Enteric methane emission in extensive cattle in Salamanca (Spain)

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60th Meeting EAAP. Barcelona, 2009

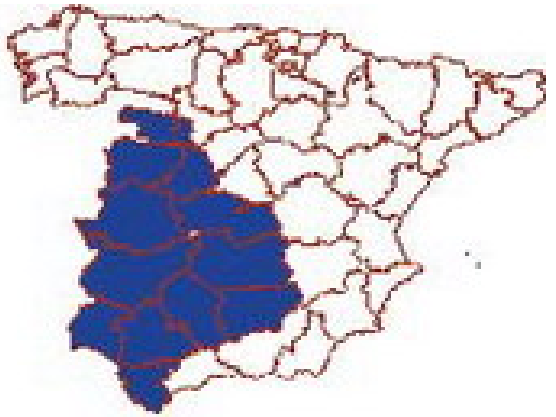
Livestock: source of greenhouse gases

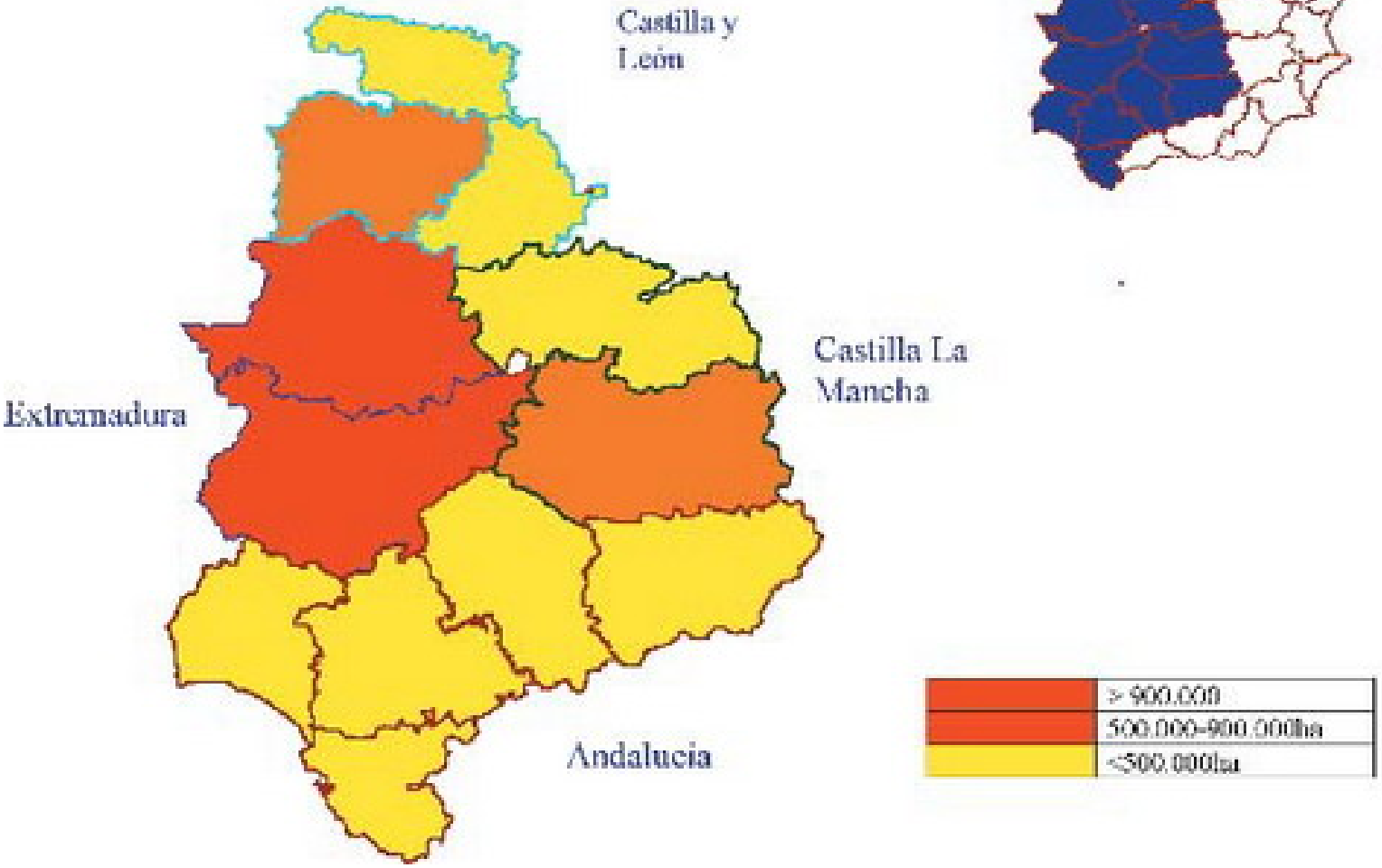
Extensive cattle in Salamanca

Based on *dehesa*

Dehesa: central and south western Spain.

Also in Portugal (called *montado)*





Extensive cattle in Salamanca

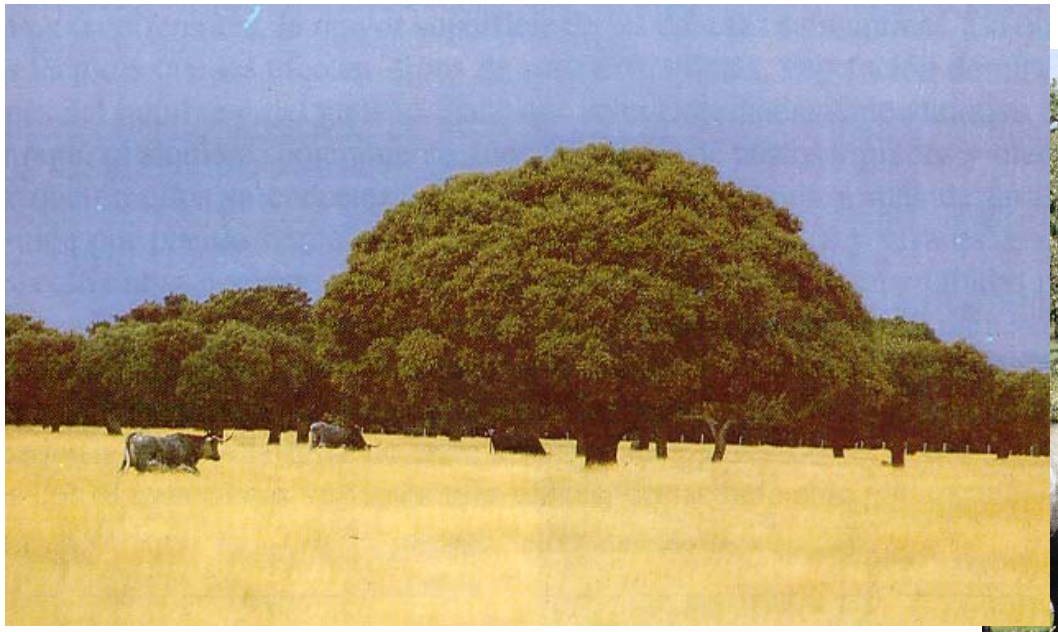
Autochthonous breeds:
Morucha. Crossed with Carolais, Limuosin…

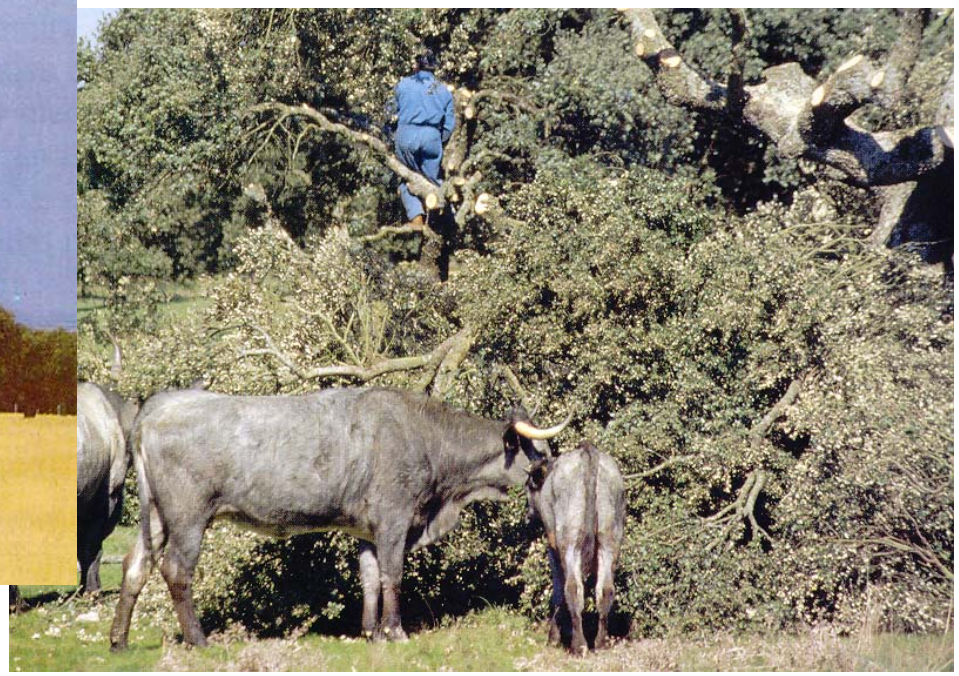
Grazing all year around, no stables for cows.

Weaning: 6 month after calving, 200-250 kgLW

Extensive cattle in Salamanca

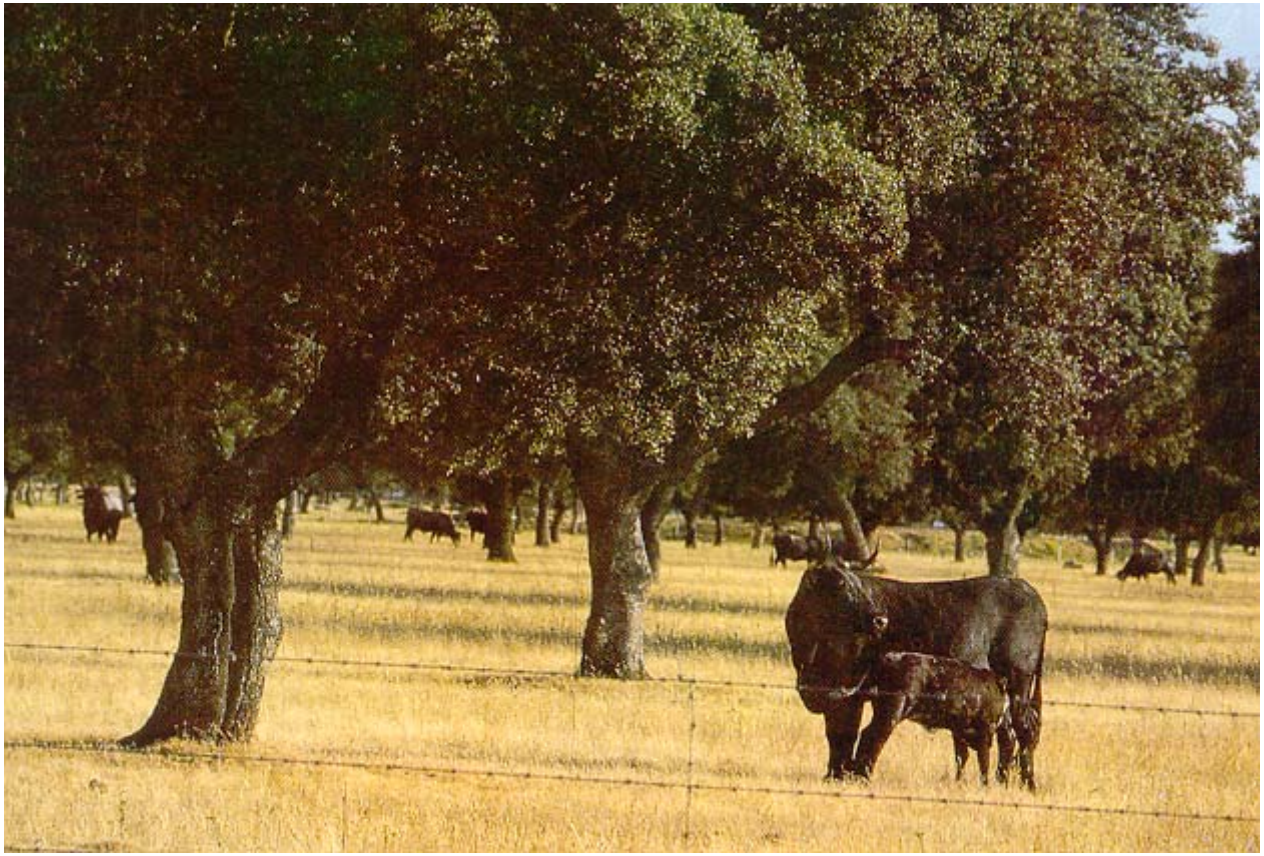
- Autochthonous breeds: Morucha
- Use of natural resources





Enteric methane: estimate is needed

- National national greenhouse gas inventories
- Searching for sustainable production systems



Enteric methane: estimate

- Tier 2 method (IPCC, 2006); estimate is based on:
  - average feed intake in gross energy and
  - CH_4 conversion rates (Ym)

$$EF = \frac{EB \cdot \frac{Y_m}{100} \cdot 365}{55{,}65}$$

Enteric methane: estimate

- Tier 2 method (IPCC, 2006); estimate is based on:
  - average feed intake in gross energy and
  - CH_4 conversion rates (Ym)
- **Our aim: improving estimate**

17 MJ/kgMS gross energy pastures

(Almoguera, 2007)

$Ym = -0{,}0038 \cdot DE^2 + 0{,}3501 \cdot DE - 0{,}8111$

(Cambra-López *et al,* 2008)

Monthly pastures production in *dehesa,* DE of the area pastures

(Daza, 1999; Martín Bellido *et al*, 1986; Martín Polo *et al*, 2003)

Practical feeding calculated

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1. Practical feeding
   - **Pastures**: 1460 kg DM/year·ha, monthly production adapted from Daza (1999).
   - **Stocking rate**: 0,4 heads/ha
   - **Requirements** for grazing cows of 550 kg, considering physiological status, following Daza (1999),
   - **Quality** of pastures and supplementary feeding

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1. Practical feeding
   - **Summer**: 7 kgDM/d pastures, 1,5 kg/d pellet feeding in July and August; in September, 7,6 kgDM/d straw and 1,5 kg/d pellet feeding
   - **Autumn** (October): 10 kgDM/d pastures.
   - **Winter** (November-March): 1,25 kgDM/d pastures and 6 kgDM/d *Vicia*-oats hay.
   - **Spring**: 9,4 kgDM/d pastures

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2. Calculating Ym:
   - **Summer**:

     $Ym = -0{,}0038 \cdot 42^2 + 0{,}3501 \cdot 42 - 0{,}8111 =$ **7,19 %**
   - **Autumn** (October):

     $Ym = -0{,}0038 \cdot 39{,}7^2 + 0{,}3501 \cdot 39{,}7 - 0{,}8111 =$ **7,1 %**
   - **Winter** (November-March):

     $Ym = -0{,}0038 \cdot 60{,}35^2 + 0{,}3501 \cdot 60{,}35 - 0{,}8111 =$ **6,48 %**
   - **Spring**:

     $Ym = -0{,}0038 \cdot 58{,}98^2 + 0{,}3501 \cdot 58{,}98 - 0{,}8111 =$ **6,62 %**

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3. Calculating FE:
   - **Spring**:

$$FE = \frac{GE \cdot \frac{Y_m}{100} \cdot 91}{55{,}65} = \frac{17 \cdot 9{,}4 \cdot \frac{6{,}62}{100} \cdot 91}{55{,}65} = 17{,}2959$$

(kg CH_4/head)

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3. Calculating FE:
   - **Summer**:

     FE= 15,7169 kg CH_4/head
   - **Autumn** (October):

     FE= 6,7224 kg CH_4/head
   - **Winter** (November-March):

     FE= 22,5206 kg CH_4/head
   - **Spring**:

     FE= 17,2959 kg CH_4/head

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3. Calculating FE:

62,2858 kg CH_4 /head·year

Tier 1 estimate: 57 kg CH_4 /head·year
(IPCC, 2006)

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Further steps:

- ¿C sequestration of *dehesa*?

- ¿Is this production system a sink or a source of greenhouse gases?