

## BEEF PRODUCTION SYSTEM OF SICILIAN LOCAL BREEDS. PRELIMINARY REMARKS

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### Background

The Italian bovine resource is largely represented by animals specialised for the production of milk, and therefore a high quota of meat of a national matrix comes from those subjects that reach the slaughterhouse or the end of their productive career or as young fattened animals. The cross-breeding of dairy cattle with bulls specialised for beef, for the production of quality veal, is one of the main strategies suggested to improve the productive potentialities of the national bovine resource.

Even in Sicily they have recourse to cross-breeding in order to improve the production of beef both quantitatively and qualitatively, employing as a maternal breed autochthonous genetic types and paternal breed bulls specialised for beef (Zumbo *et al.*, 1998). These animals are reared commonly following the cow-calf pairs, which represents a solution for the preservation of the autochthonous genetic resource and the employment of the marginal areas through the utilisation of the forage resources naturally present, at times scarcely or not at all exploited.

As we should like to obtain the greatest productive response from the breeding it is necessary to know the best genetic combination obtainable and therefore which are the races for beef from which to choose the bulls to inseminate the dairy cattle. As the productive response can vary even with the weight at slaughter, the breeding conditions, the diet, it is also opportune to know the influence of these factors in fattening the cross-breeds. Given the importance and the vastness of the topic, the Agriculture and Forest Regional Assessorship of the Sicilian Region with the research project: *Quality and Tracing of Sicilian meat*, co-ordinated and carried out by the Consortium of Meat Research, intends to draw up a detailed map of the quality of the meat produced in Sicily, as well as testing indirectly the different typologies of breeding that is better linked to the production, the quality and the commerce of meat produced with specific requirements.

### Objectives

The specific objective of this part of research work is to study the chemical composition and the nutritional characteristics of beef produced in Sicily and deriving from the cross-breeding with autochthonous populations.

### Methods

The research was carried out on twenty cross-bred calves, 10 males and 10 females, weaned in a natural way, deriving from autochthonous Sicilian cows and a Charolaise bull. The animals, up to the age of 9 months were kept in extensive conditions and utilised the available pasture for feeding. Only 90 days before slaughter, at a live weight of  $450 \pm 20$  kg they were transferred to a collective stable and fed with 6 kg/head/die of concentrate and 3 kg/head/die of wheat straw. The chemical composition (Crude Protein: CP; Ether Extract: EE; Non Structural Carbohydrates: NSC; Ash; Neutral Detergent Fibre: NDF; Acid Detergent Fibre: ADF; Acid Detergent Lignin: ADL) of the feeding (Table 1) was determined according to the A.O.A.C. (1995) official methods. All the subjects at the age of 12 months were slaughtered after fasting from food for 12 hours, but not from water (A.S.P.A. 1991). A sample cut of meat carrying out of two perpendicular sections at the vertebral column in correspondence with the cranial margin of the VIII and the IX rib (Andrighetto *et al.*, 1996) was taken from the right half carcass of each subject, after 8 days of ripening at a temperature of 4°C and R.H. of 80% (A.S.P.A., 1996). After the dissection of the sample cut the area of the muscle *Longissimus thoracis* was individuated, freed from the perimysium and a sample was prepared on which the following analytic determinations were carried out: humidity, proteins, lipids, ashes, minerals and vitamins, according to the A.O.A.C. (1995) official methods. The energy was calculated using the coefficients 16.7 kJ/g for the proteins and 37.7 kJ/g for the lipids (Fidanza & Liguori, 1988). The data obtained were subjected to the statistic analysis for the calculation of the mean, standard deviation and of the *t*-test (SAS, 2001) to evaluate any eventual differences between the males and females.

### Results and discussion

Table 2 shows the mean values of the chemical composition and the energetic value of the muscle *Longissimus thoracis*. The statistic analysis showed no significant differences between males and females in relation to the nutritional characteristics of the meat (Table 2), the mean values, however, are within those reported in the directive 90/4967CEE relative to the nutritional labelling of the food products.

The average percentage content in the protein was similar to the results found on the same muscle by Poli *et al.* (1994) on Chianina (22.09%), Charolaise (22.34%) and Limousine calves (22.67%) by Renand *et al.* (2002) on Aubrac calves (22.40%), by Destefanis *et al.* (1993) on Piemontese calves (22.25%) and by Sañudo *et al.* (1999) on Pirenaica calves (22.3%); but higher than that found by Renand *et al.* (2002) on Salers calves (21.8%) by Biagioli *et al.* (1984) on Chianina x Maremmana (21.57%), Charolaise x Maremmana (21.60%) cross breeds and by Sañudo *et al.* (1999) on Retinta calves (21.1%).

The average content in intramuscular lipids, equal to 1.45% (Table 2), is lower than the results found by Cutrignelli (2000) on Podolici calves (2.51%), by Renand *et al.* (2002) on Salers calves (2.4%), by Roux *et al.* (1993) on Charolaise calves (2.60%), by Sañudo *et al.* (1999) on Pardo Albina calves (2.84%); but higher than that found by Destefanis *et al.* (1993) on Piemontese calves (0.71%); as reported by Lawrie (1983) according to whom the intramuscular fat is less in the muscles of double rump cattle. The content in ashes was similar to that reported by different authors in literature. The content in vitamins and minerals (Table 3, 4) are within the range reported by Manfredini (1988) and Fidanza & Liguori (1988) for veal.

The results observed point out how the content in proteins, ashes, minerals and vitamins has shown no significant differences with the most commonly reared genetic types, while, the fat content has been particularly lean.

### Conclusions

However, the preliminary results point out the validity of the valorisation of the autochthonous genetic types to produce beef in the internal areas of Sicily, maintaining the ordinary breeding conditions. The employment of the Charolaise bull in cross-breeding with Sicilian cows has given off meat of good nutritional characteristics, comparable to those of the best races specialised for meat.

Table 1. Chemical composition of feeding

|                | Concentrate | Wheat straw |
|----------------|-------------|-------------|
| Dry matter (%) | 88.84       | 91.01       |
| In DM (%)      |             |             |
| CP             | 17.97       | 2.81        |
| EE             | 3.10        | 1.58        |
| NSC            | 53.43       | 10.40       |
| Ash            | 5.29        | 7.19        |
| NDF            | 22.21       | 78.02       |
| ADF            | 7.04        | 48.71       |
| ADL            | 0.84        | 4.74        |

Table 2. Nutritional characteristics of *Longissimus thoracis* (on wet basis; mean  $\pm$  SD)

|               | males + females    | males              | females            | P    |
|---------------|--------------------|--------------------|--------------------|------|
| Water (%)     | 74.70 $\pm$ 1.36   | 74.66 $\pm$ 1.45   | 74.77 $\pm$ 0.60   | 0.32 |
| Protein (%)   | 22.28 $\pm$ 0.77   | 22.37 $\pm$ 0.91   | 22.14 $\pm$ 0.60   | 0.43 |
| Fat (%)       | 1.45 $\pm$ 0.56    | 1.59 $\pm$ 0.51    | 1.24 $\pm$ 0.64    | 0.20 |
| Ash (%)       | 1.04 $\pm$ 0.13    | 1.07 $\pm$ 0.04    | 0.99 $\pm$ 0.20    | 0.24 |
| Energy (kJ/g) | 426.93 $\pm$ 26.49 | 433.67 $\pm$ 26.08 | 416.81 $\pm$ 27.28 | 0.18 |

Table 3. Mineral content of *Longissimus thoracis* (on wet basis; mean  $\pm$  SD)

|            | males + females      | males                | females             | P    |
|------------|----------------------|----------------------|---------------------|------|
| Ca (mg/kg) | 91.42 $\pm$ 3.85     | 76.64 $\pm$ 3.51     | 116.06 $\pm$ 8.89   | 0.23 |
| P (mg/kg)  | 1824.08 $\pm$ 121.19 | 1835.38 $\pm$ 148.42 | 1805.25 $\pm$ 80.58 | 0.36 |
| Fe (mg/kg) | 18.36 $\pm$ 6.43     | 16.84 $\pm$ 7.02     | 20.90 $\pm$ 8.70    | 0.38 |

Table 4. Vitamin content of *Longissimus thoracis* (on wet basis; mean  $\pm$  SD)

|                    | males + females    | males              | females            | P    |
|--------------------|--------------------|--------------------|--------------------|------|
| Vitamin A (UI/kg)  | < 500              | < 500              | < 500              | ---  |
| Vitamin B1 (mg/kg) | 1.22 $\pm$ 0.37    | 1.18 $\pm$ 0.02    | 1.30 $\pm$ 0.43    | 0.35 |
| Vitamin B2 (mg/kg) | 0.12 $\pm$ 0.02    | 0.12 $\pm$ 0.02    | 0.12 $\pm$ 0.02    | 0.43 |
| Vitamin C (mg/kg)  | 107.25 $\pm$ 45.12 | 117.60 $\pm$ 54.95 | 90.00 $\pm$ 19.31  | 0.17 |
| Vitamin PP (mg/kg) | 268.17 $\pm$ 26.93 | 260.08 $\pm$ 29.01 | 281.66 $\pm$ 20.45 | 0.13 |

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