Dagene

Annual Meeting

(20-22 May 2009, Zagreb, Croatia)

BIOLOGICAL CHARACTERISTICS OF TUROPOLJE PIG BREED AS FACTORS IN RENEWING AND PRESERVATION OF POPULATION

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Turopolje pig breed

- Croatian autochthonous pig breed
- One of the older Europeans breed
- Originally created as a breed for outdoor production system in the ecosystem of marsh meadows and flood forest (*Deschampsietum caespitosae - Quercetum roburis*) in continental climate
- Turopolje region (near the Zagreb)

Production system

Traditional Croatian technology of low feed input (0.5 kg of corn seed/animal/day) in the ecosystem (acorn, soil, pasture) is using in breeding and production of fatteners in outdoor system

The size of population

- at the FAO list of endangered and disappearing breeds - World Watch List for Domestic Animal Diversity (*Loftus and Scherf, 1993)*
- under the re-establishement and preservation programme *(Robić, 1996 and Radović, 1999)*

Paper objectives

The aim of this paper was to present some of the biological traits which could be of importance in the program of preservation *in-situ*:

- Size of breeding and effective population
- Litter size, weights and survival of piglets
- Carcass composition ant tissues characteristics

Size of population

Breeding population of Turopolje pig breed in Croatia

Breeding size	YEAR												
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Boar	3	8	6	6	5	5	4	6	9	14	13	29	15
Sow	12	17	13	36	40	45	70	99	116	129	137	164	130
Ne	9.6	21.8	16.4	20.6	17.8	18.0	15.1	22.6	33.4	50.5	47.5	98.6	53.8

Source: Annual report – pig breeding, CLC (1997 - 2007)

The effective size of population (Ne) was calculated according to formula by Falconer and Mc Key (1996): $Ne = 4\ x\ \frac{Nm\ x\ Nf}{Nm + Nf}$

Nm = number of male (boars) individuals
Nf = number of female (sows) individuals

Biological traits

Litter size at Turopolje pig breed

	Total born	Live born			Losses
		Total	Male	Female	
n	115	94	43	51	21
x	7.7	6.3	2.8	3.4	1.4
sd	1.36	1.65	1.33	1.42	1.29
Range	5-10	2-8	0-5	1-5	0-4

n = number of piglets of 15 sows

Birth weights and survival of piglets from 1st to 42nd day of age

Day of age	Weights of piglets (kg) at 1st day of age									
	< 1.0 (n=2)		1.0 – 1.2 (n=8)		1-2 – 1.4 (n=19)		> 1.4 (n=5)		Average (total n=34)	
	x ± sd	%	x ± sd	%	x ± sd	%	x ± sd	%	x ± sd	%
1st	0.9±0.09	5.9	1.1±0.08	23.5	1.3±0.03	55.9	1.5±0.04	14.7	1.25±0.14	100
7th	1.18±0.0	2.9	1.8±0.25	23.5	2.2±0.19	52.9	2.6±0.31	14.7	2.12±0.39	94.0
14th			2.2±0.13	23.5	27.0±0.41	52.9	3.3±0.23	14.7	2.68±0.45	91.1
21st			2.6±0.19[a]	23.5	3.1±0.47	52.9	3.7±0.15[b]	14.7	3.08±0.51	91.1
28th			3.0±0.42[a]	23.5	3.6±0.62	47.1	4.2±0.41[b]	14.7	3.59±0.67	85.3
35th			3.2±0.65[a]	17.6	4.0±0.80[b]	41.2	4.5±0.69[b]	14.7	3.92±0.79	73.5
42nd			3.6±0.88[a]	17.6	4.4±0.71[b]	41.2	5.0±0.52[b]	14.7	4.35±0.96	73.5

[a,b] Within the same rows means with different superscript differ at P<0.05.

CARCASS AND TISSUES COMPOSITION

Carcass characteristics

Turopolje pig							
Carcass weight	Back fat	MLD	Lean Meat	SEUROP class	Total tissues in carcass		
kg	mm	mm	%		muscle	Fat	Bone
79.4±4.4	32.0±0.81	50.2±1.32	45.25±0.22	R	40.6±1.39	38.0±1.3	9.4±0.85
Black Slavonian pig*							
79.5±2.41	-	-	-	-	32.4±1.31	48.4±1.57	9.9±0.84
Mangalitsa*							
80.1±1.56	-	-	-	-	28.8±0.65	51.9±1.02	9.5±0.47

* Source - Kralik and Petričević, 2001

Carcass composition and tissues distribution in the carcass and parts

Parts	Parts in carcass**	Tissue (%)					
		Muscle		Fat		Bone	
	%	carcass	parts	carcass	parts	carcass	parts
		x±sd					
Leg	25.7±0.53	12.7±0.77	49.6±2.9	10.6±0.95	39.9±2.61	2.4±0.26	10.5±1.45
Shoulder	15.5±0.20	8.20±0.52	54.1±4.39	5.7±0.58	35.3±4.97	1.6±0.48	10.6±0.84
Loin	14.8±0.63	6.6±0.57	44.5±2.8	5.8±0.47	39.7±2.06	2.4±0.60	15.8±1.88
Neck	8.8±0.48	5.2±0.44	58.6±3.81	2.3±0.33	26.5±3.37	1.3±0.13	14.9±1.2
BRP*	19.2±0.54	7.9±0.37	40.8±3.04	9.6±0.79	50.7±3.15	1.7±0.15	8.5±0.98

* BRP – Belly rib part;
**Less valuable part = 9.2%; Double chin = 2.8%; Lard = 4.0%

Intramuscular fat content and fatty acid profile of MLD and back fat (%)

	Total Fat	SFA	MUFA	PUFA
	x ± sd			
MLD	3.03±0.4	39.6±3.74	54.8±2.95	5.6±2.87
Back fat	93.0±3.76	37.0±3.37	50.8±1.97	12.2±2.41

MLD – *musculus longisimus dorsi*

Muscle fibre characteristics of MLD

Breed/ crossbred	SO		FG		FOG	
	µm	%	µm	%	µm	%
	X ± SD					
Turopolje pig	38.9±12.1	10.5±1.1	57.7±14.8	52.9±14.9	53.5±14.6	36.7±18.3
LWSLP*	38.8±12.4	6.4±1.7	67.2±15.9	59.5±16.7	55.4±13.1	34.1±17.3
BS**	65.0±9.8	11.7±1.4	68.5±4.6	69.1±3.7	54.9±4.51	19.6±2.8
DBM***	51.7±7.1	15.3±5.4	61.5±9.5	71.3±6.9	49.1±7.6	12.2±4.3

Source: * LWSLP = (♂Large White x ♀Swedish Landrace) x ♂Pietrain (Đikić *et al.,* 2006)
** Black Slavonian (Salajpal et al., 2007)
*** ♂Duroc x ♀Berlin Miniatur (Fiedler *et al.,* 2003)

CONCLUSIONS

The size of population

Turopolje pig breed passed from critical to endangerment status in period from 1996 to 2008

- Infectious diseases (Swine fever, *Brucellosis, Leptospirosis*) could be the limiting factor in *in-situ* preservation of Turopolje pig breed

CONCLUSIONS

Biological traits

Litter size and birth weight of piglets of today's Turopolje breed are within the breed standards and are not limiting factors in renewing and preservation of this breed

Low weights and survival of piglets during suckling period, especially after 21st day of age are suggesting the need for the further investigation of piglets rearing according to the traditional Croatian low input technology in the outdoor system

CONCLUSIONS

Carcass and tissues composition

Some traits of carcass and tissue of Turopolje pig are specific and could be a result of specific historical conditions of breeding, selection and production in the specific environment of the outdoor system

The carcass and tissue composition give the opportunity for setting up a breeding program which would support the re-establishment of the population on the economic base