Evaluation of the Violino-producing aptitude in does e chevon: slaughter performance and meat quality

A. Gaviraghi\textsuperscript{1,3}, F. Saltalamacchia\textsuperscript{2}, A. D’Angelo\textsuperscript{1,3}, L. Noè\textsuperscript{1,3}, M. Iacurto\textsuperscript{2}, M. Mormile\textsuperscript{2}, G. F. Greppi\textsuperscript{1,4}

\textsuperscript{1} Istituto Sperimentale Italiano “L. Spallanzani”. Rivolta d’Adda, Italy
\textsuperscript{2} Istituto Sperimentale per la Zootecnia. Consiglio per la Ricerca e la Sperimentazione in Agricoltura, Monterotondo, Italy
\textsuperscript{3} Agricoltura e Ricerca s.c. Milano, Italy
\textsuperscript{4} Dipartimento di Scienze Cliniche Veterinarie. Università di Milano, Italy

Corresponding author: Alessandro Gaviraghi. Istituto Sperimentale Italiano “L. Spallanzani”. Loc. la Quercia - 26027 Rivolta d’Adda (CR), Italy - Tel. +39 0363 78883 - Fax: +39 0363 37047981 - Email alessandro.gaviraghi@isils.it

ABSTRACT: The aim of this work was to determine the slaughter performance and some chemical and physical characteristics of dairy does whose thighs were used to make the traditional ham called violino and of chevons. Moreover, the aptitude to produce the violino by chevons slaughtered at the age of one year was assessed. The rate of animals suitable to produce the violino was 57\% for the chevons. Physical parameters and chemical composition of the meat resulted similar between the two classes of animals. Thus, rearing some chevons in a dairy farm could be a further way to increase the incomes of the farmers.

Key words: Goat meat, Meat quality, Goat ham (Violino).

INTRODUCTION – The violino is a traditional meat product obtained from goats of either local breeds (Frisa), or cosmopolitan (Alpine, Saanen) and their crossbred. It is a particular ham produced with the thighs cured and stored for up to three month and it is a typical good of Valtellina and Valchiavenna, two valleys located in the province of Sondrio. Usually, the violino is obtained from females of dairy goats but not all the these are suitable to produce this typical salted air-dried ham. In order to make the violino, the does should have thighs with a right shape and conformation, weigh more than two kg and without any sort of defects such as excessive fat infiltration, synovitis, bursitis and other inflammation status. The meat which is not utilised for the violino is used to produce the salame and the salamino, two types of salami obtained by mixing goat ground meat, pork ground meat and pork fat in different proportions. To promote the violino, a rigorous evaluation of the slaughter performance and meat quality is very important. Moreover, in the last years, due to the fact that the market requires goat milk throughout the year, births are no more concentrated in spring and the market value of kids in seasons other than Easter time drops dramatically. The production of violino from chevons would therefore provide added market value to goat production in this area. A survey was carried out to assess slaughter performances, chemical and physical characteristics of the meat of does whose thighs are used to make the violino. Furthermore, the capacity to produce the violino by chevons slaughtered at the age of one year was evaluated and their raw meat quality was analysed.

MATERIAL AND METHODS – The survey was carried out on 40 does and 29 chevons at the age of 337 days (±15 days). At slaughter, body weight was recorded. At carcass dissection (48 hours after slaughtering), the weight of the carcass and the thighs were recorded. The carcass yield and the percentage of thighs on the carcass were calculated. Then, on a sample of 23 does and 27 chevons the entire Longissimus thoracis muscle (LT) was removed from the right side of each carcass to determine meat quality.
The following analysis were carried out according to the A.S.P.A. procedures (1996): colour (CIELAB colour space: L∗, a∗, and b∗, Chroma, Hue), pH, thawing loss (TL), drip loss (DL), cooking loss (CL), Warner Bratzler Shear Force (WBS) on raw and cooked meat. Dry matter, ash, protein and lipid contents were determined according to the A.O.A.C. (1995). A one-way analysis of variance was performed.

RESULTS AND CONCLUSIONS – The rate of chevons suitable for violino production was 57 %.
The carcass weight of the chevons resulted lower than that of the does, the incidence of the thighs was higher in the chevons (Table 1).

Table 1. Slaughter performance of does and chevons.

|                     | Does (n=40) |          | Chevon (n=27) |          | P       | SE       |
|---------------------|-------------|----------|---------------|----------|---------|----------|
| Body weight (kg)    | 59,51       | 13,73    | 34,88         | 5,93     | <0.001  | 2,72     |
| Carcass weight (kg) | 23,76       | 5,61     | 16,08         | 2,79     | <0.001  | 1,13     |
| Carcass yield (%)   | 40,04       | 3,11     | 46,14         | 2,72     | <0.001  | 0,72     |
| Thigh weight (kg)   | 2,54        | 0,43     | 2,11          | 0,38     | <0.001  | 0,07     |
| Percentage of weight thighs (%) | 10,91 | 1,31  | 13,19         | 1,01     | <0.001  | 0,21     |

This and the usually lower number of meat defects in the thighs of the chevons can explain the higher number of hams obtained from the chevon.
As with most livestock species, age and sex influence meat properties.
PH values (Table 2) were both greater than 5,7, Simela et al., (2004) indicated that goats were particularly prone to stress caused by pre-slaughter handling.
Consequently most goat carcasses had very low glycolytic potential at slaughter and attained high pH regardless of age, sex and pre-slaughter conditions. As well-known, pH influences many characteristics of meat such as the water holding capacity and colour parameters.
The chevons had higher (P<0.001) percentage of thawing loss than does (Table 2), while the drip loss followed an opposite trend (P<0.001). These results were in agreement with Schönfeldt et al., (1993b) that found enhanced drip loss in old goats. Regarding cooking loss, a similar development in all samples was found.
Moreover, in chevons the amount of liquid losses at thawing was considerable whereas in does the main effect of dripping was established.
According to McMillin and Brock (2005), WBS values on raw meat resulted higher (P<0.001) in does (Table 2). Conversely, WBS values on cooked meat were higher in chevons than in does, but the differences were not relevant. However, Johnson et al., (1995b) reported that the shear force values of LT muscles from female carcasses were lower than those from castrated male carcasses, which had lower shear force values than the muscles from intact male carcasses.
Colour parameters, particularly yellowness values (b∗) and Chroma, were significantly influenced by the sex and age classes. Does had higher (P<0.001) yellowness values than chevons.
These results could be due to an intensive utilization of the pasture by the does that increased the carotene content of their meat.
The chemical composition of LT seemed not to be influenced by the sex and age classes, as reported by McMillin and Brock (2005).
Physical parameters and chemical composition of the meat resulted similar between the two classes of animals. The meat of the chevons can be considered suitable to produce the violino and probably the percentage of thighs utilized for the manufacturing process could be improved.
Therefore, rearing chevons in dairy farms to produce violino could be a way to enhance the production of this typical product and to improve the farmer’s income.
The authors would like to thank Carlo Gianoncelli and all the butchers at “Strigiotti Sergio s.n.c.” for their kind collaboration.

The research was supported by Regione Lombardia (Hircus Meat Project) and P.I.C. Interreg III A 2000-2006 Italia-Svizzera Project.

REFERENCES – A.O.A.C., 1995. Official methods of analysis. Ed. Washington, D.C., U.S.A. A.S.P.A., 1996. Metodiche per la determinazione della qualità della carne. Università degli Studi di Perugia. Johnson, D. D., J. S. Eastridge, D. R. Neubauer, and C. H. McGowan. 1995a. Effect of sex class on nutrient content of meat from young goat. J. Anim. Sci. 73:296–301. McMillin K. W., and Brock A. P. Production practices and processing for value-added goat meat. J. Anim. Sci. 2005. 83:E57-E68. Schönfeldt, H. C., R. T. Naudé, W. Bok, S. M. van Heerden, and L. Sowden. 1993b. Cooking- and juiciness-related quality characteristics of goat and sheep meat. Meat Sci. 34:381–394. Simela L., Webb E.C., Frylinck L. 2004. Effect of sex, age and pre-slaughter conditioning on pH, temperature, tenderness properties and colour of indigenous South African goats. S. Afr. J. Anim. Sci. 34 (Supplement 1): 208-211.

Table 2. Physical parameters, colour and chemical composition of Longissimus thoracis of does and chevon.

|                      | Does (n=23) | Chevon (n=27) |
|----------------------|-------------|---------------|
|                      | Mean       | SD           | Mean       | SD           | P   | SE  |
| **Physical parameters** |            |              |            |              |     |     |
| pH                   | 5,92       | 0,31         | 5,78       | 0,18         | n.s. | 0,07 |
| TL (%)               | 1,12       | 0,91         | 4,85       | 1,83         | <0,001 | 0,42 |
| DL (%)               | 1,85       | 0,92         | 0,94       | 0,43         | <0,001 | 0,20 |
| CL (%)               | 19,56      | 5,53         | 18,47      | 4,00         | n.s.  | 1,35 |
| WBS raw (kg/cm²)     | 5,98       | 1,32         | 4,53       | 1,24         | <0,001 | 0,38 |
| WBS cooking (kg/cm²) | 4,85       | 1,13         | 5,14       | 1,66         | n.s.  | 0,44 |
| **Colour**           |            |              |            |              |     |     |
| L*                   | 35,18      | 5,24         | 37,11      | 3,64         | n.s.  | 1,26 |
| a*                   | 13,01      | 2,79         | 11,59      | 2,51         | n.s.  | 0,75 |
| b*                   | 11,65      | 2,37         | 9,83       | 1,72         | <0,01  | 0,58 |
| Chroma               | 17,55      | 3,24         | 15,27      | 2,63         | <0,01  | 0,83 |
| Hue                  | 41,95      | 5,37         | 40,60      | 5,74         | n.s.  | 1,58 |
| **Chemical composition** |        |              |            |              |     |     |
| Dry matter (%)       | 26,02      | 1,87         | 26,20      | 1,43         | n.s.  | 0,49 |
| Protein (%)          | 21,88      | 1,64         | 21,70      | 1,55         | n.s.  | 0,48 |
| Fat (%)              | 3,01       | 1,38         | 3,13       | 1,45         | n.s.  | 0,42 |
| Ash (%)              | 1,13       | 0,10         | 1,37       | 0,52         | n.s.  | 0,12 |