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Gochu Asturcelta semiextensive production: Carcass and meat quality and fatty acid profile

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Abstract. The breeders association of Gochu Asturcelta (ACGA), has recovered Asturcelta pig breed. The aim of this work is to characterize the carcass and meat produced. Sixteen carcasses were used and carcass weight, dressing percentage and fatness were assessed. Likewise, meat quality parameters as pH, colour (L*, a*, b*), proximal chemical composition, fatty acid profile, water holding capacity, instrumental texture (Warner-Braztler) and sensory analysis were performed. Average carcass weight and dressing percentage were 180 ± 30 kg and 79 ± 3% respectively. Thickness subcutaneous fat was higher than common modern breeds (44 ± 9 mm 6th and 54 ± 6 mm *gluteus medius*). Meat colour measurements revealed lower L* and higher a* values than common commercial breeds. Chemical composition revealed a high intramuscular fat content (9.2 ± 3.5%FM), but fatty acid profile showed a higher content in MUFA than common modern breeds. Water holding capacity was higher than commercial hybrids. Instrumental texture and sensory analysis show that this meat could be defined as tender, juicy and with good palatability.

Keywords. Pork – Carcass – Meat – Fatty acids.

Production semi-extensive du Gochu Asturcelta : Qualité de la carcasse et de la viande et profil en acides gras

Résumé. *L'association des éleveurs Gochu Asturcelta a repris l'élevage de porc Asturcelta. L'objectif de ce travail est de caractériser la carcasse et la viande de ce produit. Seize carcasses ont été utilisées et le poids de la carcasse, le rendement vrai et l'engraissement ont été établis. De même, les paramètres de qualité de la viande comme le pH, la couleur (L*,a*,b*), la composition chimique proximale, le profil en acides gras, la capacité de rétention d'eau, la texture instrumentale (Warner-Bratzler) et l'analyse sensorielle ont été étudiés. Le poids de la carcasse et le rendement vrai étaient de 180 ± 30 kg et de 79 ± 3%. L'épaisseur de la graisse sous-cutanée était plus élevée que chez les races commerciales plus communes (44 ± 9 mm 6th et 54 ± 6 mm sur le* Gluteus medius*). La mesure de la couleur de la viande a révélé un L* plus faible et a* plus élevé que chez les races commerciales. La composition chimique a montré une graisse intramusculaire élevée (9,2 ± 3,5 %) et le profil en acides gras a montré une quantité plus élevée de MUFA que la moyenne. La capacité de rétention d'eau était plus élevée que chez les races commerciales. La texture instrumentale et sensorielle montre que la viande peut être définie comme tendre, juteuse et savoureuse.*

Mots-clés. *Porc – Carcasse – Viande – Profil en acides gras.*

I – Introduction

The changes at world meat markets over the past decade and the improvement in the educational and economical conditions of most consumers have increased the demands in meat they consume. As a consequence, consumers are searching for meat that has characteristics that differ from the most commonly consumed meat. Today, consumers are better informed and more concerned about genetic reserve, production systems and the environment and animal welfare requirements (Fortina *et al.*, 2005; Meinert *et al*., 2008).

Under this framework, the breeders association of Gochu Asturcelta (ACGA), supported by Principado de Asturias, has recovered Asturcelta pig breed, through a genetic selective program carried out by SERIDA. This Spanish local breed, originated from ancient Celtic breed, characterized by medium-sized and rusticity, is located in the North of Spain. In this area, the natural constraints from the climate and the geography seem to be unfavourable to mass meat production at low cost; consequently, the use of natural sources could be profitable to rear these animals. To produce a high quality meat, however, it is necessary to evaluate variables related to animal production, such as genetic and management properties, as well as variables associated with the processing of meat. In this sense, breed is an important factor that might influence the characteristics of the finished product; therefore, it is presumable that carcass and meat obtained could be different form the most common pork commercialised. Thus, this meat could become an appreciated product that could be sold at high prices in specialty markets and restaurants, and could be considered a profitable alternative for achieving the objective of sustainable meat production, meeting at the same time the European Union requirements about production system, extensification and territory use to contribute to the livelihood of rural population. Te aim of this work was to describe the carcass and meat characteristics of Gochu Asturcelta breed.

II – Materials and methods

Sixteen carcasses of Gochu Asturcelta breed were used. Carcass weight, dressing percentage and backfat thickness (6th rib and M. *gluteus medius* level) were assessed. After the carcasses were cooled for 24 h at 4ºC, the M. *longissimus thoracis* muscle between the 6th and 11th ribs was removed from the left carcass side and divided in portions to analyze meat quality.

In this sense, the following meat quality parameters were analyzed: pH, muscle colour (L*, a*, b*) using the m. *longissimus thoracis* at the 6th rib, proximal chemical composition (moisture, protein and fat content), fatty acid profile, water holding capacity (cooking losses) and instrumental texture (Warner-Braztler). Likewise, in order to perform sensory analysis (descriptive profile), loins were sliced in steaks about 2 cm thick and cooked in double-plate grill (preheated at 220ºC for 10 minutes) to an internal temperature of 70ºC. After cooking, each steak was wrapped in aluminium foil and kept hot until the time of assessment. Using a increasing 5-points scale, a trained eight- member sensory panel was asked for the following sensory characteristics: fresh colour, cooked colour, odour liking, tenderness, juiciness, flavour liking and overall liking.

Results are shown as means and standard deviations for each parameter.

III – Results and discussion

Carcass weight, carcass yield, thickness subcutaneous fat and ultimate pH are reported in Table 1. Average carcass weight and dressing percentage agreed to age at slaughter (14-18 months), and are within values commonly observed when modern hybrids are slaughtered at this age.

Table 1: Carcass characteristics of Gochu Asturcelta breed

Parameter	Average	Standard deviation
Carcass weight (kg)	180.4	30.2
Carcass yield (%)	79.4	3.4
Backfat thickness, 6ª rib level (mm)	44.0	9.0
Backfat thickness, *G. medius* (mm)	54.6	6.0
pH24 M. *longissimus thoracis*	5.78	0.17

Backfat thickness measurements were more closely related with Iberian pig values than with common commercial hybrids (Ramírez and Cava, 2007).

Regarding pH values, although average values were in the normal range, some animals showed pH values closed to the threshold of DFD meat, thus, the values were above those observed in commercial hybrids, but this values are in the line of other studies with local European breeds, who proposed an effect of muscular fibre type and an incomplete post mortem glicolisis, caused by a large of number of genetic factors, as hyposthesis to explain such results (Fortina *et al.*, 2005; Ryu *et al.*, 2008).

Table 2 summarizes nutritional characteristics of meat from Gochu Asturcelta. Intramuscular fat content was higher than average values observed in commercial hybrids. These data, even slightly higher than those obtained in other rustic local breeds (Fortina *et al.*, 2005; Gil *et al.*, 2008; Ryu *et al.*, 2008) confirm that these breeds are prone to adipogenesis.

Table 2: Moisture, fat, protein and fatty acid profile (summary) of Gochu Asturcelta meat

Parameter	Average	Standard deviation
Moisture (%)	69.1	2.9
Fat content (% FM)	9.2	3.5
Protein content (% FM)	21.4	0.9
Saturated fatty acid (%)	36.8	1.1
Monounsaturated fatty acid (%)	55.9	1.5
Polyunsaturated fatty acid (%)	7.3	1.1

Regarding fatty acid composition, several research studies involving different local Italian breeds (Fortina *et al.*, 2005; Pugliese, 2004; Meinert *et al.*, 2008) reported higher saturated, lower monounsaturated and higher polyunsaturated fatty acid percentages than those observed in our trial. These results could be explained by the different feeding system used. In that regard, in mentioned studies a common diet based on concentrates were offered to animals, whilst, in the present study, the feeding strategy included also concentrates but free access to roughage and some fruits such chestnuts. On the other hand, the lowest content in polyunsaturated fatty acid could be caused by the dilution effect of phospholipids rich in these fatty acids due to a high content of intramuscular fat.

The meat quality instrumental parameters and also the scores of sensory parameters given to Astrucelta pig meat are reported in Table 3. Lightness (L*), redness (a*) and yellowness (b*) indicate that Asturcelta pig breed provide darker, redder and yellowier meat than commercial breeds such as Landrace, or Large White. In this sense, Gil *et al.,* (2008) reported values ranged 46.0-48.0 for L*, 2.7-3.0 for a* and 3.6-4.3 for b* for these breeds. Likewise, water holding capacity measured as cooking losses was higher than commercial hybrids. This result could be related with the high content of intramuscular fat, as has been reported in other studies comparing different pig breeds (Pugliese *et al.*, 2004; Gil *et al.*, 2008; Meinert *et al.,* 2008)

Regarding Warner-Braztler shear force, values obtained corresponded with tender meat, although the meat studied was not aged, in consonance with the common practice in the pork industry, because only a slight improvement of tenderness is obtained after ageing in pork meat (Meinert *et al.,* 2008). However, our shear force values are lower than those observed in other studies (Pugliese *et al.*, 2004; Meinert *et al.,* 2008). In this sense, several factors are known to affect tenderness, such as connective tissue, intramuscular fat, which have a major impact (Wood *et al.*, 2004; Meinert *et al.*, 2008; Crawford *et al.*, 2010), thus, the higher content of intramuscular fat observed in our study, could have led to more tender meat.

Sensory evaluation provided medium to high scores for the majority of attributes assessed. The raw and cooked meat colour was scored as darker respect to conventionally commercial pork meat, which is consistent with colorimetric measurements. The scores given to pork meat studied (around 3.5 points in a 5 points scale), indicated that Asturcelta pig breed provides meat with sensorial values slightly above respect to the average.

Table 3. Colorimetric parameters (L*, a*. b*), instrumental texture (Warner-Braztler test) water holding capacity (cooking loses) and sensorial analysis (5 points scale) of Gochu Asturcelta meat

Parameter	Average	Standard deviation
Lightness (L*)	45.9	4.6
Redness index (a*)	6.7	1.7
Yellowness index (b*)	9.0	1.8
Warner-Braztler (kg)	4.3	1.4
Cooking loses (%)	15.2	3.2
Sensorial analysis		
Colour intensity (raw meat)	3.9	0.7
Colour intensity (cooked meat)	3.0	0.7
Odour liking	3.4	0.4
Tenderness	3.2	0.6
Juiciness	3.2	0.5
Flavour liking	3.6	0.3
Overall liking	3.3	0.4

IV – Conclusions

Asturcelta pig breed provide heavier and fatter carcasses than commercial breeds. Meat obtained is characterized by high fat content, with higher percentage of monounsaturated fatty acids than commercial breeds. Instrumental measurements and sensory analysis, show that this meat could be defined as tender, juicy and with good palatability.

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