MEAT FROM ABERDEEN ANGUS STEERS FINISHED ON PASTURE WITH SUPPLEMENTATION, CONCENTRATE OR PASTURE (1): FATTY ACIDS COMPOSITION AND HEALTH INDICES

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Abstract – The results showed that meat from animals finished on pasture, even when grains supplementation is adopted, have a lower level of C16:0, an atherogenic fatty acid, and a higher level of health favorable fatty acids such as the C18:3n3 (ALA), EPA and DHA. The n-3 fatty acids level were higher in meat from animals fed on pasture, even with supplementation, in comparison to concentrate. The thrombogenic indice is high in meat from animals fed on concentrate, but there are no differences for the atherogenic indice. In conclusion, meat from animals fed on pasture, even when supplemented with grains, produce healthier meat in regards to the fatty acids composition and some health lipid indices.

Key Words – Lipids health indices, *Longissimus dorsi* muscle, pasture and concentrate.

I. INTRODUCTION

In Uruguay, the meat production is mainly based on three systems: animals finished on pasture and supplementation (PS), concentrate (C) or pasture (PAS). Informed consumers generally consider meat finished on pasture as healthier than meat finished on concentrate [1-2]. However, there is limited scientific evidence which supports this concept in Uruguay [3]. Therefore, the objective of this investigation was to compare the fatty acids composition and some lipid health indices of meat from Aberdeen Angus (AA) steers finished on the different feeding systems used in the country.

II. MATERIALS AND METHODS

The meat was from the *Longissimus dorsi* of ten AA steers (24-28 months, 498-503 kg of live weight) reared and finished on pasture and supplement (corn grains) or finished on concentrate, both for 90 days before slaughtering. Concentrate was based on roughage/concentrate (30:60 on dry matter basis). Roughage consisted of whole plant sorghum silage, silo wet grain sorghum. Concentrate was soybean hulls and wheat bran, mineral sources, urea and ionophore. After slaughtering, carcasses were kept refrigerated at 1-2 ºC for 36 hours *postmortem* and then the *Longissimus dorsi* muscle (10-12th rib) was withdrawn and conserved at – 20 ºC until analysis. Fatty acids composition and the calculus of health indices have been done as previously described [4]. Results were statistically analyzed by ANOVA one-way procedure using NCSS 2007 software.

III. RESULTS AND DISCUSSION

PS and PAS fed animals showed a lower level of C16:0, a known atherogenic fatty acids, than C fed animals (Table 1). On other hand, the level of health favorable fatty acids such as C18:3n3 (ALA), EPA and DHA showed a higher content for PS and PAS versus C. The ALA showed even a higher level in PAS compared to PS (Table 1). In regards to the lipid health indices, the PS and PAS groups showed a higher n-3 level and a favorable n-6/n-3 ratio in comparison to the C group (Table 2). Furthermore, the thrombogenic indice was unfavorably higher in the C group than in the PS and PAS groups. However, the atherogenic indice was not different between the three groups. The results are in accordance with previous findings comparing animals fed on pasture versus concentrate [1-2]. The pasture versus concentrate, even when supplementation is adopted, not only helps produce a healthier meat in relation to the fatty acids composition and the cardio vascular diseases (CVD) health indices, it also enables the production of meat which presents favorable attributes in regards to nutrients such as minerals and vitamins, as it was found in other investigations [2].

IV. CONCLUSION

Taken together, the results support the idea that Aberdeen Angus steers finished on pasture, even when grain supplementation is included, promote the production of a CVD healthier meat, regarding the fatty acids composition, in comparison to animals produced on concentrate.

Table 1: Effect of different diet on the composition of fatty acids in Longissimus dorsi of AA meat

	Pasture + Supplement	Concentrate	Pasture	P
Fatty Acids				
C12:0	0.08 ±0.02	0.14 ±0.01	0.08 ±0.01	NS
C14:0	2.68 ±0.52	4.16 ±0.25	2.57 ±0.97	NS
C15:0i	0.32 ±0.04	0.23 ±0.03	0.26 ±0.02	NS
C15:0ai	0.33 ±0.05	0.16 ±0.04	0.29 ±0.02	NS
C14:1	0.37b ±0.07	0.75a ±0.07	0.32b ±0.03	<0.01
C15:0	0.69 ±0.12	0.55 ±0.05	0.65 ±0.03	NS
C16:0i	0.20 ±0.03	0.18 ±0.01	0.23 ±0.01	NS
C16:0	25.77b ±1.72	30.81a ±0.56	25.22b ±1.08	<0.05
C16:1	3.40b ±0.23	4.43a ±0.09	3.36b ±0.11	<0.01
C17:0	1.38a ±0.05	1.09b ±0.03	1.40a ±0.07	<0.01
C17:1	0.96a ±0.07	0.71b ±0.01	0.99a ±0.02	<0.02
C18:0	18.61a ±1.08	13.53b ±0.34	18.53a ±0.40	<0.01
C18:1	37.65 ±1.13	37.44 ±0.77	37.44 ±0.13	NS
C18:2n-6 LA	2.49 ±0.29	2.36 ±0.05	2.83 ±0.16	NS
C20:0	0.13 ±0.04	0.05 ±0.00	0.14 ±0.01	NS
C18:3n-6	0.08a ±0.00	0.02b ±0.00	0.02b ±0.00	<0.03
C20:1	0.12 ±0.01	0.15 ±0.01	0.14 ±0.01	NS
C18:3n-3 ALA	0.67a ±0.03	0.23c ±0.00	0.57b ±0.01	<0.01
CLA	0.42 ±0.06	0.30 ±0.02	0.43 ±0.00	NS
C20:3n-3	0.11a ±0.01	0.03b ±0.00	0.09a ±0.00	<0.01
C20:3n-6	0.14a ±0.02	0.08b ±0.01	0.12ab ±0.01	<0.03
C20:4n-6 ARA	0.32 ±0.06	0.24 ±0.01	0.28 ±0.01	NS
C20:5n-3 EPA	0.08a ±0.01	0.02b ±0.00	0.06a ±0.01	<0.01
C22:5n-3 DPA	0.05 ±0.01	0.04 ±0.01	0.03 ±0.00	NS
C22:6n-3 DHA	0.26a ±0.04	0.08b ±0.01	0.21a ±0.01	<0.02
Others	2.70 ±0.16	2.23 ±0.18	3.76 ±0.81	…..

Values are mean± SEM for meat from Aberdeen Angus (AA) steers. i= iso, ai=anteiso. CLA= isomer c9t11 of conjugated linoleic acid. Different lower cases within rows mean significant differences at level of p<0.05. P= level of signification. NS= no significant.

Table 2:Lipid Health indices calculated from results of Table 1

	Pasture + Supplement	Concentrate	Pasture	P
SAT	50.19 ±2.43	50.91 ±0.90	49.37 ±1.38	NS
MUFA	42.50 ±0.96	43.48 ±0.63	42.25 ±0.01	NS
PUFA	4.62 ±0.50	3.39 ±0.09	4.63 ±0.17	NS
n-6	3.05 ±0.38	2.70 ±0.06	3.24 ±0.18	NS
n-3	1.15a ±0.10	0.40b ±0.02	0.96a ±0.01	<0.001
n-6/n-3	2.63b ±0.12	6.83a ±0.33	3.39b ±0.22	<0.001
P/S	0.09 ±0.02	0.07 ±0.003	0.09 ±0.01	NS
Atherogenic Indices	0.78 ±0.11	1.02 ±0.04	0.76 ±0.05	NS
Thrombogenic Indices	1.08b ±0.12	1.43a ±0.06	1.07b ±0.06	<0.05

Values are means ±SEM. SAT, MUFA and PUFA mean Saturated, monounsaturated and polyunsaturated fatty acids, respectively. Different lower cases within rows mean significant differences at level of p<0.05. P= level of signification. NS= no significant.

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