Economic and grazing resources analysis of extensive livestock farming systems (dehesas) in Spain

Structure of the presentation

- **Introduction**
  - The dehesa ecosystem
  - Extremadura Region
  - Livestock systems

- **Materials and methods**
  - Study area
  - Sample selection
  - Calculation and evaluation of grazing resources

- **Results**
  - Energy requirements of livestock
  - Economic valuation
The dehesa system

- Pasture is combined with Quercus spp trees
- Soil acid, shallow sandy loams of low fertility
- The climate: continental Mediterranean
  - Temperature: 16-17°C
  - Rainfall: 300 and 800 mm
- Livestock species
- Other Uses: cork and hunting
- Area:
  - Spain reaches a total of approximately 5.8 million hectares
  - 0.5 million hectares are located in southern Portugal

Typical agro-forestry system of the Iberian Peninsula
Extremadura Region

- **Surface:**
  - 41,634 km² (8.2%)

- **Population**
  - 1,095,894 (2.6%)

- **Density**
  - 26.03 inhab./km²
Livestock systems

Extensive LFS

- High operation size
- Meat production oriented
- The products are high quality, but seasonal
- Deficient in commercialization
- Contribute to environmental protection
- No other alternatives other than livestock production exist in the area

The importance of these livestock farming systems

1. Contribution to the regional economy
2. Guarantee the maintenance of this complex and particularly sensitive ecosystem.
Livestock systems: Cattle herds

- Authoctonous breeds suckling cows:
  - Retinta
  - Morucha
  - Avileña-Negra Ibérica
  - Lidia

- Breeding: Dec - July
- Suplementation period: Sept - March
- Product sold: weaned calf 180 days - 200 kg
Livestock systems: Cattle herds
Livestock systems: Sheep herds

- **Breeds:**
  - Merino
  - Entrefina

- **Breeding:**
  - 1 lambing per year
  - 2 lambing/3 years
  - No lambing during summer

- Some of them are dairy sheep herds: low milk yield

- Lamb sold after fattening: 22-28 kg
  - 80 days old
Livestock systems: Goat herds

- **Breeds**
  - Verata
  - Serrana

- **Breeding: Spring**

- **Milk yield**
  - 235 l/goat
  - 230 days

- **Weaned kids: 9kg**
Livestock systems: Pig herds

- **Breeds:** Iberian
- **Breeding phase:**
- **Outdoors or indoors**
- **2 farrowing**
  - Dec
  - June
- **Sows and boars:** fed with cereals
Livestock systems: Pig herds

- **Fattening period:**
  - **1st Stage “’c ria’”:** Birth-23kg
  - **2nd stage “rec ria”:** 23kg-100kg
  - **3rd stage (Fattening)** 100-160kg
    - “Montanera”: Animals fattened with acorn for 2.5-3 months and Slaughtered with 16-20 months old
    - “Recebo”: acorns+cereals
    - “Cebo”: cereals
Pig products: Iberian dry-cured ham

- The curing process takes from 12 months to 36 months.
Purpose of this grazing valuation

- Which amount of environmental resources cover the food needs of livestock in extensive farming systems such as dehesas?
- Current situation: significant increases in the cost of feedstuffs.
- Main utility of answering this question to adapt livestock densities to available grazing resources in the farms in order to reduce supplementary feed costs and overstocking risks.
The main question is….

How much of livestock requirements are covered by grazing???

- Livestock requirements of all the animals in the farms (cattle, sheep, pigs..)
- Which percentage of these Requirements are covered by grazing
- Livestock density
- How much cost these grazing resources?

- Field work
Materials and Methods
Study area

- **Region of Extremadura**
- **2.2 million ha**
- **More than 50% of the utilized agricultural area is considered to be dehesa.**
Sample selection

- The data used were obtained from survey questionnaires conducted in 2004 and 2005 with dehesa farm owners or managers in the Region of Extremadura (SW Spain).
- The surveys were conducted on site
- 69 holders of dehesa farms larger than 100 ha.

Questionnaires
- Farm land uses
- Number and types of animals
- Feedstuffs
Calculation and evaluation of grazing resources

The total requirements of species \( i \) (\( NTG_i \)) are determined by the total number of animals of class \( j \) (\( N_j \), animals of the same age, and sex), the correction factor for the breed (\( F_{cr} \)), and the animals' annual energy requirements according to their class (\( UG \)):

\[
NTG_i = \sum_j N_j \times F_{cr} \times UG
\]

Thus, a farm's total requirements (\( NT \)) will be given by the requirements of its cattle (\( UGv \)), plus its sheep (\( UGov \)), plus its pigs (\( UGp \)), etc.:

\[
NT = \sum_i NTG_i
\]

\[
NT = \sum_i UGv + UGov + UGp 
\]
The requirements covered by grazing \((N_{Tp})\) are obtained as the difference between the total requirements of the livestock \((NT)\) and the feedstuffs supplied \((NTs)\).

The grazing resources are:

\[ N_{Tp} = NT - NTs \]

(coefficients and values assigned to the principal raw materials used in animal feed in Martín et al. 1986).
The valuation of the resources was established according to the *local market values* of rent of pasture, forestry crops, and acorn for forage feeding, and taking into account the specific characteristics of each farm.

**Indicators calculated:**
- Cost of grazing feed units (€/FU Forage units)
- Cost of feedstuff unit (€/FU)
- Cost of grazing €/ha
- Cost of feedstuff €/ha
- % Cost grazing resources/ cost total feed
Results
The analysis of the farms are presented according 4 different types taking in account their technical and economics characteristics (full description of the typology construction process is developed in Gaspar et al. 2007).

DEHESA FARM: Overall sample

TYPE 1: Large sheep farms

TYPE 2: Medium-sized beef cattle production

TYPE 3: Small-scale sheep farms

TYPE 4: Mixed beef cattle, sheep, and Iberian pig farms
Energy requirements of livestock and grazing resource use

Livestock energy requirements (FU/ha) in dehesa farms

- Dehesa farms: 992
- Mixed beef, sheep, pig: 1432
- Small sheep: 1450
- Medium beef cattle: 938
- Large sheep farms: 746
% Requirements covered by grazing according to farm type

<table>
<thead>
<tr>
<th>Farm Type</th>
<th>Grazing Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehesa farm</td>
<td>71.18%</td>
</tr>
<tr>
<td>Mixed beef, sheep, pig</td>
<td>59.18%</td>
</tr>
<tr>
<td>Small sheep</td>
<td>60.01%</td>
</tr>
<tr>
<td>Medium beef cattle</td>
<td>74.07%</td>
</tr>
<tr>
<td>Large sheep farms</td>
<td>76.04%</td>
</tr>
</tbody>
</table>

Livestock density (LU/ha)

<table>
<thead>
<tr>
<th>Farm Type</th>
<th>Livestock Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehesa farm</td>
<td>0.61</td>
</tr>
<tr>
<td>Mixed beef, sheep, pig</td>
<td>0.88</td>
</tr>
<tr>
<td>Small sheep</td>
<td>0.89</td>
</tr>
<tr>
<td>Medium beef cattle</td>
<td>0.58</td>
</tr>
<tr>
<td>Large sheep farms</td>
<td>0.46</td>
</tr>
</tbody>
</table>
Energy requirements of livestock and grazing resource use

% Requirements covered by grazing according to livestock type

- Mast-feeding pigs: 100%
- Sows: 48.7%
- Sheep: 76.87%
- Cattle: 82.09%
Economic value of grazing resources and feedstuffs

**Feeding costs in dehesa farms €/FU**

- **Dehesa farm**
  - Cost of feedstuff unit (€/FU): 0.17 €
  - Cost of grazing feed unit (€/FU): 0.43 €

- **Mixed beef, sheep, pig**
  - Cost of feedstuff unit (€/FU): 0.18 €
  - Cost of grazing feed unit (€/FU): 0.51 €

- **Small sheep**
  - Cost of feedstuff unit (€/FU): 0.13 €
  - Cost of grazing feed unit (€/FU): 0.37 €

- **Medium beef cattle**
  - Cost of feedstuff unit (€/FU): 0.16 €
  - Cost of grazing feed unit (€/FU): 0.35 €

- **Large sheep farms**
  - Cost of feedstuff unit (€/FU): 0.19 €
  - Cost of grazing feed unit (€/FU): 0.50 €
Economic value of grazing resources and feedstuffs

Cost of grazing feed units in dehesa farms (€/FU)

- Mast-feeding pigs: 0.46 €
- Sows: 0.16 €
- Sheep: 0.17 €
- Cattle: 0.16 €
Economic value of grazing resources and feedstuffs

Feeding costs in dehesa farms (€/ha)

- Dehesa farm: Total cost per feed (grazing + feedstuffs) 176 €
- Mixed beef, sheep, pig: Total cost per feed 306 €
- Small sheep: Total cost per feed 233 €
- Medium beef cattle: Total cost per feed 147 €
- Large sheep farms: Total cost per feed 140 €

Feeding cost categories:
- Total cost per feed (grazing + feedstuffs) €/ha
- Feedstuffs €/ha
- Grazing (pasture + mast-feeding)
Conclusions

- In dehesa systems grazing resources cover a major part of the livestock's requirements especially in beef cattle farms.
- The use of grazing resources is conditioned by the size of the holding and livestock density.
- The use of the pasture as feed for the livestock is the principal economic utilities in these systems.
- Reduced livestock feed costs compared with more intensive systems.
- The greatest costs are in acorn feeding of Iberian pig.
Thanks for your attention

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