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Use of Narbonne vetch grain (*Vicia narbonensis*) in Charolaise bull feeding: effect on *in vitam* and *post mortem* performances and on quality of meat

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ABSTRACT: The addition of Narbonne vetch grain in the diet of 20 Charolaise bulls (420 ± 44 BW), during the finishing period (100 days), was investigated to study the effects on *in vitam* and *post mortem* performances and on quality of meat. No significant differences for ADWG ("Vetch" 1.55 kg/d vs. "Control" 1.40 kg/d; P = 0.34), FCR ("Vetch" 7.10 kg/kg vs. "Control" 7.49 kg/kg; P = 0.93) and yield ("Vetch" 60.97% vs. "Control" 62.13%; P = 0.33) were observed. The nutritional and physical characteristics of *Longissimus thoracis et lumborum* muscle showed no significant differences for Crude Protein ("Vetch" 22.47 vs. "Control" 22.36; P = 0.80), Fat ("Vetch" 2.56 vs "Control" 2.49; P = 0.87), Energy ("Vetch" 1130 vs. "Control" 1119; P = 0.79), TBARs ("Vetch" 0.063 vs. "Control" 0.069; P = 0.72), Luminosity ("Vetch" 46.47 vs. "Control" 43.43; P = 0.11), Hue ("Vetch" 0.6 vs. "Control" 0.6; P = 0.16), Chrome ("Vetch" 27.64 vs. "Control" 25.5; P = 0.56), Cooking loss ("Vetch" 26.77% vs. "Control" 28.62%; P = 0.33) and WBS ("Vetch" 3.4 kg f/cm² vs. "Control" 3.3 kg f/cm²; P = 0.76). These preliminary results show interest towards the vetch grain as a protein source in the finishing period of bulls.

Key words: Protein source, Vetch, Beef performance, Meat quality.

INTRODUCTION – Nowadays, the evaluation of protein source alternative to soybean, with nutritional characteristics suitable to satisfy the animals requirements for their productions represents a critical point (Rubio *et al.*, 1995; Morbidini *et al.*, 2005). In this context, the presence in Sicily of autochthonous grain legumes could represent a possible solution for the internal area, their market connection and the main utilizations of them as alternative protein source of bull feeding. The aim of this study was to evaluate the effects on some *in vitam* and *post mortem* performances, so as on meat quality of beef cattle fed a concentrate containing vetch grain as a partial substitute to soybean meal.

MATERIAL AND METHODS – The trial was carried out on 20 Charolaise bulls, homogeneous for age (11 ± 1.4 months) and body weight (420 ± 44 kg). During the finishing period (80 days, preceded by a 20-day adaptation period), the animals were fed with two isoenergetic and isonitrogenous diet constituted by concentrate (as fed: 7.5 kg/head/day for 50 days; 8.5 kg/head/day from day 51 to slaughtering), straw (1.25 kg/head/day, as fed) and depectinated citrus pulp (8.5 kg/head/day, as fed) and divided into two homogenous groups of 10 each called "Control" and "Vetch" (10 % of Narbonne vetch (*Vicia narbonensis* L.), CV. *Velox* into the concentrate instead of soybean meal). The chemical composition of feeds was analysed by AOAC (2000) official methods (table 1). Every 20 days, body weight (electronic scale, Marchall Pesage), average daily weight gain (ADWG) and feed conversion rate (FCR) were determined. The animals were slaughtered after 12 hours of fasting (ASPA, 1991) and on each half-carass the pH (Hanna Instruments HI 9025 CE) was measured at 45 min (pH₄₅) and 24 hours (pH₂₄).

Table 1. Chemical composition of feeds (%).

	"Vetch"	"Control"	Straw	Citrus pulp
Dry Matter	90.11	89.97	93.41	15.56
Crude Protein (on DM)	15.23	15.37	2.59	9.92
Ether Extract (on DM)	3.57	3.52	1.65	4.56
Crude Fibre (on DM)	5.09	4.29	37.81	33.87
Ash (on DM)	5.00	5.03	6.89	4.14

Individual samples of *Longissimus thoracis et lumborum* muscle (T8-L1) were taken (ASPA, 1996) to determine the physical (ASPA, 1996) and chemical (AOAC, 2000) characteristics; the energy content was calculated by using the coefficients proposed by Fidanza and Liguori (1988). pH, colour (CIE L*a*b* System; DV Spectral Scanner) and oxidative stability (TBARs) (Faustman et al., 1992) were measured at 3, 5 and 7 days to evaluate the shelf life of meat. Cooking loss (Honikel, 1998) and tenderness (Warner - Bratzler Shear force; INSTRON 5542) were determined at day 7. Data were subjected to ANOVA (proc. GLM by SAS, 2001).

RESULTS AND CONCLUSIONS – No significant differences between the Vetch and the Control group were observed for *in vitam* and slaughtering performances (table 2).

Concerning the quality of meat, the chemical (table 3) and physical (table 4) characteristics showed similar values in both groups, even if slightly higher values for Chroma and lower values for Cooking loss were observed for Vetch group compared to the Control ones.

Table 2. In vitam and slaughtering performance (mean ± SD, P).

	"Vetch"	"Control"	P
ADWG (kg/day)	1.55	1.39	0.34
Final weight (kg)	591.23	598.71	0.66
FCR (kg/kg)	7.10	7.49	0.93
Yeld (%)	60.97	62.13	0.33
pH1	6.75	6.79	0.29
pHu	5.34	5.54	0.24
pH3	5.42	5.51	0.06
pH5	5.19	5.49	0.19
pH7	5.45	5.46	0.85

Table 3. Chemical characteristics (g/100g) of the meat in relation to the diet (mean ± SD, P).

	"Vetch"	"Control"	P
Moisture	73.55 ± 1.14	73.87 ± 1.00	0.60
Crude Protein	22.47 ± 0.63	22.36 ± 0.88	0.80
Fat	2.56 ± 0.68	2.49 ± 0.92	0.87
Ash	1.11 ± 0.03	1.10 ± 0.05	0.74
Energy (Kcal/kg)	1130 ± 6.2	1119 ± 8.3	0.79

The oxidative stability of the muscle showed no significant variations between the two groups (table 5), testifying a good resistance of the intramuscular lipids to oxidation.

These preliminary results show the necessity of a better knowledge of the nutritional characteristics of the vetch grain in order to optimise its utilisation as a protein source into the diet of finishing bulls. This could help to reduce the cost of the diet without modifying *in vitam* and *post mortem* performances, and the meat quality too, as well as to valorise Sicilian autochthonous species destined to the manufacturing industries.

Table 4. Physical characteristics of the meat in relation to the diet at day 7 (mean \pm SD, P).

	"Vetch"	"Control"	P
Luminosity	46.47 \pm 1.8	43.43 \pm 2.9	0.11
Hue	0.6 \pm 0.0	0.6 \pm 0.0	0.16
Chroma	27.64 \pm 1.5	25.5 \pm 2.4	0.56
WBS (kg f/cm ²)	3.4 \pm 0.8	3.3 \pm 0.4	0.76
Cooking loss (%)	26.77 \pm 3.1	28.62 \pm 3.6	0.33

Table 5. TBARs trend during storage (Absorbance at 532 nm).

	"Vetch"	"Control"	P
Day 3	0.046	0.047	0.92
Day 5	0.047	0.050	0.56
Day 7	0.063	0.069	0.67

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