The iSAGE decision support system (DSS)

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European sheep & goat sector

- Low incomes
- High production costs
- Subsidies
- Low level of innovation
European sheep & goat sector

- Low incomes
- High production costs
- Subsidies
- Low level of innovation

Shortage of decision support tools
WP4 – Task 4.4
Produce user friendly tools that can be provided to industry

Objective: Develop a decision support tool that will optimise sheep and goat production and will incorporate the recommended changes

www.isage-dss.eu
Model-driven, web-based, decision support system for sustainable small ruminant farming

**Features**
- Future what-if scenarios
- Different production systems
- Important farm aspects
- Simple and comprehensible reports focused on:
  - **Profitability**
  - **Productivity**
- Human readable advice
- Create/compare different scenarios

**Impacts & Benefits**
- Visualization of impact of choices
- Action plan on *efficient farm management*
- Production and profitability optimisation
Production and farming systems

• Dairy sheep and goat production systems
  • Intensive
  • Extensive
• Meat sheep production system
  • Intensive
  • Extensive
Potential users

• Sheep and goat farmers
• Consultants
  ✓ Veterinarians
  ✓ Animal scientists
  ✓ Co-operatives
• Companies
  ✓ Dairies
  ✓ Machinery construction companies
  ✓ Feed companies
Methodology

Input parameters

• Flock size
• Production (targeted milk or meat, animal weight)
• Grazing (yes / no, area grazed, grazing time & distance, pasture availability)
• Feeding (amounts & nutritional values of feeds)
• Income from subsidies
• Costs (detailed breakdown of variable costs)
• Farm prices (products & feeds)
Methodology

Data collection – Defaults values & acceptable ranges

• Meat sheep production system
  ✓ UK
    o Agriculture and Horticulture Development Board (AHDB)
    o National Sheep Association (NSA)
  ✓ Spain - Oviaragón – Pastores Grupo Cooperativo

• Dairy sheep production system
  ✓ France - Institut de l’ elevage (idele)
  ✓ Greece – Laboratory of Animal Husbandry, AUTH

• Dairy goat production system
  ✓ Greece - Laboratory of Animal Husbandry, AUTH
Methodology

Projectional model

Energy & protein requirements of different categories of sheep and goats

Algorithm

Assessment of nutritional management and impact on production and farm economics
Methodology

Estimates - Outputs

- Simulations of scenarios - Reports on profitability & productivity
- Farm income, variable costs and gross margin
- Production estimates

- Pasture availability at the end of the year
- Useful farm statistics (e.g. ram to ewe ratio, stocking rate)
- Other advanced outputs

Dairy sheep & goat farms
- Live weight
- Milk production

Meat sheep farms
- Live weight
- Carcass weight
Methodology

Cloud-based app

- Input of data to designated web forms
- Check for correctness
- Comparison with theoretical min and max limits
- Central collection and storage on a cloud server
- Processing with a model algorithm
- Guide for farm management decisions
How does it work?
1st Step: Login
2\textsuperscript{nd} Step: My farms

<table>
<thead>
<tr>
<th>NAME</th>
<th>TYPE</th>
<th>LOCATION</th>
<th>ANIMALS</th>
<th>EWES</th>
<th>GROSS MARGIN/ANIMAL</th>
<th>GROSS MARGIN</th>
<th>INCOME</th>
<th>COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK meat sheep farm</td>
<td>Sheep</td>
<td>Yorkshire, United Kingdom</td>
<td>1100</td>
<td>500</td>
<td>40 €</td>
<td>20000 €</td>
<td>70000 €</td>
<td>50000 €</td>
</tr>
<tr>
<td>Spanish meat sheep farm</td>
<td>Sheep</td>
<td>Monnells</td>
<td>2000</td>
<td>800</td>
<td>60 €</td>
<td>50000 €</td>
<td>110000 €</td>
<td>60000 €</td>
</tr>
<tr>
<td>French dairy sheep farm</td>
<td>Sheep</td>
<td>Bordeaux, France</td>
<td>500</td>
<td>370</td>
<td>97 €</td>
<td>120000 €</td>
<td>200000 €</td>
<td>80000 €</td>
</tr>
<tr>
<td>Greek dairy goat farm</td>
<td>Goat</td>
<td>Xrisopetra, Kilkis</td>
<td>265</td>
<td>200</td>
<td>70 €</td>
<td>14000 €</td>
<td>46000 €</td>
<td>32000 €</td>
</tr>
<tr>
<td>Greek dairy sheep farm</td>
<td>Sheep</td>
<td>Vasilika, Thessaloniki</td>
<td>265</td>
<td>200</td>
<td>100 €</td>
<td>20000 €</td>
<td>60000 €</td>
<td>40000 €</td>
</tr>
</tbody>
</table>

[button] CREATE NEW FARM [button]
3rd Step: Create farm
3\textsuperscript{rd} Step: Create farm

Basic farm data
Please insert the data for size and output of the farm according to the previous year’s production. These basic information is used in order to facilitate the comparison with the results of the projectional scenarios that you will be creating.

- Total number of sheep
- Number of ewes milked
- Profit
- Profit per ewe
- Income
- Costs

Save farm  CANCEL
4th Step: My farm

Greek dairy sheep farm

Animal type: SHEEP
Produce: DAIRY
Country Model: GR

Basic Farm Information

Number of Sheep: 265
Milked Ewes: 200
Gross Margin per Ewe: 100€

Scenario with default values

This scenario describes the management of an average dairy sheep farm in Vasilika, Greece. The flock consists of 200 milked ewes, 5 rams and 55 replacement lambs.

<table>
<thead>
<tr>
<th>Number of Sheep</th>
<th>Milked Ewes</th>
<th>Gross Margin per Ewe</th>
<th>Gross Margin</th>
<th>Income</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>265</td>
<td>200</td>
<td>136,73</td>
<td>28,029</td>
<td>68,250</td>
<td>40,221</td>
</tr>
</tbody>
</table>
5th Step: Create scenario-Input data

1. Flock characteristics

- How many animals do you have and sell?
- Number of lambs: 55
- Number of not milked ewes: 5
- Number of lambs slaughtered: 240
- Number of lambs sold: 5
- Stable size: 400

- Number of milked ewes: 200
- Number of rams: 5
- Number of adult sheep slaughtered: 10
- Number of adult sheep sold: 5
5th Step: Create scenario - Input data

1. Flock characteristics

How many animals do you have and sell?

- Number of lambs: 55 animals
- Number of not milked ewes: 5 animals
- Number of lambs slaughtered: 240 animals
- Number of lambs sold: 5 animals
- Stable size: 400 m²

- Number of milked ewes: 200 animals
- Number of rams: 5 animals
- Number of adult sheep slaughtered: 10 animals
- Number of adult sheep sold: 5 animals

(Show help)
5th Step: Create scenario - Input data

2. Production

How much do your animals produce?

- Average ewe weight: 60 kg
- Potential milk production: 300 kg/year
- Duration of lactation period: 8 months
- Lamb carcass weight sold: 9 kg
- Fat in milk: 6.5%
- Protein in milk: 5%
- Birth weight: 3.5 kg
- Weight at weaning: 15 kg
- Age at weaning: 2 months
- Age at first mating: 8 months
5th Step: Create scenario - Input data

3. Processing
What products do you produce on farm from your milk?

- Cheese produced
  - 0 kg

- Bottled milk produced
  - 0 kg

- Yogurt produced
  - 0 kg

- Butter produced
  - 0 kg

- Cream produced
  - 0 kg

- Other processed
  - 0 kg
5th Step: Create scenario - Input data
5th Step: Create scenario-Input data

5. Feeds
What and how much do you feed your animals?

5.0 Concentrate fed per day
How much concentrate do you feed to each of your animals daily?

- Concentrate fed to lambs per day:
  - 0.3 kg/animal/day

- Concentrate fed to milked ewes per day during lactation period:
  - 0.83 kg/animal/day

- Concentrate fed to milked ewes per day during dry period excluding last month before birth:
  - 0.22 kg/animal/day

- Concentrate fed to not milked ewes per day:
  - 0.3 kg/animal/day

- Concentrate fed to milked ewes per day during last month before birth:
  - 0.66 kg/animal/day

- Concentrate fed to rams per day:
  - 0.6 kg/animal/day
5th Step: Create scenario-Input data

6. Income and costs
What are your income and costs

6.0 Subsidy
How much money do you get from subsidies?

- Direct payments last year: €/farm
  - 2600

- Coupled subsidies paid per animal per year: €/animal
  - 12

- Compensations: €/farm
  - 0

6.1 Cost of labour
How much money do you spend each year for labour?

- Hired workers used: people
  - 1

- Family labour used (unpaid): people
  - 2

- Hours of work per hired worker: hours/month
  - 240

- Cost of labour: €/hour/person
  - 2
5th Step: Create scenario-Input data

### 7. Prices

Prices for products and feeds

#### 7.0 Milk processed products price

How much do you get for each Kilogram of milk you process to products you sell?

<table>
<thead>
<tr>
<th>Product</th>
<th>Price per kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheese</td>
<td>0</td>
</tr>
<tr>
<td>Yogurt</td>
<td>0</td>
</tr>
<tr>
<td>Bottled milk</td>
<td>0</td>
</tr>
<tr>
<td>Cream</td>
<td>0</td>
</tr>
<tr>
<td>Butter</td>
<td>0</td>
</tr>
<tr>
<td>Other milk processed products</td>
<td>0</td>
</tr>
</tbody>
</table>

#### 7.1 Farm prices

Prices for milk, meat and feeds

<table>
<thead>
<tr>
<th>Product</th>
<th>Price per unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>€0.86/kg</td>
</tr>
<tr>
<td>Adult meat</td>
<td>€2.5/kg carcass</td>
</tr>
<tr>
<td>Adult sheep sold price</td>
<td>€150/animal</td>
</tr>
<tr>
<td>Concentrate for lambs price</td>
<td>€0.38/kg</td>
</tr>
<tr>
<td>Concentrate for lactation period price</td>
<td>€0.36/kg</td>
</tr>
<tr>
<td>Concentrate for last month before birth price</td>
<td>€0.36/kg</td>
</tr>
<tr>
<td>Straw</td>
<td>€0.07/kg</td>
</tr>
<tr>
<td>Hay</td>
<td>€0.17/kg</td>
</tr>
<tr>
<td>Silage</td>
<td>€0.12/kg</td>
</tr>
<tr>
<td>Concentrate for dry period/ewes not milked price</td>
<td>€0.25/kg</td>
</tr>
<tr>
<td>Concentrate for rams price</td>
<td>€0.25/kg</td>
</tr>
<tr>
<td>Fluctuating number animals (internal use only)</td>
<td>1 number</td>
</tr>
</tbody>
</table>

iSAGE, Workshop, Thessaloniki, Greece, 15 January 2020
### 6th Step: Report page

#### Scenario results

<table>
<thead>
<tr>
<th>Milked animals</th>
<th>Energy Balance</th>
<th>Protein Balance</th>
<th>Weight Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lactation period</td>
<td>-0.16 MJ</td>
<td>50.90 g</td>
<td>-0.97 kg</td>
</tr>
<tr>
<td>Dry period</td>
<td>1.87 MJ</td>
<td>39.17 g</td>
<td>2.9 kg</td>
</tr>
<tr>
<td>Last month before birth</td>
<td>1.45 MJ</td>
<td>80.41 g</td>
<td>0.65 kg</td>
</tr>
</tbody>
</table>

**Estimated milk production change of milked ewes considering energy and protein balance:** -2.57 kg

<table>
<thead>
<tr>
<th>Non milked animals</th>
<th>Energy Balance</th>
<th>Protein Balance</th>
<th>Weight Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non milked ewes</td>
<td>2.24 MJ</td>
<td>38.92 g</td>
<td>9 kg</td>
</tr>
<tr>
<td>Rams</td>
<td>1.70 MJ</td>
<td>66.85 g</td>
<td>8.3 kg</td>
</tr>
<tr>
<td>Lambs</td>
<td>0.6 MJ</td>
<td>14.57 g</td>
<td>0.23 kg</td>
</tr>
</tbody>
</table>

**Gross margin**

- **Gross margin**
  - **28,028,75€/year**
- **Gross margin per ewe**
  - **136,73€/year**
- **Gross margin excluding subsidies**
  - **22,968,75€/year**
- **Gross margin per ewe excluding subsidies**
  - **161,36€/year**
6th Step: Report page

**Income**

- Income from milk: 51,158.54 €/year
- Income from meat: 10,531.66 €/year
- Income from animal sales: 1,500 €/year
- Income from subsidies: 5,060 €/year
- Income from milk processed products: 0 €/year
- Total Income: 68,250.20 €/year

**Costs**

- Feed costs: 28,876.45 €/year
- Seasonal labour cost: 200 €/year
- Total costs of labour: 5,960 €/year
- Cost of renting: 0 €/year
- Farm running costs: 1,500 €/year
- Farm utility costs: 1,950 €/year
- Milking parlour costs: 500 €/year
- Processing costs: 0 €/year
- Veterinary costs: 1,235 €/year
- Grazing land costs: 0 €/year
- Total Costs: 40,221.45 €/year

**Costs per animal**

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>Feed costs per animal</th>
<th>Feed costs per milked ewe</th>
<th>Feed costs per non milked ewe</th>
<th>Feed costs per ram</th>
<th>Variable costs per lamb</th>
<th>Variable costs per milked ewe</th>
<th>Variable costs per non milked ewe</th>
<th>Variable costs per ram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed ewe</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
</tr>
<tr>
<td>Ram</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
</tr>
<tr>
<td>Lamb</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
</tr>
<tr>
<td>Non milked ewe</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
<td>115.84 €/animal</td>
</tr>
</tbody>
</table>
Basic simulated scenarios

- Flock size optimisation
- Production optimisation
- Pricing: Lower milk/meat prices & higher feed prices
- Extensification of the production system
- Different feeding strategies

**Goal**

Remain sustainable
Next steps

• Testing and feedback from sector/industry
• Improvements on the system
• Obtain defaults and ranges from other countries to create customised models
Thank you!