Audited	0
Confidentiality:	The Environment Agency Water Efficiency A	Awards 2001.	

#### Background

-Environment Agency Water Efficiency Awards 2001

Size and type -Plant Nursery

-100% dependent on mains water

#### Objectives

-To improve water efficiency and stability of supply

-To efficiently recycle water whilst removing plant pathogens and hazardous chemicals

-To maintain crop quality

#### **Resource Management Activities**

-Installation of a slow sand filter to recycle run-off and excess water from irrigation -Routine maintainance of the filter to ensure minimal clogging -Control of flash flooding on the site

#### Comments

-The annual mains water bill was £64143, this was reduced to £24119. The practice resulted in: -Recycling of 20% of water used. -Improved environmental awareness of staff

-Substantial cost savings