THE FATTY ACID PROFILE OF LIPIDS FROM MULARD DUCK MUSCLES

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Background

The nutrition of poultry is one of the ways that offers a possibility to regulate both the quantity and quality of fat (Jensen 1997). From the human nutrition point of view, the content of fatty acids in lipids from muscles is very important. At present, there are tendencies to increase the level of monounsaturated fatty acis in human diets and decrease in saturated fatty acids. Morover the ratio of saturated to unsaturated fatty acids ought to be on the definite level (Skrabka-Błotnicka et al. 1999).
In Poland the method of force feeding of the waterfowl had been used until 01.01.1999. This practice is forbidden in Poland from this day. The force feeding of ducks and geese is very popular in other countries (France, Israel, Madagaskar, Lithuania, Hungary, Spain, Taiwan) for production of not only fatty liver but for tasty meat. This branch of poultry production has been developed intensively in these countries, for economic reasons.
We had been working on the Mulard duck muscles (force feeding) characteristic for several years.The part of the obtained results was presented by Wołoszyn et al. 1995 a,b, Przysiężna et al. 1996, Skrabka- Błotnicka et al. 1996, Wołoszyn 1997, 1998. No data have been in the literature concerning the fatty acids profile of lipids from these ducks muscles. Therefore the aim of this work was to present the results of our investigation on this topic.

Objectives

To study the fatty acid profile of lipids extracted from breast and leg muscles of force fattened Mulard drakes and ducks.

Materials and Methods

The material for examination were the breast and leg muscles cut out 24h. after killing from industrially slaughtered male and female Mulard ducks. The ducks were force fattened with maize for 14 days.
The fatty acid composition was carried out according to the standard BN 89/6130 - 03, using the Hewlett- Packard's Gas Chromatograph 5860, with the flame- ionization detector. The methyl estters of fatty acids were separated on the Supleco Supelcowax-10 column (30m x 0,53nm x 1,0μm). The column temperature was 253^{0}C, nitrogen was used as the carrier gas.
The results were subjected to statistical analysis. The T- Student's test was used to evaluate the differences between average values.

Results and Disscusion

The results are shown in table 1.
The fatty acids from C_{10} till C_{22} (breast muscles) and from C_{12} till C_{22} (leg muscles) were identified. It was established that the fatty acids $C_{16:1}$, $C_{18:0}$, $C_{18:2}$ in the breast muscles were affected by sex. There were determined in leg muscles the higher content of $C_{16:1}$, $C_{18:2}$, $C_{20:4}$ and lower $C_{20:1}$, $C_{18:0}$ than in breast muscles of the birds of both sexes. The unsaturated fatty (UFA) acids were predominant in the fatty acids composition. The monounsaturated fatty (MUFA) acids amounted to 53,0-55,0% and polyunsaturated (PUFA) to 9,0-11,8% of the global content of fatty acids. Leg muscles were characterized by higher level of polyunsaturated fatty acids than breast muscles of birds of both sexes. In this case, the duck muscles were especially different from other ones. The unsaturated / saturated (UFA/SFA) ratio was 1,6- 1,7 for breast muscles and higher- 1,9-2,0 for leg muscles. The highest content of oleic and palmitic acids among the identified fatty acids were stated. In the examined muscles the higher content of oleic acid and lower of stearic, linoleic and arachidonic acids was obtained than in results previously published by Salichon et al. (1993),Romboli et al. (1997) for Muscovy, Smith et al. (1993), Leskanich i Noble (1997) for Pekin and Guy and Rousselot- Pailley (1991) for Mulard no force feeding ducks. The palmitic acid content was similar to the value determined in Muscovy and Mulard and lower than in Pekin ducks. These differencies resulted probably from force feeding.

Conclusions

It shoud be admitted that fatty acid composition of the force fattened duck muscles is favourable from the human nutrition point of view. Both, the high level of polyunsaturated fatty acids and their ratio to saturated testifies this.It was observed that the force feeding influenced the fatty acids profile lipids from Mulard duck muscles.

TABLE 1 : FATTY ACID PROFILE LIPIDS FROM MUSCLES OF FORCE FATTENED MULARD DUCKS

Fatty acid(%)	Drake				Duck			
	Breast		Leg		Breast		Leg	
	X	SD	X	SD	X	SD	X	SD
C_{10}	0,1	0,01	-	-	0,1	0,01	-	-
$C_{12:0}$	0,1	0,01	0,1	0,01	0,1	0,01	0,1	0,01
C_{13}	0,2	0,03	0,1	0,01	0,1	0,01	-	-
$C_{14:0}$	1,0	0,10	0,9	0,06	0,8	0,05	0,9	0,07
$C_{14:1}$	0,2	0,03	0,3	0,02	0,2	0,03	0,2	0,02
$C_{15:0}$	0,2	0,03	0,1	0,01	0,1	0,01	0,1	0,01
$C_{15:1}$	0,3	0,03	0,2	0,01	0,3	0,05	0,1	0,01
$C_{16:0}$	25,8	1,60	25,2	1,50	25,5	1,70	25,1	1,60
$C_{16:1}$	$4,6^{aA}$	0,20	$6,1^{b}$	0,40	$4,1^{aB}$	0,20	$6,1^{b}$	0,40
$C_{17:0}$	0,2	0,02	0,2	0,02	0,2	0,02	0,1	0,01
$C_{17:1}$	0,1	0,01	0,2	0,02	0,2	0,02	0,2	0,02
$C_{18:0}$	$8,3^{aB}$	0,30	$7,0^{b}$	0,30	$10,0^{aB}$	0,40	$7,0^{b}$	0,30
$C_{18:1}$	46,0	1,40	46,6	1,40	46,6	1,30	47,5	1,30
$C_{18:2}$	$8,3^{aB}$	0,35	$9,5^{b}$	0,37	$7,4^{aB}$	0,37	$9,8^{b}$	0,36
$C_{18:3}$	0,8	0,01	0,7	0,02	0,8	0,01	0,8	0,02
$C_{20:0}$	0,1	0,01	0,1	0,01	0,1	0,01	0,1	0,01
$C_{20:1}$	$1,5^{a}$	0,07	$1,0^{b}$	0,06	$1,6^{a}$	0,08	$0,8^{b}$	0,08
$C_{20:2}$	0,3	0,01	0,3	0,01	0,2	0,01	0,3	0,02
$C_{20:4}$	$0,7^{a}$	0,04	$0,9^{b}$	0,04	$0,6^{a}$	0,05	$0,9^{b}$	0,03
$C_{22:0}$	0,1	0,01	-	-	0,1	0,01	-	-
$C_{22:1}$	0,3	0,01	0,1	0,01	0,3	0,03	0,1	0,01
UFA	63,1		65,9		62,3		66,8	
MUFA	53,0		54,5		53,3		55,0	
PUFA	10,1		11,4		9,0		11,8	
SFA	36,1		33,7		37,1		33,4	
UFA/SFA	1,7		1,9		1,6		2,0	

X - average value n = 8 ; SD - standard deviation ; AB - values with different letter differ at P<0,05, within the sex ; a,b - values with different letter differ at P<0,05, within the kind of muscle.

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