Present situation and future challenges of beef cattle production in Italy and the role of the research

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The Italian beef cattle production in the European scenario

- France 22.5%
- Germany 15.3%
- Italy 11.4%

(OFIVAL, 2007)
### Main categories of cattle slaughtered for meat production in Italy in the year 2005

(Source: modified from ISTAT, 2007)

| Category       | Heads (000) | Average live weight (kg) | Dressing out (%) |
|----------------|-------------|--------------------------|------------------|
| Veal calves    | 988         | 243                      | 59.2             |
| Young bulls    | 1.949       | 583                      | 58.2             |
| Beef heifers   | 565         | 457                      | 56.3             |
| Culled cows    | 541         | 557                      | 46.7             |
National self-supply for cattle meat: 63% (CRPA, 2006)

- young bulls and heifers: 14%
- veal calves: 13%
- culled cows: 73%

(ISMEA, 2006)
The production systems
Veal calves

| Farm location | %  |
|---------------|----|
| Veneto        | 40 |
| Lombardy      | 40 |
| Piedmont      | 10 |

Farm size: 500-600 calves ± 500. (From 100 to > 2000).

(Cozzi et al., 2003)

Stocking rate: ????
Veal calves

Animals

| Breed                        | Source                        | %  |
|------------------------------|-------------------------------|----|
| Holstein & Brown ♂           | National                      | 77 |
| Holstein & Simmental         | Imported (PL, F, D)           | 23 |

Group housing in multiple pens (Dir 97/2/EC)

Feeding plan: milk replacer + small amount of roughage (Dir 97/2/EC)
**Fattening young bulls**

**Farm type and location**

| Rearing system | Cattle population | Farm location       |
|----------------|-------------------|---------------------|
| **Intensive**  | 70-75%            | Po Valley           |
| **Extensive**  | 25-30%            | Piedmont & Central regions |

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Fattening cycle and stocking rate in a sample of different Italian beef cattle farms

(Source: ISMEA, 2006)

| Type of farm | Intensive | Extensive |
|--------------|-----------|-----------|
| Farm location | Veneto | Piedmont | Tuscany |
| Cattle breed | Charolais & FC<sup>x</sup> | Blonde d’Acquit. | Chianina |
| Farm size | heads | 1320 | 380 | 28 |
| Cattle live weight: | | | | |
| Initial | kg | 368 | 237 | 257 |
| Final | kg | 641 | 597 | 722 |
| Daily gain | kg/d | 1.30 | 1.39 | 1.25 |
| Cycle duration | d | 210 | 260 | 372 |
| Stocking rate | LU/ha<sup>y</sup> | 7.0 | 4.5 | 1.2 |

<sup>x</sup>FC = French crosses; <sup>y</sup>LU/ha = Livestock Units/hectare.
Intensive farms

Animals

Strong dependence on imported cattle

- 1,000,000 heads imported in the year 2005
- 80% from France (Charolais, Limousin + Crossbreds)
- 20% from Eastern Europe (Polish Friesians and Simmental).

Housing systems

- Indoor loose housing in multiple pens on littered or slatted floor pens

Feeding plan

- High concentrate diets with small amounts of roughage fed as Total Mixed Ration. Maize as main feed crop and energy source
Extensive farms

Animals

• Young bulls of Italian beef breeds: Piemontese, Chianina, Marchigiana, Maremmana, Podolica, Romagnola

Housing systems

• Loose housing in small multiple pens or tied stalls on permanent bedding indoor

Feeding plan

• Concentrates top-dressed to the forage portion in which maize silage is replaced by luzerne and meadow hays. Energy from cereal grains and protein from luzerne hay, field beans and soybean
The future challenges and the role of the research
Main critical points of the Italian beef cattle production

- Environmental impact
- Dependence on imported cattle
- Need for new feeding strategies
- Animal welfare
The environmental impact of beef cattle farms

Problem:
• To comply with the Nitrate Directive 91/676/EC

Proposed solutions:
• downsize the farm stocking rate
• reduce dietary crude protein
### Performance and nitrogen excretion of steers fed diets with different crude protein concentration during the finishing period

|                             | Dietary crude protein | ∆ 12/14 |
|-----------------------------|-----------------------|---------|
|                             | 12% DM                | 14% DM  |
| Initial live weight (kg)    | 404                   | 404     |
| Final (FLW) (kg)            | 496                   | 517     | - 4.1%* |
| Average daily gain (kg/d)   | 1.64                  | 2.02    | - 18.8%*|
| Days of trial (d)           | 56                    | 56      |         |
| N intake (g/d)              | 198                   | 240     | - 17.6%**|
| Excreted N (% of N intake)  | 88.7                  | 88.9    | - 0.2%  |
| Total N excreted (g)        | 9820                  | 11938   | - 17.7%**|

*P < 0.10; **P < 0.05.

(Source: modified from Cole et al., 2003)
### Performance and nitrogen excretion of steers fed diets with different crude protein concentration during the finishing period

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| Excreted N            | % of N intake 88.7    | % of N intake 88.9  | - 0.2%               |
| Total N excreted      | g 9820                | g 11938             | - 17.7%**            |
| **Additional days on feed\(^1\)** | **d 13**          | --                  |                      |
| **Total N excreted to equalize FLW** | **g 12004** | **g 11938** | **0.6%** |

\*P < 0.10; \**P < 0.05.

\(^1\)Days required by the steers fed 12% CP to reach the same final live weight of 14% CP steers.

(Source: modified from Cole et al., 2003)
The scientific research

Mission

To identify strategies to increase the efficiency of N retention

Technical solutions:

Veal calves

Improve knowledge on true digestibility & efficiency of absorption of dietary essential aminoacids
Essential amino acid composition of tissue protein and ruminal bacteria

|            | Tissue protein | Ruminal Bacteria |
|------------|----------------|------------------|
| Methionine | 2.7            | 2.6              |
| Lysine     | 7.6            | 7.9              |
| Histidine  | 2.7            | 2.0              |
| Phenylalanine | 4.8       | 5.1              |
| Threonine  | 3.7            | 5.8              |
| Leucine    | 9.2            | 8.1              |
| Isoleucine | 5.8            | 5.7              |
| Valine     | 5.9            | 6.2              |
| Arginine   | 3.4            | 5.1              |

(Source: modified from O’Connor et al., 1993)
The scientific research

**Mission:**

To identify strategies to increase the efficiency of N retention

**Technical solutions:**

- **Veal calves**
  - Improve knowledge on true digestibility & efficiency of absorption of dietary essential aminoacids

- **Fattening young bulls**
  - Feeding solutions capable to maximize microbial growth in the rumen
The dependence on imported cattle

Problems:

- Increasing trend of costs of foreign cattle
- Additional costs and limitations for cattle transport due to new regulations on animal welfare
To improve the fleshiness traits of the young livestock

**Mission:**

**Reproduction**
Reduce the fertility problems in dairy cows to allow a wider use of the cross-breeding with beef bulls

**Biotechnology**
Production and use of male sexed semen of beef bulls in cross-breeding schemes
The need for new feeding strategies

Problem for veal calves:

- Sharp increase in the cost of main raw materials used for milk replacers formulation

![Graph showing the cost of whey powder and skimmed milk powder over time.](image)
The scientific research

Mission:
To reduce the amount of milk replacers by feeding large amounts of solids feeds

Ideal requirements of a solid feed for veal calves

Not impair the function of the esophageal groove

Low iron bioavailability  Suitable meat colour
The need for new feeding strategies

Problem for young bulls and heifers:

- High risk of rumen acidosis due to the low forage : concentrate ratio of the diets

↓ Rumen pH
High starch & NFC

↑ Rumen pH
High NDF
To find alternative feeding solution capable to increase the effective fiber of the diet without lowering the starch content.

Mission:

Technical solution:

Inclusion of large amount of coarsely chopped maize silage as main roughage source of the TMR.
# Use of coarse maize silage as sole roughage source for finishing bulls

(Source: Cozzi et al., 2005)

![Picture of cutting equipment](image)

## Penn State FP separator

| Maize silage | Short | Long  | P    | SEM |
|--------------|-------|-------|------|-----|
| > 19 mm %    | 2.9   | 27.7  | ***  | 2.8 |
| > 8 mm %     | 77.0  | 57.8  | ***  | 4.6 |
| Bottom %     | 22.2  | 14.5  | **   | 5.5 |

9 mm Chopping length 19 mm
# Feed and chemical composition of the experimental diets

|                      | MS-Short+Straw | MS-Long | P | SE |
|----------------------|----------------|---------|---|----|
| **MS-short**         |                |         |   |    |
| kg/d                 | 5.0            | --      |   |    |
| **MS-long**          |                |         |   |    |
| “                    | --             | 10.0    |   |    |
| **Starch sources**   |                |         |   |    |
| “                    | 4.2            | 3.2     |   |    |
| **Soybean meal**     |                |         |   |    |
| “                    | 1.2            | 1.1     |   |    |
| **Sugar beet puls**  |                |         |   |    |
| “                    | 1.3            | 1.0     |   |    |
| **Bran**             |                |         |   |    |
| “                    | 0.3            | 0.4     |   |    |
| **Straw**            |                |         |   |    |
| “                    | 0.7            | --      |   |    |
| **Min-vit**          |                |         |   |    |
| “                    | 0.4            | 0.4     |   |    |
| **Dry matter**       |                |         |   |    |
| %                    | 57.7           | 50.6    | **| 2.3|
| **Crude protein**    |                |         |   |    |
| %dm                  | 13.2           | 13.3    | NS| 0.7|
| **NDF**              |                |         |   |    |
| %dm                  | 32.2           | 31.7    | NS| 2.2|
| **Starch**           |                |         |   |    |
| %dm                  | 33.0           | 33.0    | NS| 1.8|
| **F : C ratio**      |                |         |   |    |
| %dm                  | 32: 68         | 45 : 55 |   |    |

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Growth performance, ruminating behaviour and dressing out of finishing Limousine bulls fed the two experimental diets

|                      | MS-Short+Straw | MS-Long | P   | SE |
|----------------------|----------------|---------|-----|----|
| Live weight:         |                |         |     |    |
| - Initial            | 426            | 426     | NS  | 7  |
| - Final              | 622            | 613     | NS  | 39 |
| Average daily gain   | 1.43           | 1.35    | NS  | 0.25 |
| Ruminating time:     |                |         |     |    |
| - / kg DM            | 35             | 40      | *   | 3.0 |
| - / kg NDF           | 107            | 125     | *   | 9.9 |
| Dressing out         | 62.6           | 62.0    | NS  | 16.3 |

*P < 0.05.
The animal welfare issue

EU Directives 91/629/CEE e 97/2/EC

No EU regulation in force

Main deficiencies of our rearing facilities

• Housing pens with **fully** slatted floor

• Total **lack** of dedicated alleys & ramps for moving and loading cattle before transport to the abattoir
Italy has still a prominent position in the European scenario of beef cattle production

Solutions are needed to solve impellent issues, first of all the environmental impact of the intensive farms

These solutions must be based on robust scientific knowledge to be accepted by stakeholders & official institutions

Veal and beef producers and the scientific community should work together in a common effort to defend and promote our rearing systems