# CONSUMER ANALYSES FROM BEEF FATTENED AT DIFFERENT PERIODS IN AN ORGANIC SYSTEM

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## Introduction

Carcass and meat quality of beef may depend on various factors, including breed, management system, as well as the consumption of different concentrate ration and slaughter weight. Feeding regimen influences nutritive value of meat, juiciness, hardness and flavour <sup>(1).</sup> The aim of this experience is to reveal the characteristics of beef meat, fattened by an organic feeding regimen (different rations) and two periods of fattening, through out instrumental analyses and consumer tests at two different times of storage.

### Materials and methods

Nineteen male yearlings from Avileña-Negra Ibérica breed type (a rustic breed from the Central area of Spain) were used. Animals were divided in two lots according their fattening period. Lot A, was formed by 10 animals fattened 97 days and Lot B, with 9 animals fattened during 137 days. The other studied factor was the feeding regimen with animals limited to 9 kg of concentrate/day with straw *ad libitum* and animals with a limit of 5 kg of concentrate/day with grass hay and straw *ad libitum*. Feed consumed by animals was entire of organic agricultural and controlled by the use of an individual transponder. All animals in lot B were eating the last ten days a daily ration of 9 kg of concentrate due to a computer failure. At the end of the fattening they were slaughtered in a commercial abattoir. M. *longissimus dorsi*, was removed (48 h post mortem) from the left side of carcass and steaks were cut. At this time, analyses like pH using a penetrating electrode, water-holding capacity (WHC) by compression <sup>(2)</sup> and intramuscular fat <sup>(3)</sup> were made. The dissection to obtain the percentages of muscle, total fat and bone was made at the 6<sup>th</sup> rib. The rest of steaks were vacuum-packaged and kept to 4°C until 7 and 14 days of storage to evaluate the effect of ageing period on meat quality.

166 consumer analyses were made by IMIDRA staff in different sessions to evaluate all meats. Meat samples were placed on aluminium-fold strips and grill-cooked to a core temperature of 80°C after the grill was preheated to 250°C. Each person tasted four lot/feeding/ageing combinations and valued tenderness, juiciness, flavour intensity and global acceptability on hedonic descriptive scales of seven points (organised from minor to major attribute intensity). Statistical analysis was carried out by analysis of variance (ANOVA) and using the GLM procedure (Statgraphics plus).

## **Results and discussion**

Productive data of young bulls during fattening under two types of organic feeding are shown in Table 1. Animals from lot A had a better carcass than lot B. We observe that animals with feeding 1 had a greater average daily gain and also greater concentrate consumption than animals from lot B, like it was expected. There was not a significant effect of feeding regimen on carcass weight.

	Lot		Fee	ding	P value			
	А	В	1	2	Lot	Feeding	LxF	m.s.e
LWS (kg)	579.69	564.90	578.46	566.129	0.513	0.584	0.653	2292.1
CD (%)	55.10	52.92	54.22	53.80	0.011	0.586	0.497	2.68
AS (d)	522.00	485.62	484.62	523.00	0.129	0.111	0.849	2411.6
ADG (kg/d)	1.36	1.47	1.62	1.22	0.215	0.000	0.789	0.03
RCW (kg)	319.40	299.07	313.54	304.94	0.136	0.515	0.494	292.7
Concentrate consumption	583.00	570.29	719.43	433.86	0.128	0.000	0.136	783.1

Table 1. Means of productive parameters during fattening period and results of carcasses.

LWS= Liveweight at slaughter; CD = carcass dressing (RCW\*100)/LWS; AS= age at slaughter; ADG= average daily gain; RCW= refrigerated carcass weight; Lot A= 97 days of fattening; Lot B= 137 days of fattening; Feeding 1= 9 kg concentrate/animal/day + straw *ad libitum*; Feeding 2= 5 kg concentrate/animal/day + straw + grass hay *ad libitum*; m.s.e=means square of the error.

Characteristics of beef obtained by instrumental analyses to define meat quality are observed in Table 2. The mean pH value was lightly smaller in lot B than lot A. A significant effect by the different ration was observed at the dissection of the  $6^{th}$  rib. Animals with limited concentrate intake were not able to depot fat and because of

this, meat had not a marbled aspect and resulted with a high percentage of muscle. An appropriate ration to animal requests improves the fat content (marbling) and reduces the collagen content that exists in the muscle <sup>(4)</sup>.

	Lot		Feeding		P value			
	A	В	1	2	Lot	Feeding	LxF	m.s.e
pН	5.49	5.42	5.47	5.44	0.014	0.355	0.666	0.00
IF (%)	2.13	2.34	2.36	2.12	0.593	0.535	0.791	0.70
WHC (%)	14.40	15.01	14.60	14.81	0.258	0.695	0.014	1.24
M/B (%)	2.40	3.47	2.37	3.50	0.053	0.043	0.556	1.22
M/TF (%)	6.69	7.38	5.57	8.50	0.466	0.007	0.933	4.10

Table 2. Instrumental characteristics of meat (means) at 48 h post mortem.

IF= intramuscular fat; WHC= water-holding capacity; M/B= ratio muscle/bone; M/TF= ratio muscle/ total fat; Lot A= 97 days of fattening; Lot B= 137 days of fattening; Feeding 1= 9 kg concentrate/animal/day + straw *ad libitum*; Feeding 2= 5 kg concentrate/animal/day + straw + grass hay *ad libitum*; m.s.e=means square of the error.

Hedonic tests showed that the main (significant) effects that influenced consumer satisfaction were the fattening and the ageing periods (Table 3). A higher ageing period resulted in a higher tenderness, flavour intensity and global acceptability values of meat. There was an interaction between the fattening and ageing period effects on tenderness and so we observed a greater variability in lot A as ageing time increased than in lot B. At any ageing time, meat from lot B was the best evaluated. Many authors have met a remarkable influence from animal age on tenderness, the younger the bull, the higher the tenderness until a certain age where tenderness falls as age increases <sup>(5)</sup>.

Table 3. Consumer responses based on hedonic test and Warner-Bratzler shear force test.

		Lot		Feeding		P value			
	Ageing	А	В	1	2	Lot	Feeding	Ageing	m.s.e
Tenderness	9 d	3.74	4.85	4.44	4.16	0.004	0.092	0.007	0.370
	16 d	4.81	4.93	5.07	4.66				
Juiciness	9 d	3.90	4.63	4.45	4.08	0.060	0.051	0.232	0.317
	16 d	4.49	4.48	4.67	4.30				
Flavour	9 d	4.05	4.62	4.41	4.27	0.016	0.543	0.027	0.238
intensity	16 d	4.59	4.83	4.74	4.68				
Overall	9 d	4.11	4.75	4.47	4.39	0.015	0.449	0.005	0.212
	16 d	4.81	4.95	4.96	4.80				

Ageing 16 d= 14 d of storage (vacuum packaged); Lot A= 97 days of fattening; Lot B= 137 days of fattening; Feeding 1= 9 kg concentrate/animal/day + straw *ad libitum*; Feeding 2= 5 kg concentrate/animal/day + straw + grass hay *ad libitum*; Ageing 9 d= 7 d of storage (vacuum packaged); m.s.e=means square of the error.

## Conclusions

Meat samples from animals fattened by organic feeding during a long period (137 days) and tasted after 14 days of storage were the best evaluated. Varying the forage:concentrate ratio supplied to animals were found lightly differences on instrumental characteristics but significant on body composition. A better tenderness and overall acceptability were obtained with a longer fattening and ageing periods.

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