EuroSheep
European Knowledge Exchange

European Network for interactive and innovative knowledge exchange on animal health and nutrition between the sheep industry actors and stakeholders

E-learning material
for
UK farmers' needs

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 863056.

How to address…

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Grassland & Grazing management in sheep systems?

10 solutions
1 factsheet
6 tips & tricks

Solutions proposed by EuroSheep

Solution name	Country
Herbvalo - knowing the valorisation of grass on your grassland – an assessment tool	
Parasitism management in grazing animals	
Ewe replacement management tool	
Rotational grazing systems (Establishment and management)	
Guidelines for implementing rotational grazing	

Solution name	Country
Pasture measurement	
Sward stick and platemeter	
Grazing: what is achievable and how?	
Online history of grazing routes to remember and improve grazing routes in the next year.	
“Wikiloc”- a free tool to record grazing activities	

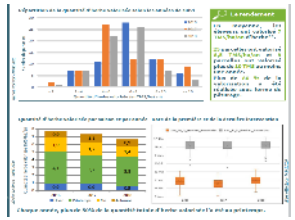
Factsheet

Managing the transition of breeding replacements - EuroSheep Network

Tips & Tricks

Spanish T&T_Grazing Plan – YouTube
Spanish T&T_Forage supply calculation – YouTube
Spanish T&T_Electric Fence Teaching – YouTube
Irish Tips & Tricks - Electric fencing tips – YouTube
Irish Tips & Tricks - 3 strand electric fencing tip – YouTube
Irish Tips & Tricks - Creep grazing gate - YouTube

HerbValo – knowing the valorisation of grass on your grassland



- **Need/expectation addressed:** grassland and grazing management
- **Aim:** to manage the grassland's production and valorisation during the season or the campaign.

➢ A tool that **estimates the quantity of valorised grass** at the parcel's scale

➢ Enables its user to determine what practices could impact positively or negatively the valorisation of the grass

➢Combines parcels and a detailed grazing plan

➢ Each cycle involves multiplying the number of days spent at pasture par by the flock's average intake

Proper valorisation of grass

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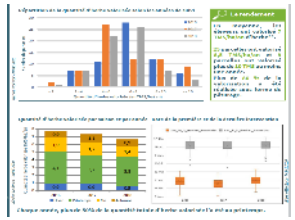
HerbValo – knowing the valorisation of grass on your grassland



- **How to implement it:** 2 types of files
  - **Paper** : systematic recording of information concerning the chosen parcels
    Excel file : evaluating the quantity of valorised grass per parcel per month, season or year

- **Expected benefits:** to build **confidence** in practices, to provide ideas for **better valorisation**, to **adapt** the management system
- **Prerequisites and/or limits:** No measurement on the grassland, requires basic knowledge of Excel and farmers' practices recording.

Proper valorisation of grass

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HerbValo – Cost-Benefit & Sustainability Analysis

• Additional Costs (in green, items related to environmental evaluation too)				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)[1]	☒	☐	3 %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages	☐	☐	… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed[2]	☒	☐	… %	… €
• Fertilizer[3]	☐	☒	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise[4]	☒	☐	… %	250 €/year
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify):	☐	☐	… %	… €
Total	☐	☐		

• Additional Incomes				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☒	☐	… %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	… €

- ***Maximize the use of grass and then increase grazing.***
- *Better gestion of paddocks =* ***reduction in the use of fertilizer and manure input.***
- *Using* ***less fertilizer and manure*** *= better for the environment and air quality.*
- *Using* ***more grazing*** *= improvement in* ***feed self-sufficiency***
- *It is good for society to see animals grazing and leads to a better image.*
- *Herbvalo can lead to the* ***implantation of hedges*** *on pastures -> good* ***for biodiversity*** *as it is a home for some small animals.*

Parasitism management in grazing animals

Need/ issue: Grassland and grazing management

Aim: Management measures to interrupt the cycle of infection of grazing animals through life forms of the parasites excreted by parasitized animals and hosted on the vegetation.
Description: Parasitism by internal and external parasites is inextricably linked to grazing.

Infection of the animals is through certain life forms of the parasites excreted by the parasitized animals present in the field or developed on the vegetation (eg. eggs evolving to larvae) and then consumed by other grazing animals. These life forms, when ingested, infect the naïve animals and multiply thus continuing the cycle of infection.

→ Grazing management techniques which break the cycle of parasites infection can substantially control internal parasites in sheep.

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Parasitism management in grazing animals

- **How to implement:**

Grazing management measures to interrupt this cycle in the field can be quoted as:

1) reduction of grazing animals on a given area and certainly below the grazing capacity, which measure slows the rate of infection

2) alternating animal species on a given area, since some of the parasites are species specific this breaks the cycle of infection

3) transferring a new group of animals into “clean” grazing field, which can been achieved through deworming the flock grazing previously, early enough to “clear” from parasites the grazing area

4) applying rotational grazing of grazed parcels, introducing in between grazing bouts long intervals of rest in order to break the cycles of parasites

5) providing animals, for grazing, fields cultivated with plants expressing anthelminthic properties (such as sainfoin, chicory, dandelion etc)

- **Expected benefits:** Easier harvesting, higher productivity and quality of forage both as hay and silage.
    - **Prerequisites and /or limits:** No prerequisites and limits identified

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Replacement management tool

Need/issue: Grazing management

- **Aim :** Feeding planning of replacement ewe-lambs according to productive objectives (economic approach and replacement schedule).

Description :

- Excel Tool to calculate the amount of feed required at every phase of the rearing period, and economical impact.
- It forecasts the most relevant dates according to the feeding chosen (expected weight/date for mating).
- The user can make simulations with different feeding alternatives and to assess their impact on the rearing as well

Aim:
Feeding planning

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Replacement management tool

- **How to implement:**

  Download file in your computer (free)

- **Expected benefits:**
  - Planning and feeding properly animals during the rearing period and calculation of costs

- **Prerequisites/limits :**
  - Excel 2016

Aim:
Feeding planning

Cost-Benefit & Sustainability Analysis

• Additional Costs				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☒	☐	… %	1.15 €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages	☐	☐	… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☒	☐	… %	5 €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify):	☒	☐	… %	… €
Total	☐	☐		6.5

• Additional Incomes				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)	☒	☐	… %	4.5 €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): shorter replacement period and earlier age at mating	☒	☐	… %	9 €
Total	☐	☐		**13.5**

Average increase in earning (lamb-ewe)	(€/…)	**7 €**

- ***Good planification*** *of the rearing and replacement period* ***->*** *additional labour and technical advice to implement the solution.*
- ***Additional benefits*** *= less time for the rearing period and a more* ***suitable growth leading*** *to an increase of milk production.*
- ***Better replacement planification*** *with:*
  - *a reduction of the replacement period*
  - *more accurate feeding schedule.*
  - *Increase of the feeding, grazing and feed-self efficiency.*
- ***Better animal welfare***
- ***Better family labour organisation*** *-> improve the social sustainability and the image of the company.*

Aim: Feeding planning

Rotational grazing systems - establishment and management

Background

- Rotational grazing systems involves
  - dividing areas into paddocks
  - managing paddocks in rotation

- Facilitates
  - grassland management
  - higher herbage utilization
  - high feed value silage
  - creep grazing for lambs
- Requires
  - calculate ideal paddock size (3 days grazing per group)
  - access to paddocks
  - water supply
  - fencing

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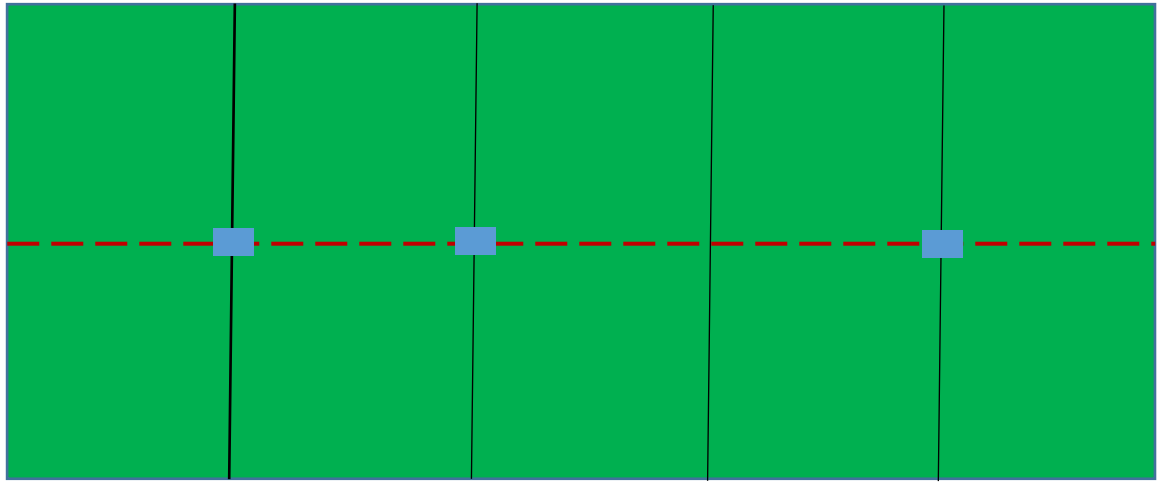
Rotational grazing systems - establishment and management

How to set up:

- 5 permanent paddocks per grazing group
- Electric fencing to split paddocks
- Aim for 3 days grazing per half paddock
- Approximately 21 day rotation in mid season and 40 day rotation in spring and autumn



- Strategically locate drinking troughs between main paddocks which can be split

Expected benefits:

- Higher grass utilization
- Increased sward quality
- High feed value silage produced
- Increases animal performance
- Reduce feed costs

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Cost-benefit & sustainability analysis

• Additional Costs (in green, items related to environmental evaluation too)				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☐	☐	… %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)[1,2]	☒	☐	10-20 %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)[3]	☒	☐	50 %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		

• Additional Incomes				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)[4]	☒	☐	5 %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		

Average increase in earning (per ewe, ha, etc.)	(€/…)	… €

Benchmark is a meat sheep farm grazing 100 ewes plus their lambs (1.6 lambs reared/ewe joined/year) and 25 replacements. Rams are purchased each year. Stocking rate is equivalent to 10 ewes/ha and aims to finish lambs from grass prior to the end of the grazing season.
Five 2 ha paddocks were established using permanent fencing which includes gates, water troughs and pipes.

- *Despite the initial materials cost of establishing a paddock system, the benefits **include improved herbage utilisation**, **management strategies** and the **opportunity to conserve high feed value forage** for the winter period.*
- *It improves **feed and grazing efficiency** (utilisation of herbage) and **increases animal output**. **Feed self-sufficiency also increases** due to improved opportunities for the production of winter forage.*
- *There is a **positive impact on emissions** as the grazing season length can be increased from a rotational grazing system, reducing housing time for animals over the winter period. There are greater emissions associated with manure excreted indoors. **Higher growth rates from lambs will reduce days to slaughter, which ultimately reduces animal related emissions.** There is a **slight negative impact** from materials used due to the initial investment in fencing.*
- *Use of a rotational grazing system creates a **better working environment** for grazing management and a better farmer image.*

Implementing Rotational Grazing

Need/issue: Grassland and grazing management (ewe)
Aim : To provide a solution for helping farmers who are getting started into rotational grazing.

Description :

Four page A4 document containing a summary of the essential knowledge required for getting started in rotational grazing. The document is easily digestible help guide.

How to implement:

Guide outlines:

- Initial set up, including how many paddocks are in the rotation, stocking rate, moving stock etc.
- The essential infrastucture materials, including wire, waterpipes, electric source, etc.
- Labour requirements, including helpful ways of saving labour costs
- Other helpful tips on power and earthing

Aim:
Guide on getting started in rotational grazing

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Implementing Rotational Grazing

- **Expected benefits:**
- Increase grass grown and utilisation (reduced waste) = increased output/ha and/or decreased inputs
- Better maintain pasture quality = improved livestock performance late season
- Improve allocation of late season/winter grazing= Reduce winter feeding costs
- More grass in the Spring = Less supplementation
- Greater persistency of sown species = Less reseeding


New Entrants to Farming

Rotational Grazing

Farm Advisory Service

- **Prerequisites/Limits:**
- The basic concepts and knowledge of paddock rotational grazing are highlighted in the document. However, there is no mention of other rotational grazing systems such as cell grazing, techno grazing.
- The movement timings of sheep between paddocks may vary across countries as varying climates etc. may impact the rest period of pasture and thus the timings may differ from that of the UK.
- The Rotational grazing benefits might not be seen at lambing. When rotational paddock grazing is compared to set stocking system at lambing, it is seen as a better option to set stock as ewe and lamb relationships may be impacted through regular shifting at this time.

Aim:
Guide on getting started in rotational grazing

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Cost-benefit & sustainability analysis

• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☒	10 %	… €
• Labour (man-hours)	☐	☒	12 %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☒	☐	… %	15,000 £
• Feeding : concentrates	☐	☒	90 %	… €
• Feeding : forages	☐	☒	10 % (per head)	… €
• Electricity	☒	☐	5%	… €
• Water (water, troughs, piping etc.)	☒	☐	300%	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☒	☐	30 %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): …….	☐	☐	… %	… €
Total	☐	☐		

• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)	☒	☐	45-50%	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		

Average increase in earning (per ewe, ha, etc.)	(€/…)	**… €**

Aim:
Guide on getting started in rotational grazing

Sward Stick and Platemeter

Need/issue: Grassland and grazing management (ewe)
Aim : To help in quantifying grass in the field (how to measure grass).

Description :

- The sward stick and board**:-** a ruler and compression board to measure grass heights, the ruler contains a conversion table from cm to kg/dry matter per hectare.

- Platemeter:- A manual or electronic device used to calculate the density of the sward and converts it to a kg/dry matter per hectare measurement.

Aim:
Quantify grass in the field

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Use of Sward stick and Platemeter

- **How to implement:**
- Walk the field in a W-shape taking your board and sward stick or Platemeter.
- Put the Board on the sward to compress the grass, put the sward stick against and take the reading.
- The sward stick has 5 different calibrations. Spring, late spring, summer, autumn, winter take the reading at the time of year measured. Optimum grazing zone is 8cm - 4cm for sheep with lambs at foot.
- Platemeters do the measurements for you, most electronic platemeters require 30 plonks (measurements) per field to give you the average. Depending on the model, some save the result automatically and others you have to manually record.
- Sward stick and platemeters measure grass supply in kg of dry matter and from that value we can find out how much of grass can meet the demand of stock.

Aim:
Quantify grass in the field

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Use of Sward stick and Platemeter

- **Expected benefits:**
- Able to quantify grass in kg dry matter allowing correct stocking rate to be set and accurate feed budgeting to occur. Measuring grass helps improve grassland management practices.

- **Prerequisites/limits :**
- Must be done by the same person, consistency is key. Regular grass walks every 2 weeks is advised. The grass measured must be representative of the field.
- The Platemeter must be calibrated before use with excess grass removed from base as this may skew results.

Aim:
Quantify grass in the field

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Pasture measurement

Background

- Grazed pasture is the cheapest feed for sheep
- Important to maintain the supply of high feed value grazing swards throughout the grazing season
- Grass is usually measured in kg DM/ha
- Ideal grazing covers for are between 1200-1500 kg DM/ha

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Pasture measurement

Swards can be measured using the following techniques:

1) Cutting and weighing

- Place the quadrat on representative area
- Clip herbage in quadrat to target post grazing height
- Weigh herbage
- Estimate herbage DM % and use calculation:

Weight of grass (kg) x grass DM% x 40,000 = kg DM/ha

2) Rising platemeter

- Measures the compressed height of a sward
- Each 'click' represents 0.5cm
- Take 30 heights across the entire paddock in a 'W' pattern
- Subtract your target post grazing height (e.g. 4cm) from the sward height
- Multiply your figure by 300kg DM/ha

3) Sward Stick

- Easy to use and low investment
- Use gauge on side to show swards are
  - grazed out
  - growing
  - should be grazed
  - too heavy to graze

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Pasture measurement

How to use data:

- Calculate your farm covers - manually
  - online application
- Average farm cover is calculated as follows:
  - multiply each paddock cover by its area
  - total all paddocks covers
  - divide by total area
- Pasture management decision support tools
  - automatically calculates growth rates, average farm cover, days grazing ahead etc.
  - creates reports to show total pasture production per paddock

Expected benefits:

- Higher grass utilzation
- Improved sward feed value
- Extend grazing season
- Improve animal performance
- Reduce feed costs
- Online applications will:
  - determine the quantity of grass produced
  - identify best and worst performing paddocks

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Grazing management of lambs – what is achievable?

Background

- Grazing management involves matching grass supply and feed value with animal requirements
- As grass matures
  - proportion of stem increases
  - digestibility and intake potential decreases
- To achieve high lamb performance maximise the proportion of leaf, thus digestibility and intake potential

Grazing management of lambs – what is achievable?

How to implement:

- Sward height - easiest and most effective way to manage pasture
- Increase post-grazing sward heights as the season progresses for lambs

Table 1. Target post grazing sward heights for lambs

	Grazing system	
Month	**Rotational**	**Set stocked**
March	**3.5 – 4**	**5**
April	**3.5 – 4**	**5 – 6**
May	**4.5 – 5**	**6**
June	**5.5 – 6**	**6 – 7**
July	**6**	**7 – 8**
August	**6**	**7 – 8**
September	**6**	**8**

Expected benefits:

- All lambs can be drafted for slaughter prior to the end of the grazing season without concentrate supplementation (except for triplets to weaning)

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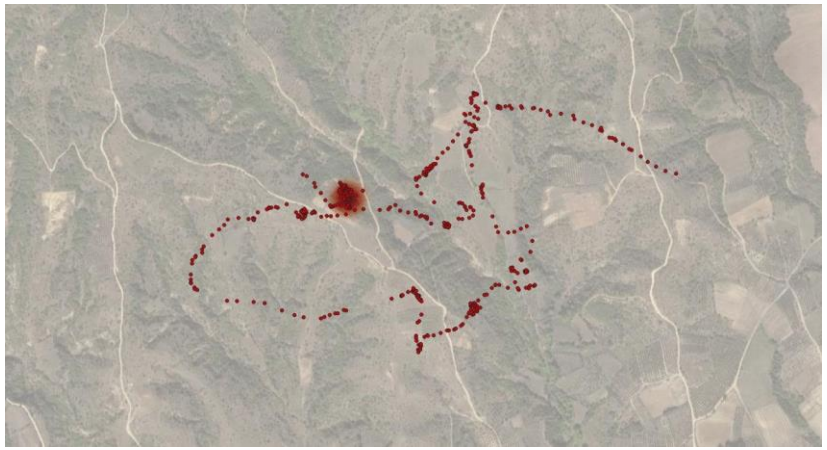
Online history of grazing routes to remember and improve grazing routes in the next year.



Need/ issue : Grassland and grazing management

Aim: Improve grazing routes

remember points of interest and best grazing grounds

cooperate with other farmers grazing in the same region.

Description :

- Documenting and logging grazing routes and spots can be an important tool to improve both the herds productivity as well as the sustainable management of the grazelands.
- Functional changes on the routes and grazing areas can be possible if there is a visualised “history” of the previous movements.
- Modern, low cost and easily accessible equipment can be used to visualize and manage grazing routes and areas

Online history of grazing routes to remember and improve grazing routes in the next year.

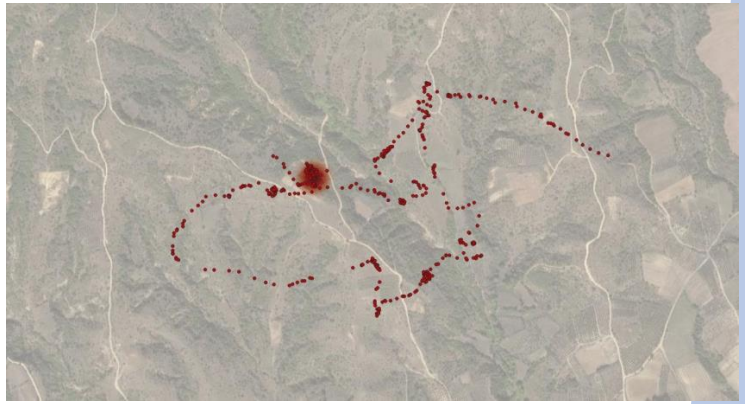
How to implement:

- GPS technology can be utilised either through commercial animal tracking equipment on grazing animals, a smartphone on the farmer or even home-made collars using cheaper GPS tracking devices.
- After importing the routes on an online map, the different maps of the different flocks can be combined on a common one.
- Additionally, each farmer can pinpoint locations of interest on their route, such as water sources, resting areas, possible dangers, areas with good vegetation etc.

Expected benefits:

Better grazing management, improved grazing areas, multi-flock management and cooperation.

- **Prerequisites and /or limits:**
- The farmer's basic understanding of the technology used could be a limit
- At least a smartphone with GPS technology is required



Cost-benefit & sustainability analysis

• Additional Costs				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☒	☐	0.1 %1	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☒	☐	0,05 %2	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): …….	☐	☐	… %	… €
Total	☐	☐		
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☐	☐	… %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	**… €**

- *The extra costs involving the purchase of a smartphone or the possible communication costs are small and in most cases the farmers already have both. The extra time needed for the farmer to learn the technology is negligible.* ***The use of the technology can potentially cover the costs and increase the income by improving the grazing routes of the flock.***

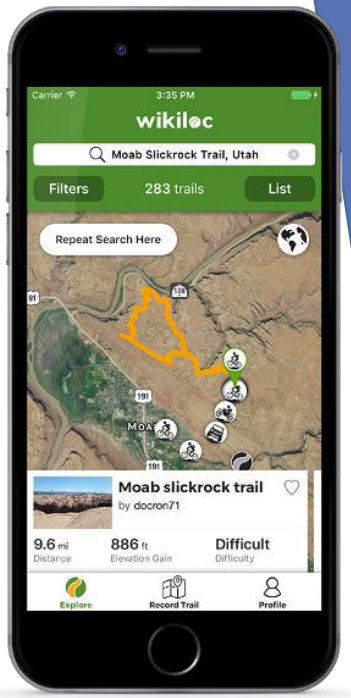
- *The technology brings no additional consumption of fuel, electricity, water etc. and thus having no negative environmental impact. The use of the method can potentially* ***improve the productivity of the flocks by improving the grazing efficiency.***

- *Monitoring of the grazing routes and cooperation between farmers grazing in the same area can* ***have positive environmental impact on the area.*** *The landscape can be better utilised by the different flocks to minimise the negative grazing impact on soil and local biodiversity. Data on grazing routes from former years can also be used to* ***better plan the present grazing routes considering the landscape protection and efficient use of the resources.*** *Planned management of water sources in grazing areas is also possible to* ***minimise water scarcity.***

“Wikiloc”- a free tool to record grazing activities

Need/issue: Grassland and grazing management (ewe)

Aim : To provide a solution for farmers to record their routes properly, to avoid overlapping with other flocks



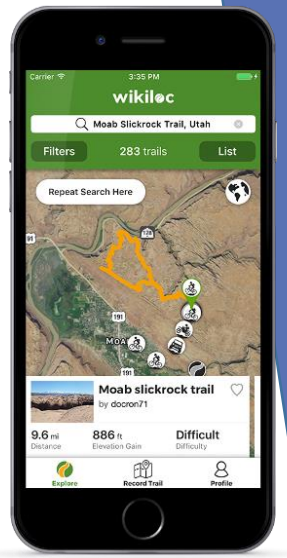
Description :

- ✓ Wikiloc is a fee application for smart phones/tablet/computers in order to track the grazing activities &routes.

Aim:
More efficient grazing practices

“Wikiloc”-a free tool to record grazing activities

- **How to implement:**
  - Farmers need a simple smartphone and download the app.
  - Free to register.
  - Press the record button before grazing. Press the finish button when grazing finishes.
  - Taking photos and adding to your route is possible. That will keep the information regarding vegetation, water resource, state of fences, grass potential. You can share with other users.



- **Expected benefits:**
  - Recording all your grazing route data,
  - Better management of grazing with zero cost
  - Useful communication between farmers thus less environmental degradation

- **Prerequisites/limits :**
  - a smartphone & a basic technology usage knowledge
  - Needs a shepherd to accompany the flock

Aim:
improve grazing routes & share information

Wikiloc | Trails of the World

Cost-benefit & sustainability analysis

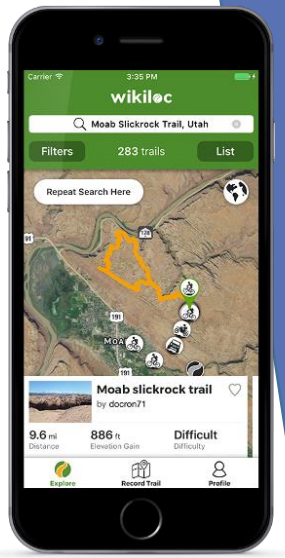
• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☐	☐	%	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☒	☐	0,003 %	… €
• Feeding : concentrates	☐	☒	40 %	… €
• Feeding : forages		X	50 %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☒	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): …….	☐	☐	… %	… €
Total	☐	☐		30€/ewe

• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)	☐	☐	20 %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		

Average increase in earning (per ewe, ha, etc.)	(€/…)	**20** €/ewe

- *Using wikiloc while grazing will help to benefit more from grassland because they will be able to communicate from the application. The only extra cost involving the purchase of a smartphone is very small, indeed most of the farmers have it nowadays. Because the **animals graze all the day they will need less concentrate and forage.***

- *Wikiloc application is a free tool which does not need any extra cost. This application has no negative impacts to the environment. **It has a positive impact on grazing efficiency and land.***



Aim:
improve grazing routes & share information

How to address…

EuroSheep
European Knowledge Exchange

Knowledge of nutrition requirements in different stages of development

9 solutions
4 factsheets
4 tips & tricks

Solutions proposed by EuroSheep

Solution name	Country
Rationing ewe lambs for good udder development	
Nutrition plan of ewe-lambs from weaning to mating	
Feeding the ewe	
BCS as a tool for nutritional requirements	

Solution name	Country
Gradual weaning protocol for lambs	
Managing ewe lamb replacements to lamb at 1 year	
Checking diet tool	
Effect of birth and rearing type on lamb performance	
Guidelines on post-weaning management	

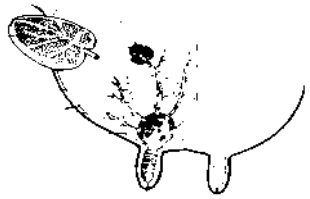
Factsheets

- Knowledge of nutrition requirements for fattening lambs - EuroSheep Network
- Feeding concentrate to lambs at pasture - EuroSheep Network
- Nutritional Requirements at Key Points in the Ewe's Production Cycle - EuroSheep Network
- In search of an ideal milk-replacer in small ruminants - EuroSheep Network

Tips & Tricks

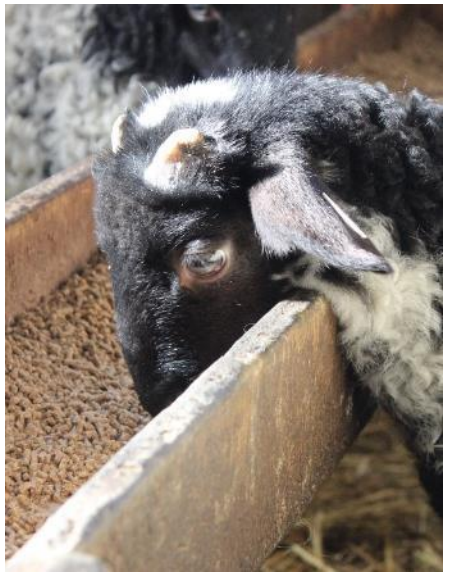
UK Tips & tricks - training hoggs to feed – YouTube
Spanish T&T_Ewe lamb access to the feeder – YouTube
Marquage des agneaux au nourrisseur_FR T&T – YouTube
Hungary Tips & Tricks - adding molasse to hay/straw - YouTube

Rationing ewe lambs for better udder development



- **Need/expectation addressed:** Knowledge of nutritional requirements in different stages of development, weaning transition management
- **Aim:** to adapt feed intake to the different growth stages of **animal tissues**, especially the udder

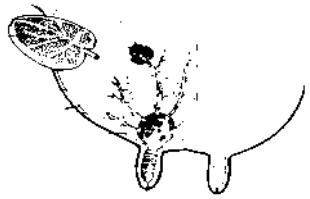
	Forage	Concentrates
Before 2 months	Free access to: good quality straw or low graminate hay	Free access to around 800 g/d
Between 2 and 3 months	Free access to: good quality hay	**Rationed at 600 g/d**



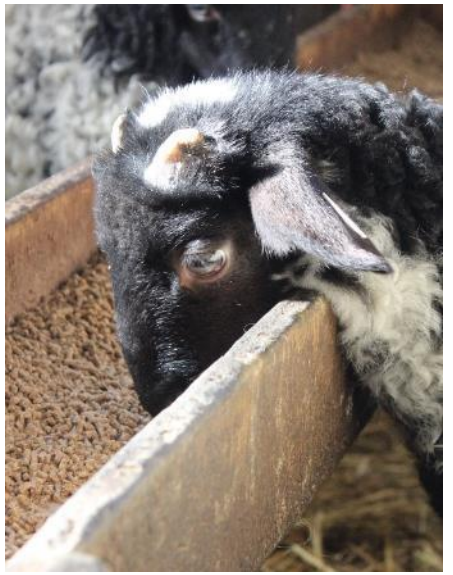
Mammary tissue start developing at 2 and 3 months of age: : if the DWG is too high, **adipose tissue** (fat) develops in the udder instead of secretory tissue!

Aim:
DWG < 170 g/d

Rationing ewe lambs for better udder development

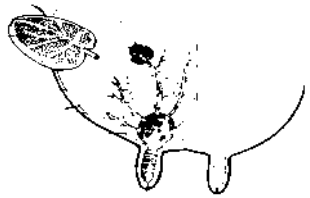


- **How to implement it:**
- Animals are weighed and sorted **depending on weight**
  - Progressive rationing and introducing a cereal
  - Quickly reach **600 g max**
- **Expected benefits:** by ensuring a good development of secretory tissue, ewes have a better milk level
- **Prerequisites and/or limits :** Knowledge of the animals' weight to make homogeneous batches, having a cereal available



Aim:
DWG < 170 g/d

Cost-benefit & sustainability analysis



• Additional Costs (in green, items related to environmental evaluation too)				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)[1]	☒	☐	… %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates[2]	☐	☒	… %	- 2 €/ewelamb
• Feeding : forages	☒	☐	… %	0.5-1 €/ewelamb
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify):	☐	☐	… %	… €
Total	☐	☒		- 1 €/ewelamb

• Additional Incomes				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☒	☐	… %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☒	☐		

- *By dividing ewe lambs into batches on their bodyweight, and rationing them on the concentrate level, they develop less fat tissue in the udder and more secretive tissue. On a career point of view, they **produce more and longer.** In the meantime, it allows to **save some concentrate,** the equivalent of 2 € per ewelamb in a 30 days period.*

- *By rationing concentrates and introducing cereals instead of a commercial feed, **feed self-sufficiency is improved.***
- *Udder is more efficient in producing milk and at the end the **animals efficiency is then also improved**.*

Nutrition plan of lambs from weaning to mating

Need/issue: Knowledge of nutrition requirements in different stages of development

Aim: to stimulate the growth and development of lambs for early entry into production

Description :

nutritional requirements of ewe-lambs are poorly known, hence mistakes can be made, with lasting effects on the lifetime performance of ewes. It Is of utmost importance to achieve target body weights at different ages and a weight at mating of at least 60-65% of the adult ewe weight.

To define the feeding plan, it is necessary to consider the way in which udder develops.

- phase 1 (1-3 months), the ewe's udder grows in line with its weight;
- phase 2 (before puberty, months 4-6) it grows more than its weight, with the formation of the mammary parenchyma and ducts (secretory tissue);
- phase 3 (months 7-9), where the growth is regulated by the estrous cycle

Aim:
growth and development of lambs

EuroSheep
European Knowledge Exchange

Nutrition plan of lambs from weaning to mating

- **How to implement:**

Phase	Age (months)	Phase duration (dd)	Target body weight (kg)	Average daily gain (g/day)	Feeding
1a	0-1.5	45	12	180-200	Colostrum/suckled milk + "weaning"concentrate (19-20% Crude protein (CP), 30-32% starch, 5-6 % Crude Fiber (CF), including whey and possibly a pre-probiotic) creep-fed ad libitum up to an intake of at least 200 g/day per lamb with the ewes milked thoroughly once a day from the beginning of the third week. It is thus possible to wean at 30-35 days.
1b	1.5-3	45	18-20	130-150	Shift from "weaning" to "growth" concentrate (17% CP, 33-35% starch, 7-8% CF) up to a maximum of 30-35 g/kg live weight + good quality hay ad libitum
2	4-6	90	22-24	40-60	200 g/day of "Breeding" concentrate (15-16% CP, 27-29% starch, 9-11% CF) + hay ad libitum + rationed grazing.*
3	7-9 (mating)	90	32-35	100-120	300-400 g/day of "Breeding" concentrate + hay ad libitum grazing** Possible flushing of underweight lambs

- **Expected benefits:** Early entry into production, higher milk production at first lactation , healthier animals
- **Prerequisites/limits:** Weighing at target ages

Aim: growth and development of lambs

EuroSheep
European Knowledge Exchange

Cost-benefit & sustainability analysis

• Additional Costs				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐		
• Labour (man-hours)	☒	☐	2%	140
• Equipment/materials (e.g. weigh , formalin etc.)	☒	☐		200 [1]
• Feeding : concentrates	☐	☐		0 [2]
• Feeding : forages	☐	☐		
• Electricity	☐	☐		
• Water (water, troughs, piping etc.)	☐	☐		
• Seed	☐	☐		
• Fertilizer	☐	☐		
• Sprays (herbicides, pesticides etc.)	☐	☐		
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐		
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐		
• Technical advise	☐	☐		
• Vet services	☐	☐		
• Lab services	☐	☐		
• Other external services	☐	☐		
• Others (specify):	☐	☐		
Total	☐	☐		
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)	☒	☐	5%	3,800 € [3]
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐		
• Farm schemes and direct payments	☐	☐		
Others (specify): ……	☐	☐		
Total	☐	☐		
Average increase in earning per ewe			(€/ewe)	**10 €**

- *Adopting a nutrition plan for lambs from weaning to mating according to the needs involves an **increase in labour and equipment and materials** costs. On the other hand, it allows for an **increase in income** due to an increase in milk production and the sale of more lambs.*

- *A **positive impact on the environment** is expected from the increase in the fertility and productivity of the flock.*
- *Better animal conditions due to greater homogeneity in groups are also expected to **decrease inter-individual competition for feeding improving animal welfare.***

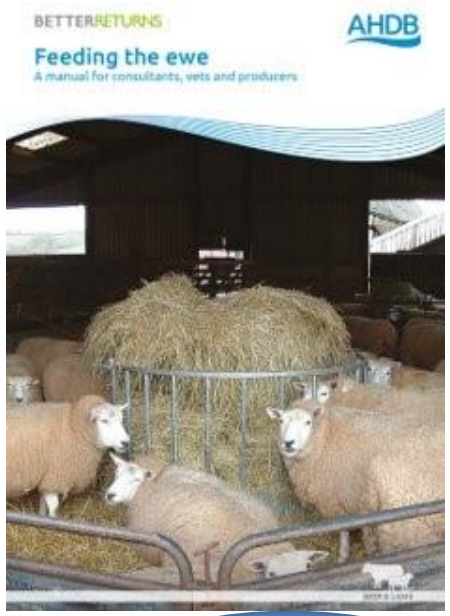
“Feeding the ewe” - feed planning

Need/issue: Knowledge of nutrition requirement (ewe)

Aim : Identify nutritional requirements of the ewe throughout her production cycle

Description :

This solution presents are series of resources available in the UK which set out the ewe nutritional requirements, simplifying feed planning.



Aim:
Feed planning throughout the year

“Feeding the ewe” - feed planning

- **How to implement:**
- “Feeding the Ewe” by AHDB provides nutritional guidance on key periods in the ewe’s production cycle:
  - Weaning – mating
  - Mating – end of third month of pregnancy
  - Final two months of pregnancy
  - Feeding period lambing- weaning (lactation)
  - Replacement ewe nutrition
- Quality Meat Scotland (QMS) produced a ewe nutrition timeline designed for farmers
- Feedbyte® is the only rationing tool available in the UK that offers a sheep package and it is charged on an annual licence fee.

- **Expected benefits:**
- Improved planning and predictions based on science
- **Prerequisites/limits:**
- Feeding the ewe provides a lot of information but may not be particularly farmer friendly. Feedbyte Rationing software is not free to use and training would be required.

Aim:
Feed planning throughout the year

Cost-benefit & sustainability analysis

• Additional Costs				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☒	☐	… %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	€350 -1200
• Feeding : concentrates	☐	☒	17%	… €
• Feeding : forages	☒		20 %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☒	☐	… %	… €
• Lab services	☒	☐	… %	€20-25
• Other external services	☐	☐	… %	… €
• Others (specify): …….	☐	☐	… %	… €
Total	☐	☐		

• Additional Incomes				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)	☒	☐	10 %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	… €

- ***Better use of feeds and efficiency****, and* ***better outcome*** *from the animal, by helping the farmer feeding their animals based on their requirements.*
- *No waste and better outcome for the animals.*

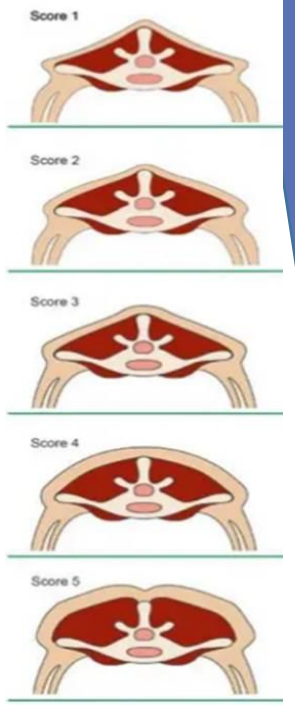
- *No impact on fuel, electricity or water consumption, but allows for a* ***better grazing management*** *and feeding of the animals, with a* ***lower reliance on bought-in concentrates****.*
- *In turn, the* ***output from the animal is potentially increasing*** *by 10%, due to a better feed management.*

- *The solution does not have a major impact on the global environment, apart for perhaps a reduction in disposal of plastic, as less plastic bags of concentrates are needed, since the guidelines focus on using silage and grazing instead of concentrates.*

BCS as a tool for nutrition requirement of ewes

Need/issue: Knowledge of nutrition requirement (ewe)

- **Aim :** To provide a practical and applicable tool for farmers who have issues on nutrition requirement of their flock



Description :

- ✓ Body condition scoring (BCS) of sheep is a management tool that farmers can use to aid on-farm decision-making and optimize animal performance.
- ✓ BCS provides a subjective assessment of the fat and muscle of the lumbar spine.
- ✓ It can be assessed quickly by palpating both the spinous and transverse processes of the lumbar vertebrae and is evaluated a five-point scale ranging from 1 to 5.
- ✓ BCS has advantages over the assessment of the nutritional status of the flock.

Aim:
provide a practical tool for nutrition requirement

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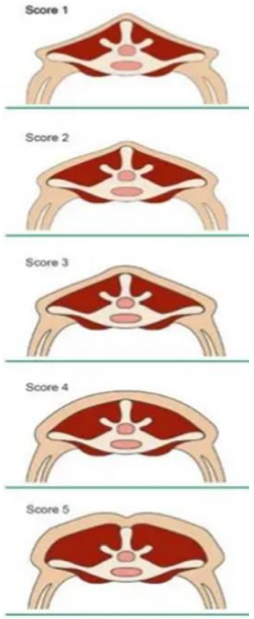
BCS as a tool for nutrition requirement of ewes

- **How to implement:** Does not require any equipment. Hand over the spine and the loin area between the last rib and the hip bones of the ewe. Feel for fat covering the 'spinous processes' (the part of the spine that points upwards) and the 'transverse processes' (the bony protrusions from either side of each vertebra). The more prominent the bone feels, the lower the body condition. Score them accordingly from 1-5.



- **Expected benefits:**
  - Far better performance of the flock
  - Better nutrition and feed management

- **Prerequisites/limits :**
  - Wooliness of the ewe is an important variation to remember
  - Farmers require training for BCS
  - The same person should measure every ewe which would provide consistency in the result

Aim:
provide a practical tool for nutrition requirement

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Cost-benefit & sustainability analysis

• Additional Costs				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☒	☐	5 %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☒	15 %	… €
• Vet services	☐	☒	10 %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): ……..	☐	☐	… %	… €
Total	☐	☐		

• Additional Incomes				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)	☒	☐	25 %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		

Average increase in earning (per ewe, ha, etc.)	(€/…)	**25** €/ewe

- *BCS tool allows farmer to classify animals according to their conditions which will **improve the productivity**. BSC application **may increase the labour** however its benefits are far beyond this labour cost. Because animals will be under better health and body conditions the **vet services cost will decrease.***

- *BCS tool will help to **increase feed and grazing efficiency** with better classification of animals according to their physical stages.*
- *Better animals will **improve farmers social acceptance** and **animal welfare**.*

Gradual weaning protocol for lambs

Need/issue: Weaning transition management (Replacement)

- **Aim :** To provide a guide for farmers on creep feeding that eases the weaning stress on lambs

Description :

✓ Weaning is one of the most stressful procedures for all lambs not only in terms of the ewe-lamb relationship but also because of its potential effect on the health of lamb. Creep feeding is a means of providing extra nutrients (usually grain) to nursing lambs Lambs gain access through a “creep” – an opening in the fence or gate that is large enough for the lambs to get through, but too small for the ewes to enter. Bodyweight is more critical than weaning age on lamb growth, and the success of early weaning must depend partly upon the speed with which the rumen development in lambs.

Aim:
To decrease the weaning stress

Gradual weaning protocol for lambs

- **How to implement:** Feed palatable feeds with small particle size: soybean meal, cracked or ground corn. Include a coccidiostat. 200-250 g of creep feed per head per day from 15 days of age to weaning is suggested. Partially sucling during creep feeding is necessary. Diets should be formulated to contain 18-20% crude protein. Provide clean, fresh water and good quality hay.

- **Expected benefits:**
  - Beneficial to lambs managed an intensive system in which early weaning is practiced.
  - It is more efficient to feed the lamb directly than to feed the ewe to produce more milk.Weaning stress may reduced
  - Stimulates rumen development.

- **Prerequisites/limits :**
  - May not be cost-effective in all situations.
  - Farmer needs to pay more attention and spend more time in the sheep barn to observe feed transition period

Aim:
Deacrese weaning stress

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Targets for lambing at 1 year of age

Background

- Replacements are a major cost for lamb production systems
  - equivalent to 25% of the lifetime value of lamb carcass output
- Lambing at 1 year of age
  - reduces replacement costs
  - increases lifetime productivity
- Lambing at 1 year has no effect on ewe productivity at 2 years of age

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Targets for lambing at 1 year of age

How to implement

- Target greater than 60% mature body weight when joining at 8 months
  - as weight at joining increases, the probability of rearing at least one lamb improves
- Use the “ram effect” to
  - induce ewes to start cycling
  - ensure all ewes exhibit overt oestrus during the first 17 days of the joining period

Nutrition during pregnancy

- Meet requirements for pregnancy and body gain to reach mature body weight
- Each 5 kg increase in adolescent ewe weight at lambing increases lamb
  - birth weight by 0.25 kg
  - daily growth rate by 10 g

Expected benefits:

- Improve lifetime ewe productivity
- Have more experience when lambing as 2-tooths

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European Knowledge Exchange

Cost-benefit & sustainability analysis

• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)[1]	☒	☐	4%	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates[2]	☒	☐	20 %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)[3]	☒	☐	5%	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): ……..	☐	☐	… %	… €
Total	☐	☐		

• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)[4]	☒	☐	15 %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	**… €**

- *Lambing at one year of age requires **additional inputs** (feed, medicine and labour) to meet pregnancy and growth requirements of the replacements and their lambs. This results in an increase in ewe lifetime performance, while maintaining growth targets for joining to lamb at two years of age.*
- *Lambing ewes at one year of age **improves feed and grazing efficiency** as the ewes are rearing more lambs during their lifetime. **Greenhouse gas emissions per kg of carcass is reduced** due to improved animal performance/output.*
- *Lambing at one year of age **increases flock output at a low cost and improves farmer image.***

Checking Diet Tool

Need/issue: Knowledge of nutrition requirements

- **Aim :** to provide advisors and even farmers with a tool to check a ration and to correct it if required.

- **Description and how to implement:**

  Excel Tool: basic ration program that calculates the requirements of sheep and goats in different production status and levels. It provides data regarding the nutritional value of more than 100 feedstuffs. It uses the equations to assess the nutritional requirements from the Spanish system (FEDNA), INRA and ARC. Very easy and intuitive to use. It also contains some complementary commercial food products such as glycogenic and ketogenic nutrients, Rapid Fermentable Carbohydrates, Rumen Health parameters (Acid Load, Rumia Index), which can be useful to reach nutritional objectives.

Aim:
check a ration and correct if required

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Checking Diet Tool

- **How to implement:**

A (free) file must be downloaded in the computer, and then it can be used.

- **Expected benefits:**

- Improve the current diet of animals
- Simulations of rations or compound feed composition
- Possibility to advice farmers regarding diets.
- Healthier flock and higher animal performances.

- **Prerequisites/limits :**

  - Windows 10 and Excel 2016
  - Farmer training
  - Videos available explaining how to use the tool

Aim:
check a ration and correct if required

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Effect of birth and rearing type on lamb performance

- Birth type (e.g. single, twin, triplet) and rearing type (how many lambs are reared by a ewe) effect individual lamb performance
- As mean flock litter size increases, the incidence of triplets increase

Effect of birth and rearing type on lamb performance

Table 1. Effect of birth type and rearing type on lamb performance

	Birth type					
	Single	Twin		Triplet		
Rearing type	1	1	2	1	2	3
Birth weight (kg)	5.6	4.5			3.7	
Gain 0-14 wks (g/d)	350	314	282	300	273	278
Weaning weight (kg)	38.0	34.0	31.2	32.5	29.9	31.0*

*offered 300g creep/lamb/day

Expected benefits:

- Target growth rates from birth to weaning for lambs born and reared as singles are 330g/d, twins are 270g/d and triplets (with creep) are 280 g/d

- Single lambs are ~7 kg heavier at weaning than lambs born/reared as twins
- Lambs born as twins and reared as singles are ~4 kg heavier at weaning than lambs born/reared as twins due to
  - -birth weight
  - -available milk supply per lamb
- Lambs born and reared as triplets
  - - lighter at birth
  - - higher daily gain to weaning
  - - similar weight at weaning due to being supplemented meal

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Cost-benefit & sustainability analysis

• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☐	☐	… %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): ……..	☐	☐	… %	… €
Total	☐	☐		
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)[1]	☒	☐	2%	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	**… €**

- *Nutritional management according to birth and rearing type **improves feed efficiency and animal performance**.*
- *Optimal nutritional management according to birth and rearing type **improves feed and grazing efficiency** as the animals have an improved growth rate and are slaughtered at a younger age. **Greenhouse gas emissions per kg of carcass is reduced** due to improved animal performance.*
- *Management according to birth and rearing type **improves animal welfare and creates a better work environment.***

Guidelines on milk/grass transition

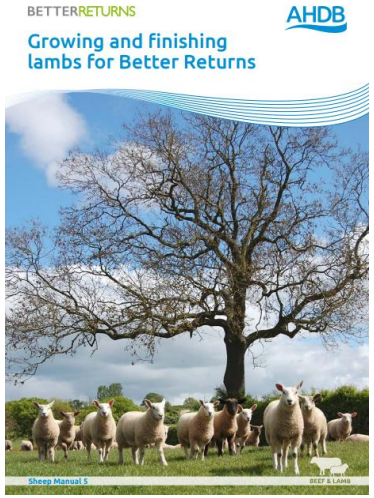
Need/issue: Post weaning management: adaptation to new feeding regime (lamb)
Aim : planning and management of lamb feeding regime to ensure adequate transition between milk and grass, so that they continue to achieve target live weight gains after weaning.

Description :

- This solution includes a booklet from AHDB “Growing and Finishing lambs for better returns” and multiple advice articles from SAC’s Sheep and Beef News and the Farm Advisory service.

Aim: Successful Post weaning management

Guidelines on milk/grass transition



- **How to implement:**
- Solutions contain information around weaning including:
  - When to wean and decision making tools depending on system and target market
  - Creeping feeding and potential beneifts – system dependant
  - Managing stress around weaning – removing the ewes and keeping lambs on familiar fields, introducing novel feeds before weaning and any treatments eg. vaccines or wormers should be given before weaning

- **Expected benefits:** Improved lamb performance and high live weight gains. Reduction in weaning check during this period of transition.

- **Prerequisites/limits :**
  - Advice on weaning will depend on individual's situation/ climatic factors but the principles can still be applied on managing transition.

Aim: Successful Post weaning management

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Cost-benefit & sustainability analysis

• **Additional Costs (in green, items related to environmental evaluation too)**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☒	☐	100 %	72 €[1]
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages	☐	☐	… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify):	☐	☐	… %	… €
Total	☒	☐		72 €
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☒	☐	2 %	1700 €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		**1710 €**
Average increase in earning (per ewe, ha, etc.)			(€/…)	**17.1**€/ewe 82 £/ha[2]

- *For Scottish grass-based farms the benefit of good weaning management is **that lambs are sold sooner**, and this means there is **more grass available for the breeding ewe flock** in the lead up to mating. This can be capitalised on with **greater ewe condition, greater stocking capacity on the farm or less feeding required in the Autumn and Winter.** This analysis worked on the assumption that the greater ewe condition will result in a 2% greater rearing percentage worth £1,710 for the benchmark farm.*

- *By **reducing stress and managing weaning well**, the farmer is **maximising the feed efficiency of the lambs** at grass which reduces the need to potentially feed them later in life when their feed efficiency is poorer. In addition, by increasing the output per ewe, **the greenhouse gas emissions per kilogram of lamb are reduced** because the ewe's methane emissions are divided by more kilograms of lamb output.*

- ***Reducing stress at weaning** benefits the welfare of the lambs.*

How to address…

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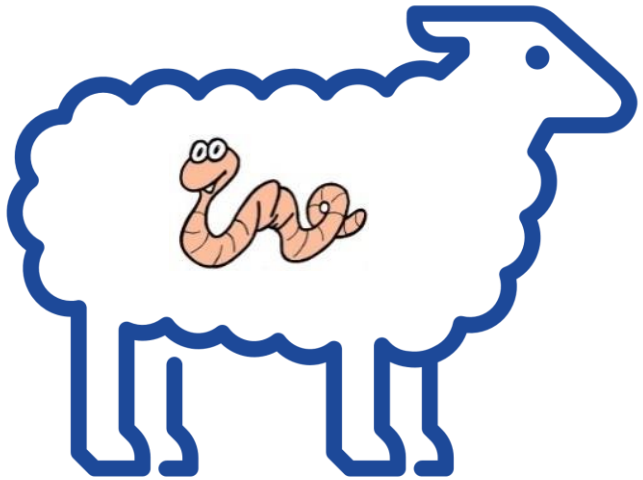
Internal parasitism

8 solutions
1 factsheet
4 tips & tricks



Solutions proposed by EuroSheep

Solution name	Country
Mixed grazing of cattle and sheep to limit parasite infestation	
Coprology control after antiparasite treatment	
Treatments and protection against internal parasitism	
Nematodirus control - forecast and anthelmintic use	

Solution name	Country
Reducing anthelmintic resistance	
The FAMACHA score assessment	
SCOPS forecast for nematodirus (website)	
Use of Targeted Selected Treatment (TST) for ewe lambs	

Factsheet

Genetics of gastrointestinal nematodes resistance - EuroSheep Network

Tips & Tricks

UK Tips & tricks - aide-memoire for withdrawal dates – YouTube

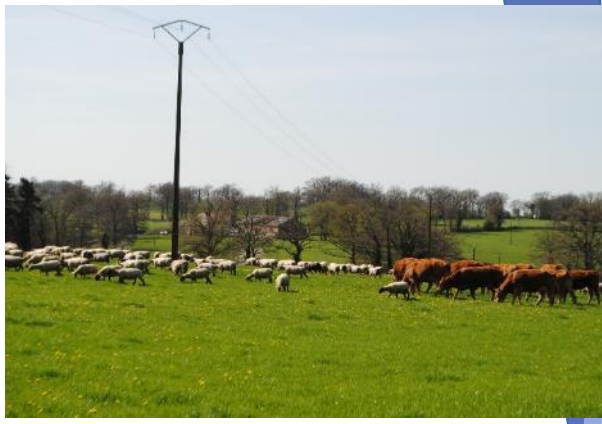
UK Tips & tricks - dosing gun holder – YouTube

French T&T_sheep skate – YouTube

Turkish T&T_Pill swallowing probe - YouTube

Mixed grazing for cattle & sheep as a solution to limit parasite infestation

Need/expectation addressed: Internal parasitism - **gastrointestinal stronylosis**



Aim:

- to propose mixed grazing of cattle and sheep to limit parasite infestation
- **To reduce** the risk of parasites and the number of **parasite treatments** required during a production cycle
- Cattle and small ruminants do not share the same type of strongylosis
- By using the same plots, bovines **proceed to "clear"** sheep from being infested by parasites, with the opposite being possible too.

Two methods of applying mixed sheep-cattle grazing:

- Through rotation of sheep flocks and cattle herds on the same plot or through simultaneous mixed grazing of both species.
- For cleaning to be beneficial on both sides, a ratio in LU close to the parity is required. Ideal ratio = one fully grown cow for 5 to 6 ewes

Inter-species synergy

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Mixed grazing for cattle & sheep as a solution to limit parasite infestation

- **How to implement it:**
  - Mixed or rotational grazing requires thought on **livestock management**, approriate **fencing** for both systems…

- **Expected benefits**
  - Decrease in egg excretion often exceed 50% and sometimes as high as 75%
  - mostly seen on ***Haemonchus contortus***
  - better growth of lambs and of replacement ewe lambs
  - The positive effect of mixed grazing is not as apparent on cattle

- **Prerequisites and/or limits:**
  - Two productions, sheep and cattle, on the same farm.
  - Fencing adapted to both productions.

Inter-species synergy

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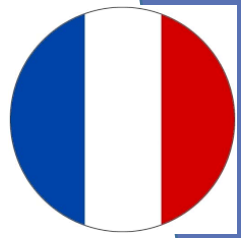
Cost-benefit & sustainability analysis



• **Additional Costs (in green, items related to environmental evaluation too)**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☐	☐	… %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.) [1]	☒	☐	10 %	0.25 €/ewe/y
• Feeding : concentrates [2]	☐	☒	-15 %	-4€ / ewe/y
• Feeding : forages	☐	☐	… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations) [3]	☐	☒	-15 %	- 0,1 €/ewe
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify):	☐	☐	… %	… €
Total	☐	☒		- 4,25 €/ewe
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool) [4]	☒	☐	3 %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	… €

- *All the fences need on be adapted to the sheep. To implement it, it can **require installing new fences**. With the amortisation, we estimate an **additional cost of 0.25€ per ewe and per year.***
- *On the other hand, less lambs will be finished inside, which will allow to **reduce the concentrates consumption by 10kg or 4€ per ewe and per year.** A reduction of anthelmintic treatment will allow a saving of 0.1€ per ewe.*

- *With a better feed efficiency, and a reduction of manure produced, because lambs can be finished outside, we estimated this solution **reduces the GHG emissions per kg carcass by 13% regarding a specialised system**.*
- *A reduction of the use of anthelmintic will have a **positive impact on the soils and the biodiversity.***

- *Regarding the **social impacts**, this solution can improve the **welfare of the flock**, improving the health of the animals. And with less animals inside, it will **improve the image of the farm and the work environment.***

Performing a coproscopic analysis after an antiparasite treatment

- **Need/expectation addressed:** Internal parasitism - **gastrointestinal stronylosis**
- **Aim:** To detect gastrointestinal strongyles resistance to pest control treatments on farms
  - Day 0: two groups of 10 animals are identified within the same lot (ewe lambs, young ovines, ewes). The first group will act as a control group. These animals won't be given any treatment. The second group will be given a treatment
  - 14 days post-treatment (day 14): both groups' faeces are collected and sent to a lab
  - A pooled sampled coproscopic analysis is conducted for both groups at the lab
  - Results

Know in order to adapt

Performing a coproscopic analysis after an antiparasite treatment

- **How to implement it:**
- Equipment: single use gloves, plastic bags/jars, a drug containing the active substance to test
- **Expected benefits:**
  - Quick learning of how **efficient** a **pest control molecule will be on a farm**
  - **Adapting** the pest control strategy**:**
  - reasonably using a molecule proved to be efficient
  - changing the chemical family if the first one proved to be inefficient.
- **Prerequisites and/or limits:**
  - Requires the use of a laboratory or veterinarian
  - Respect deadlines: efficiency control has to be carried out on the 13th, 14th or 15th (at the latest) .
  - Cost: 12-15€/analysis (per group). The laboratory will charge 30€.

Know in order to adapt

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Cost-benefit & sustainability analysis

• **Additional Costs (in green, items related to environmental evaluation too)**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours) [1]	☒	☐	1,5 %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.) [2]	☒	☐	… %	2 € / analysis
• Feeding : concentrates [3]	☐	☒	… %	… €
• Feeding : forages	☐	☐	… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations) [4]	☐	☒	… %	-1 €/ ewe
• Technical advise	☐	☐	… %	… €
• Vet services [5]	☒	☐	… %	200 €
• Lab services [6]	☒	☐	… %	60 €
• Other external services	☐	☐	… %	… €
• Others (specify):	☐	☐	… %	… €
Total	☐	☐		
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☐	☐	… %	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.) [7]	☒	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	€

- *The main objective of this solution is to have **a better knowledge of the efficiency of a medicine on the pathogens** you encounter in your farm and especially, to **identify any resistance** to the products usually used.*
- *The **additional costs** identified are : 10h labour to collect the samples and discuss the results, 2€ of plastic bags or gloves, 200€ for the visit of the vet and 60€ for the analysis (4 analysis, 15€ each).*
- *To have a **better knowledge** of the products which are efficient will allow to have a **better health management** so a better quality of the products, a better feed efficiency and a reduction of treatment.*
- *A **better feed efficiency** will improve the global environmental impact and **reduce the level of GHG per product unit**. A reduction of medicines used will allow a reduction of the discharges on the soil and **reduce the impacts on the soil biodiversity***
- *Regarding the social indicators, this solution will allow a **better animal welfare with an improvement of the health level of the flock** and a **better image of the farm** with the reduction of the chemical products used.*

Nematodiris control - forecast and anthelmintic use

Background: primarily effects lambs 6 to 12 weeks of age

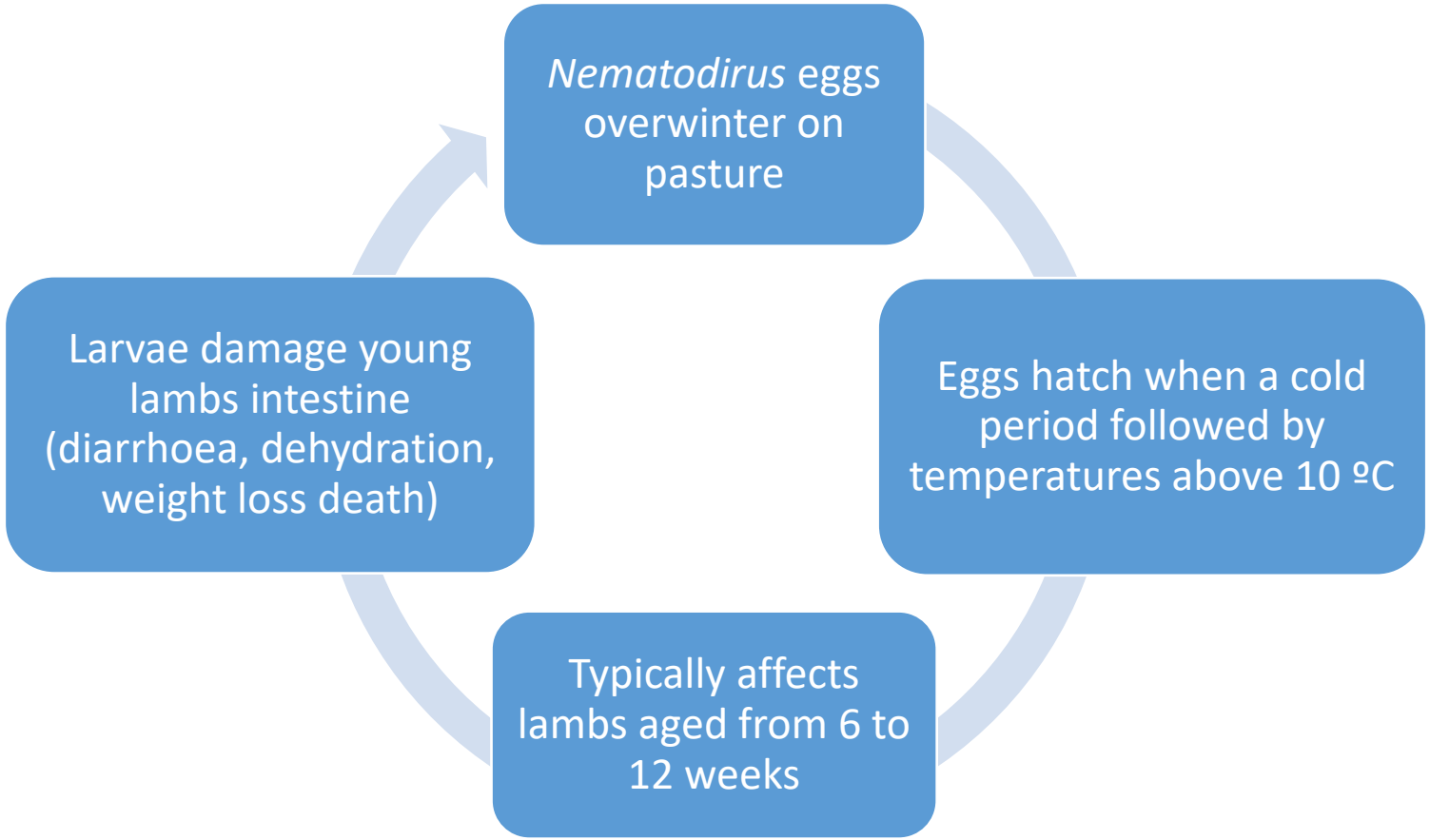

Figure 1. *Nematodirus* lifecycle

Nematodiris control - forecast and anthelmintic use

How to implement:

- Determine treatment from
  - DAFM forecast
  - clinical signs
  - farm risk
- Clinical signs include
  - diarrhoea, dehydration, wasting
  - lambs may stop eating so the diarrhoea may only consist of slimy mucus
  - dehydrated lambs may congregate around watering troughs

Treatment

- treat with a benzimidazole based product to preserve the efficacy of other drenches later in the season
- no residual activity against *Nematodirus* so a second treatment may be necessary
- if possible try not to have lambs on high risk pasture

Expected benefits:

- Correct timing of treatment will positively affect lamb performance
- Use benzimidazole products to prevent anthelmintic resistance on farms

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Reducing Anthelmintic Resistance(AR)

Background

- Internal parasites major cost to industry - losses in productivity
  - cost of control measures
- Anthelmintic resistance - ability of stomach worms to survive a worm treatment
  - becoming a problem on many sheep farms
- Need to know - if products are effective on your farm
  - management changes required to reduce AR

How to determine AR on farms

- Faecal egg count reduction test (FECRT)
  - dung sampling prior to and post dosing
  - AR is suspected if <95% reduction in FEC

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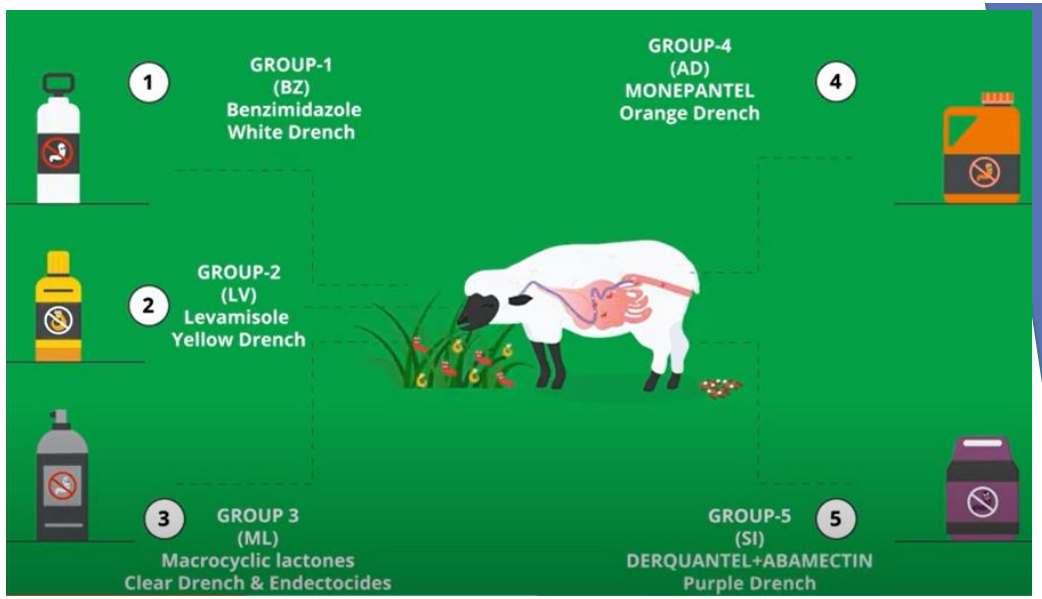
Reducing Anthelmintic Resistance

1. Don’t dose adult ewes unless demonstrated need
2. Use group 1-Benzimidazole to treat *Nematodirus*
3. Quarantine drench sheep on arrival to farm
4. Drench test/faecal egg count



Expected benefits:

- Prolong the efficacy of anthelminthic products
- Increase flock performance and profitability

Cost-benefit & sustainability analysis

• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)	☐	☐	…%	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)[1,2]	☐	☒	<2%	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services[3]	☒	☐	100%	… €
• Other external services	☐	☐	… %	… €
• Others (specify): ……..	☐	☐	… %	… €
Total	☐	☐		
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)[4]	☒	☐	5%+	… €
• Quality bonus (carcass conformation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(€/…)	**… €**

- *Reducing anthelmintic resistance on farm **improves animal performance and reduces the amount and type of anthelmintics required.** If anthelmintic resistance develops, anthelmintic costs will substantially increase due to need for group 4 and 5 wormers (orange/amino-acetonitrile derivatives and purple/spiroindoles).*

- *Reducing anthelmintic resistance **improves feed and grazing efficiency** as the animals have an improved growth rate and are slaughtered at a younger age. **Greenhouse gas emissions per kg of carcass is reduced** due to improved animal performance.*

- *A reduction in anthelmintic resistance **improves animal welfare,** creates a better work environment and **reduces physical labour,** all of which has a positive effect on farmer image.*

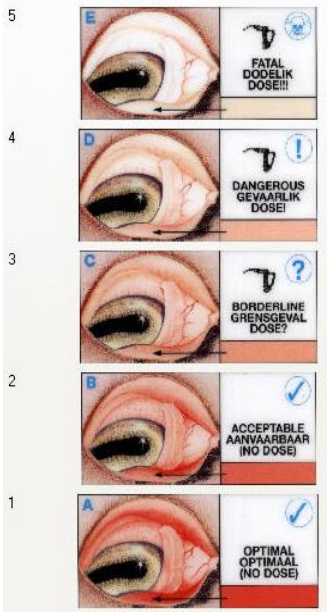
The FAMACHA score assessment

Need/issue: Internal parasitism (ewe/replacement)

- **Aim :** to treat animals towards more efficient parasite control with reduced antibiotic and anthelmintic use

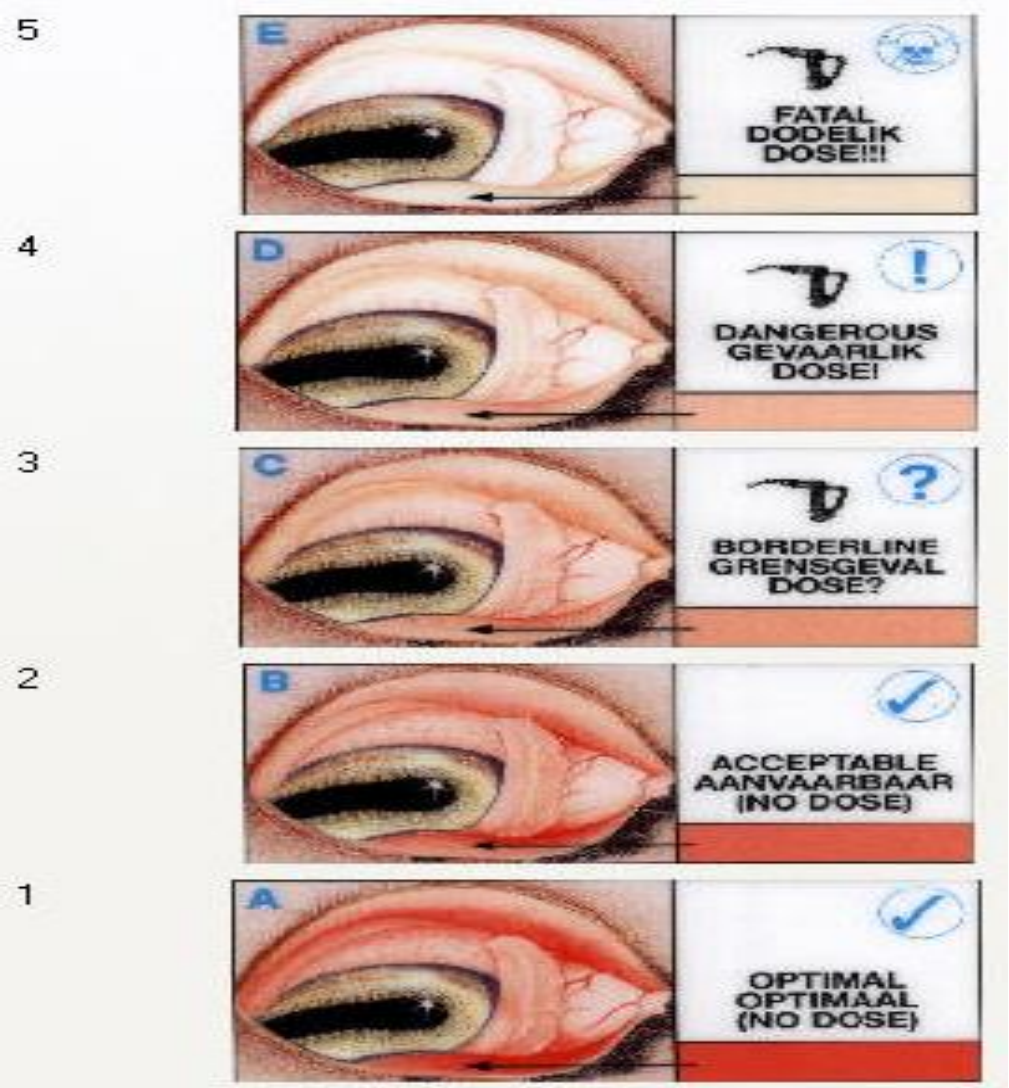
Description :

- ✓ Targeted selective treatments (TST) have been recently proposed to reduce anthelmintic usage and help to maintain populations in refugia.
- ✓ By far the best-known example of a TST indicator is the FAMACHA.
- ✓ The FAMACHA aimed to facilitate the clinical identification of sheep infected with worm for example H. contortus by comparing the colour of the ocular conjunctival mucosae with a colour card.
- ✓ It is a simple procedure to get an approximation of the parasite load sheep are carrying.



Aim:
simple procedure of the parasite load

The FAMACHA score assessment



- **How to implement:** The colour of ocular mucous membranes was classified into one of five categories according to the FAMACHA eye colour chart;

1 (A) = red, non-anemic;

2 (B) = red-pink, non-anemic;

3 (C) = pink, mildly anemic;

4 (D) = pink-white, anemic;

5 (E)= white, severely anemic.

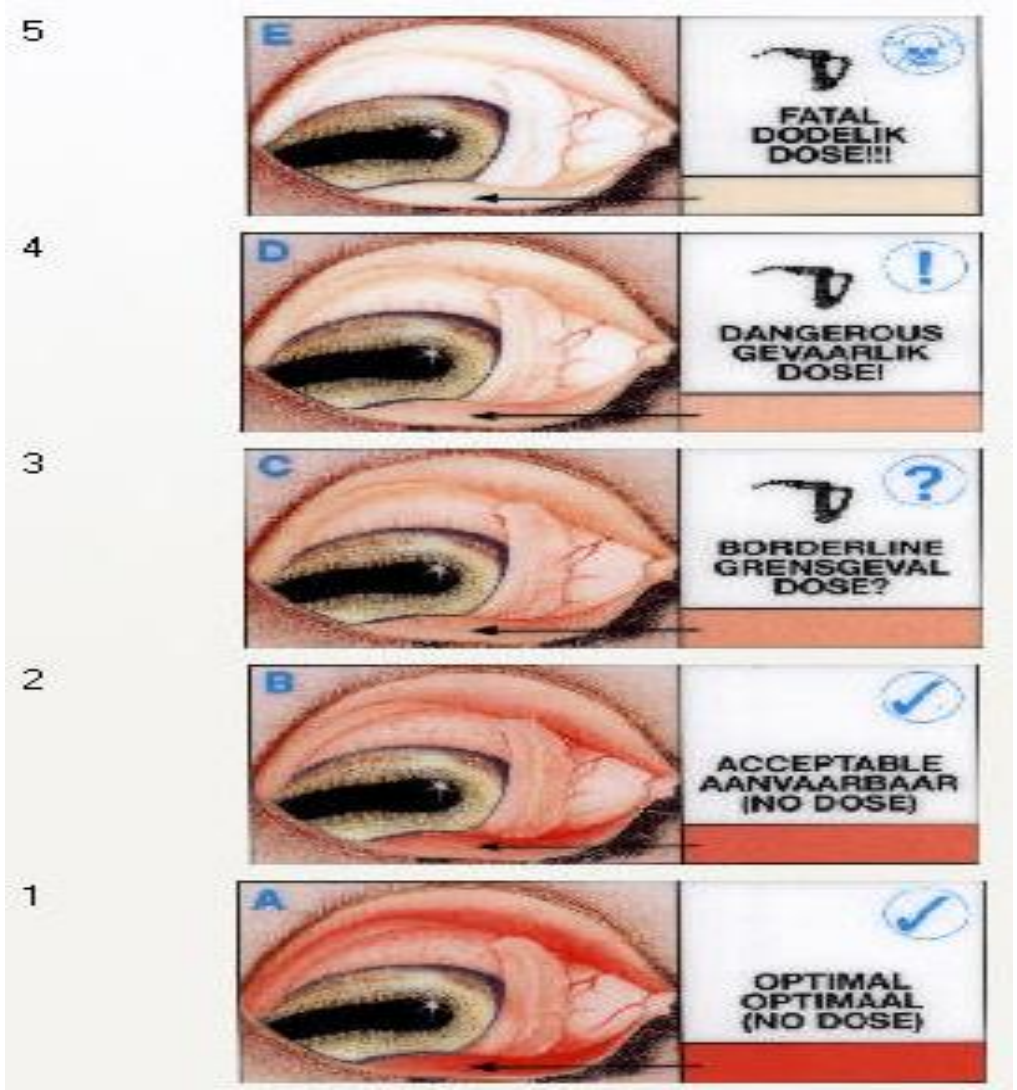
Aim:
simple procedure of the parasite load

The FAMACHA score assessment

INSTRUCTIONS FOR USE

1. Examination

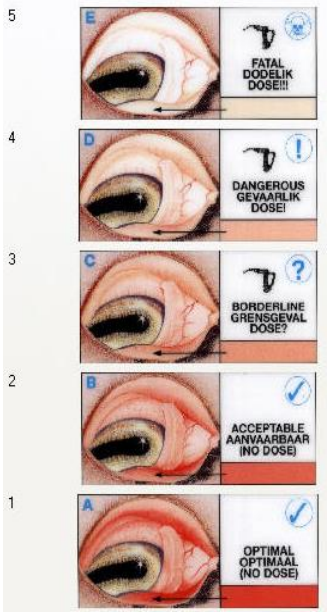
- Examine sheep in good, natural light
- Open the eyelid as shown in the sketch
- Push the upper eyelid down with the upper thumb, while the lower thumb gently pulls the lower lid downward
- Look especially at the colour inside the lower eyelid
- Open the eyelid for a short time only, or else the mucous membrane may become redder
- Compare the colours seen to those on the reverse side of this card
- Score the sheep A to E and proceed as explained in the pamphlet
- If in doubt, score the sheep at the lower (paler) category
- Examine weekly and no less than every 2 weeks



The FAMACHA score assessment

- **Expected benefits:**
  - Internal parasite status in the flock can be detected by farmers in a simple, quick and inexpensive way

- **Prerequisites/limits :**
  - only properly trained persons should use this card
  - read the full information pamphlet carefully before using the guide
  - use this guide for the only sheep
  - this chart is an aid in the control of wireworm only
  - paleness or reddening of eyes may have other causes,
  - The FAMACHA-test, not the only tool used to decide to deworm, maintain standard worm control measurements such as the FEC would be necessary
  - It may not be sufficient in detecting all sheep infected

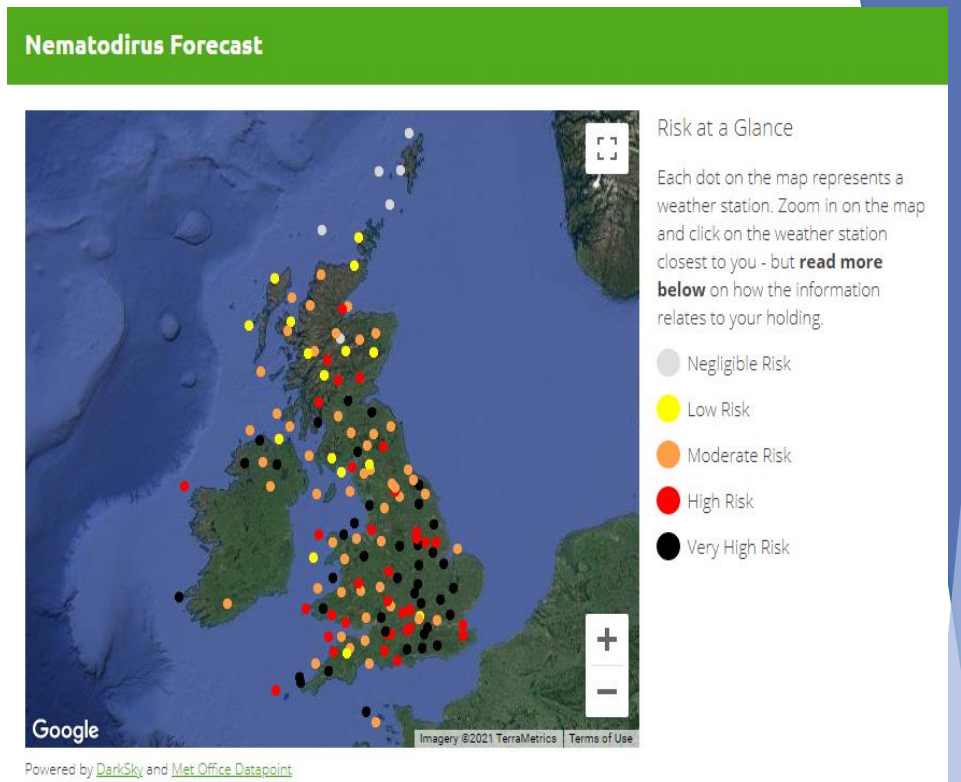


Aim:
simple procedure of the parasite load

SCOPs information including the nematodirus forecast

Need/issue: Other internal parasitism (lambs)

Aim : To provide solutions for **early detection and treatment** of nematodirus



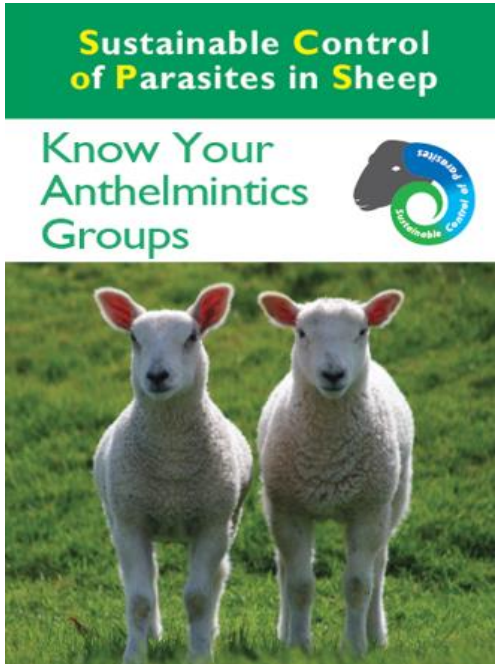
Description :

- SCOPs (Sustainable Control of Parasites) **webpage** contains a range of tools and information associated with the detection, control and treatment of various internal and external parasites.
- **Tools** of particular interest
  - Nematodirus forecast (UK based)
  - “Know your anthelmintics” publication

SCOPS | Sustainable Control of Parasites in Sheep

Aim:
Early detection of nematodirus

SCOPs information including the nematodirus forecast



- **How to implement:**
  - Assess risk of nematodirus using the local weather forecast data and other information in conjunction with the grazing history of your farm.
  - If treatment is required consult “Know your anthelmintics” guide and other literature available on the webpage.
- **Expected benefits:**
  - Identifying when different groups of lambs are at risk
  - Prediction of nematodirus hatch date -> appropriate action can be taken on farm.
- **Prerequisites/limits :**
  - Only UK forecast (potential adaptation?)
  - Access to local weather data.
  - Knowledge of grazing history.
  - Farmers should be aware of how to administer treatment effectively.
  - Good handling facilities.

Aim:
Early detection of nematodirus

Use of Targeted Selective Treatment (TST) for ewe lambs

Need/issue: Internal parasitism (ewe & replacements)

Aim : To **reduce resistance** to anthelmintic products

Description :

- The TST approach relies on treating only the animals that need anthelmintic treatment
- An algorithm **("Happy Factor")** calculates the **individual animal target weight** every month, based on its previous weight and the amount of grass available to eat during that period.
- The treatment of animal is based on the animal reaching its individual target weight or not:
    - If actual > target weight -> no treatment
    - If actual < target weight -> treatment

Aim: Reducing anthelmintic use by 40%

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Use of Targeted Selective Treatment (TST) for ewe lambs

- **How to implement:**
  - Measure grass biomass 2 weeks before TST treatment
  - Send lambs weights collected at previous event
  - Calculate target weight for each lamb
  - Upload on Trutest
- **Expected benefits:** **reduce** anthelmintic use & labour **by 40%** without compromising growth
- **Prerequisites/limits :**
  - You must weigh your lambs & measure grass regularly
  - Handling system with an **EID weigh crate**
  - Access to the **Happy Factor algorithm**

Aim: Reducing anthelmintic use by 40%

Cost-benefit & sustainability analysis

• **Additional Costs (in green, items related to environmental evaluation too)**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	0 %	0 €
• Labour (man-hours)	☐	☒	21 %	-0.08 €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☒	☐	100 % (if you need to buy an EID crate)	5000 €
• Feeding : concentrates	☐	☐	0 %	0 €
• Feeding : forages	☐	☐	0 %	0 €
• Electricity	☒	☐	1-2 %	10-20 €
• Water (water, troughs, piping etc.)	☐	☐	0 %	0 €
• Seed	☐	☐	0 %	0 €
• Fertilizer	☐	☐	0 %	0 €
• Sprays (herbicides, pesticides etc.)	☐	☐	0 %	0€
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	0 %	0 €
• Medicine (antibiotics, anthelmintics, vaccinations)	☐	☒	56 %	-1.80 €
• Technical advice	☐	☐	0 %	0 €
• Vet services	☐	☐	0 %	0 €
• Lab services	☐	☐	0 %	0 €
• Other external services	☐	☐	0 %	0 €
• Others (specify):	☐	☐	0 %	0 €
Total	☐	☒	**38%**	
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☐	☐	0 %	0 €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	0 %	0 €
• Farm schemes and direct payments	☐	☐	0 %	0 €
Others (specify):	☐	☐	0 %	0 €
Total	☐	☐		
Average increase in earning (per ewe, ha, etc.)			(+1.88 €/lamb)	**~1700** € for 900 lambs (return on EID crate investment = ~3 years)

- ***Reduces the use*** *(and therefore costs) of* ***anthelmintics treatments of lambs and young replacement, without compromising on their growth.*** *It also drastically* ***reduces on-farm labour.*** *It requires a weigh crate with an EID panel reader and farm management software.*

- ***Decreases the use of anthelmintic treatment*** *and products, and only target the animals that do not cope with worm infection. It* ***reduces the dejection of resistant worms on pastures, the leaching of anthelmintic treatments in the soil.*** *Less product is used, so fewer plastic bottles to dispose of. It* ***increases grazing efficiency*** *as the approach requires the farmer to measure grass production regularly, thus informing on grass availability. It does not compromise lamb growth.*

- ***Reduces resistance to anthelmintic products, reduces farm labour,*** *as there are less animals to treat, it* ***improves animal welfare by only targeting animal that needs treatment****, it* ***improves farmer's image*** *by reducing potential leaching of medicine in the environment, and improve the environment (better for the microbiofauna).*

How to address…

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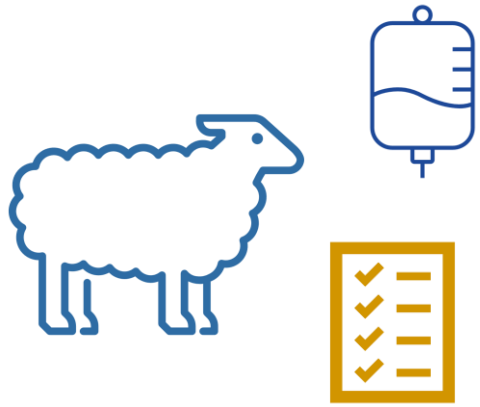
Flock health plan

4 solutions
1 factsheet
2 tips & tricks



Solutions proposed by EuroSheep

Solution name	Country
Detailed data keeping for health management to organise farms health plan / Use of smartphone or/and computer applications to get reminders	
Flock Biosecurity	
Flock health plan	
Scottish Animal Health Planning System (web-based)	

Factsheet

Biosecurity for the Sheep Flock - EuroSheep Network

Tips & Tricks

Greek Tips & Tricks - Health plan – YouTube

UK Tips & tricks - Health products dosages aide memoire - YouTube

Detailed data keeping for health management to organise farms' health plan

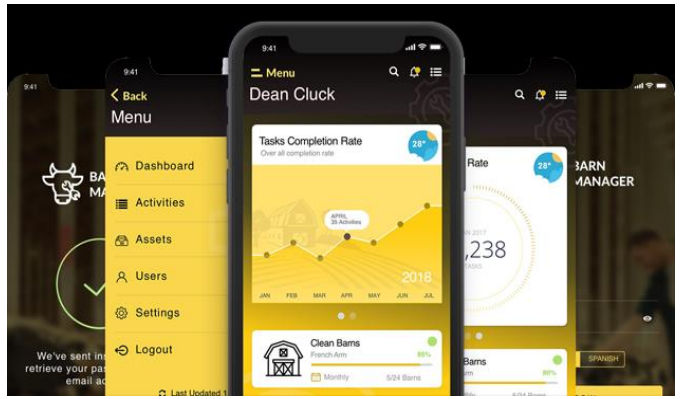
Use of smartphone or/and computer applications to get reminders

Need/ issue: Flock health plan

Aim: Improve health management of the flock

Prevent health problems and misuse of medicines

Description : Establishing a health plan on a farm can help the farmer and the farm's veterinarian to plan ahead and develop procedures to ensure the long-term health and welfare of a particular flock



- A personal computer or a smartphone/tablet can be an important tool to organise and maintain the health plan established with the cooperation of the farmer and the veterinarian.

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Detailed data keeping for health management to organise farms' health plan

Use of smartphone or/and computer applications to get reminders

- **How to implement:**
  - It is important to "feed" the system with all the required information as discussed between the farmer and veterinarian (e.g. animal codes, groups, birthdates, mating dates, lambing dates etc.)
  - The health plan established can include, among others, the vaccination program, parasite control, preventive examinations, pregnancy testing, but could also include aspects of management and nutrition
  - The farmer can have a clear schedule of what needs to be done and can get reminders in their smartphone or through email
  - A veterinarian can have a clear current view of the situation in the farm, as well as the past
  - There are several online or offline commercial software choices for managing the health plan, and in some cases the software accompanying the milking parlour can also be used for the same reason
  - Several free, online suites that can be used simultaneously by the farmer and veterinarian in order to keep data in spreadsheets, create calendars and get reminders regarding the health plan

- **Expected benefits:**
  - Solid management of the farm's health plan
  - Long-term health and welfare of the flock through disease prevention and control

- **Prerequisites and /or limits:**
  - Farmer and veterinarian must have basic knowledge of a computer or smartphone and a device.
  - Must understand the importance of accurate and complete data keeping and have the will to do so.

Flock Biosecurity

Background

- Some diseases (e.g. CODD, iceberg, abortion) are
  - highly infectious
  - can spread rapidly
- Purchased sheep can introduce
  - highly infectious disease
  - parasites
  - anthelmintic resistance
- Important for the improvement in health, welfare and productivity of animals
- Will reduce the incidence of disease on farms

Flock Biosecurity

- **How to implement**

Purchasing

Buy from flocks that have a good health status and vaccination program

Lameness

Quarantine for 4 weeks and observe for issues

Worms

- Dose with Group 4-AD + either Group 2-LV /Group 3-ML
- House for 48 hours
- Graze contaminated pasture

Liver fluke

Use flukicide for immature fluke, graze sheep on low risk pasture and dose again in 6 weeks

External parasites

Plunge dip sheep on arrival with an approved dip

Vaccinations

- Vaccinate purchased ewes against enzootic abortion
- Vaccinate for clostridial diseases

Fencing

Prevent contact with neighbouring or straying stock that may have disease

Expected Benefits:

- Reduce the spread of disease and anthelmintic resistance which negatively affects animal productivity

Add URL to website

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Cost-benefit & sustainability analysis

• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	… %	… €
• Labour (man-hours)[1]	☐	☒	>5 %	… €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages			… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☐	☐	… %	… €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
• Medicine (antibiotics, anthelmintics, vaccinations)[2]	☐	☒	>5 %	… €
• Technical advise	☐	☐	… %	… €
• Vet services	☐	☐	… %	… €
• Lab services	☐	☐	… %	… €
• Other external services	☐	☐	… %	… €
• Others (specify): ……..	☐	☐	… %	… €
Total	☐	☐		

• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output (e.g. meat, milk, wool)[3]	☒	☐	10 %+	… €
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		

Average increase in earning (per ewe, ha, etc.)	(€/ …)	€

- *Improving flock biosecurity **reduces flock health issues** and thus reduces medicine (antibiotic use), anthelminthic resistance and labour requirements. Improving flock biosecurity also **increases animal performance and output**, and thus profitability.*

- *An effective flock biosecurity protocol **improves feed efficiency** as the animals have an improved growth rate and are slaughtered earlier. **Greenhouse gas emissions per kg of carcass is reduced** due to improved animal performance. A reduction in medicine and anthelmintic use depends on the potential disease/parasites that have been avoided in the flock due to correct biosecurity protocol.*

- *An effective biosecurity protocol **improves animal welfare** by avoiding health and parasite issues, **this reduces physical labour, improves farm image a**nd potentially leaves additional leisure time.*

Flock Health Plan

Need/issue: Sheep shed management

- **Aim :** To monitor the flock and to reduce the incidence of disease, farmer stress and cash leakage.

Description and how to implement:

Aim:
reduce the incidence of disease

- Biosafety
- Cleaning, disinfection and rat extermination of sheds
- Parasite control
- Disposal od cadavers through the official cadaver collection services
- Disposal of medical waste in appropriate containers through authorized companies for the collection of medicines
- Control of new animals at entry into the farm
- Disease control and surveillance by incidence (see health solutions: BD, MV, PTBC; CA, mastitis)

Flock Health Plan

- **How to implement:**

  Monitor the flock and farm according to the proposed health plan.

  Treat sick animals according to the veterinarian's advice.

- **Expected benefits:**

- **Improve** ewe health
- ewe welfare
- **Reduce** veterinary cost and veterinary medicines
- labour cost
- Increase yields and flock profitability

- **Prerequisites/limits :**
  - Farmer training and confidence in the proposed plan

Aim:
Reduce the incidence of diseases

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Cost-benefit & sustainability analysis

• **Additional Costs (in green, items related to environmental evaluation too)**				
	Increase	Decrease	Percentage	Euro
• Fuel	☐	☐	%	€
• Labour (man-hours)	☒	☐	1 %	1.14[1] €
• Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
• Feeding : concentrates	☐	☐	… %	… €
• Feeding : forages	☐	☐	… %	… €
• Electricity	☐	☐	… %	… €
• Water (water, troughs, piping etc.)	☒	☐	33 %	0.01[2] €
• Seed	☐	☐	… %	… €
• Fertilizer	☐	☐	… %	… €
• Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
• Contractor charges (ploughing, spraying, harvesting etc.)	☒	☐	33 %	1.17[3] €
• Medicine (antibiotics, anthelmintics, vaccinations)	☒	☐	30 %	2.20-3.26[4] €
• Technical advise	☐	☐	… %	… €
• Vet services	☒	☐	30 %	1.0[5] €
• Lab services	☒	☐	100 %	0.2[6] €
• Other external services	☐	☐	… %	… €
• Others (specify):	☐	☐	… %	… €
Total	☐	☐		5.71-6.78€
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
• Output per ewe (e.g. meat, milk, wool)	☒	☐	8 % lambing +5% production	10.20+2.63€ meat 27.2+9.0€ milk[6]
• Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☒	… %	… €
• Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		**12.83€ meat 36.2€ milk**
Average increase in earning (per ewe, ha, etc.)			(€/…)	**7.12€ meat 30.49€ milk[7]**

- *A plan in a flock generates an **estimated cost** of between 6 and 7 euros per ewe due to the use of disinfectants, antiparasitic, and vaccines, mainly with the corresponding work of the veterinary services. Their use is estimated to generate a profit of between €13 and €36 per ewe, depending on whether the flock is for meat or milk, respectively. **Benefits are directly related to higher production efficiency and reduced costs** of lamb production because of increased feed efficiency and therefore improved feed conversion rates. These benefits in a flock of 300 ewes may be assessed in around 3849€ in meat flocks and 10860€ in dairy flocks.*

- *The implementation of this solution means **higher use of medicines** and vaccines, and therefore **generates a significant environmental impact** due to the production of waste, dirty water and plastic debris. However, its **impact in terms of biodiversity** and generation of high quality compost is **very positive**, as a consequence of the reduction in the use of medicines (antibiotics, anti-inflammatory treatments, etc.) that is expected with its application.*

- *The **prevention of the appearance of diseases** in a flock is probably the factor that has the **greatest economic and social impact** both internally in the flock itself and in society in general, due to the impact it has on the image of the sector, as well as the implications on the health of the population in general. Any solution that prevents the use of drugs will be aligned with the **"One health" strategy.***

Scottish Animal Health Planning System

Need/issue: Flock Health Planning SAHPS: System Features

Aim : Provision of a flock health planning system that allows targets to be set and performance to be reviewed annually and compared to previous years.

Description : An online web based health planning system that can be accessed by the flock owner and their vet. The system has 15 steps divided into 4 main sections:

1.Data collection
2.Problem analysis
3.Action plans
4.Summary of outputs

There are currently more than 2500 beef and sheep farmers registered on the system and more than 3500 flock health plans have been created.

Aim:
A plan that sets targets & monitors

Scottish Animal Health Planning System

- **How to implement:**
  - Your veterinary practice has to register to use the system.
  - Training is available.
- **Expected benefits:**
  - Ability to generate reports to compare year on year flock performance.
  - Ability to benchmark against other data in the system with filters to allow comparisons between similar enterprises within local geographic region.
- **Prerequisites/limits:**
  - Reliant on accurate and ongoing data entry.
  - Access to the system is free to veterinary practices in Scotland. Practices outwith Scotland pay an annual subscription.
  - A reliable internet connection is required.
  - An app has been created for beef cattle and one is planned for sheep.

Aim:
A plan that sets targets & monitors

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Scottish Animal Health Planning System

• **Additional Costs**				
	Increase	Decrease	Percentage	Euro
– Fuel	☐	☐	… %	… €
– Labour (man-hours)	☐	☐	… %	… €
– Equipment/materials (e.g. weigh scales, formalin etc.)	☐	☐	… %	… €
– Feeding : concentrates	☐	☐	… %	… €
– Feeding : forages			… %	… €
– Electricity	☐	☐	… %	… €
– Water (water, troughs, piping etc.)	☐	☐	… %	… €
– Seed	☐	☐	… %	… €
– Fertilizer	☐	☐	… %	… €
– Sprays (herbicides, pesticides etc.)	☐	☐	… %	… €
– Contractor charges (ploughing, spraying, harvesting etc.)	☐	☐	… %	… €
– Medicine (antibiotics, anthelmintics, vaccinations)	☐	☐	… %	… €
– Technical advice[1]	☒	☐	… %	… €
– Vet services[2]	☐	☒	… %	… €
– Lab services[3]	☒	☐	… %	… €
– Other external services	☐	☐	… %	… €
- Others (specify): ……	☐	☐	… %	… €
Total	☐	☐		
• **Additional Incomes**				
	Increase	Decrease	Percentage	Euro
– Output (e.g. meat, milk, wool)[4]	☒	☐	… %	… €
– Quality bonus (carcass confirmation, fat and protein composition etc.)	☐	☐	… %	… €
– Farm schemes and direct payments	☐	☐	… %	… €
Others (specify): ……	☐	☐	… %	… €
Total	☐	☐	**0**	
Average increase in earning (per ewe, ha, etc.)			(€/0)	**… €**

- *Having a health plan, using an app to create it, can be **beneficial to animal welfare, improve farmers' image and encourage new entrants.***
- *It is also **beneficial for the animals**, and for the farmers, enabling them to plan ahead by being less reactive, and more proactive.*
- *Definite numbers are difficult to estimate as feedback from farmers using the app is not available at this stage.*

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