

PRELIMINARY RESEARCHES REGARDING THE CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED AND THE ACHIEVING OF MEAT HYBRIDS THROUGHOUT THE HYBRIDIZATION WITH ROMANIAN BREEDS*

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ABSTRACT. Studies were performed on first generation meat hybrids, from the Bălțată cu Negru Românească (BNR) dairy cattle, into four experimental groups of five animals /group, in relation to meat bulls breeds from which the frozen semen material used for cows artificial insemination, respectively: Group E1-Limousine (Li), E2 - Aberdeen Angus (AA), E3 - Blue Blanch Belgian (BBB) and E4 - Charolaise (CH). The hybrids obtained from the experimental groups were observed in terms of dynamic growth and development through biometric measurements and periodic weightings 3 months intervals until 12 months of age. Average Daily Gain (ADG) recorded different variations in report to age and breed: at six months old, between 418.52 ± 60.97 g (Group E3 -BBB) and 486.67 ± 108.66 g (Group E2 - AA), at 12 months old, between 997.22 g (Group E2 - AA) and 1311.11 g (Group E3 -BBB).

Slaughter rate at 12 months showed variations in relation to breed and thermal regime, so in hot regime the values ranged between 56.62 % (BNR x AA) and 60.60 % (BNR x BBB) and in cold regime (to 24 hours) between 55.68 % (BNR x AA) and 59.73 % (BNR x BBB). Carcasses development indicators had values in most cases in favor of BNR x AA hybrids than BNR x BBB hybrids, with significant differences ($P \leq 0.01$) regarding the width index (201.43 cm to 175.84 cm) and pulp development index (129.27 cm to 110.64 cm). From results analysis it can be concluded that in endangered local cattle, to be abandoned because of productive reform or not relevant point of view of milk production can be used in first generation for hybridization with meat breeds in obtaining meat hybrids with morphological features, slaughter rate and carcass structure

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from superior quality categories than the maternal breed.

Key words: Dairy cows; Frozen semen material; Meat hybrids; Morphological parameters; Slaughter rate.

REZUMAT. Cercetări preliminare privind conservarea raselor de taurine locale aflate în pericol de abandon și obținerea unor hibrizi pentru producția de carne prin hibridarea cu rase românești. Studiile au fost efectuate pe hibrizi de carne de primă generație, obținuți de la vaci de rasă Bălțată cu Negru Românească (BNR), repartizați în patru loturi experimentale a câte cinci capete/lot, în funcție de rasele taurilor de carne, de la care s-a utilizat material seminal congelat (m.s.c.) pentru însămânțarea artificială a vacilor selectate, respectiv: Lotul E1 - Limousine (Li), Lotul E2 - Aberdeen Angus (AA), Lotul E3 - Blue Blanch Belgique (BBB) și Lotul E4 - Charolaise (CH). Produșii obținuți de la vacile BNR din loturile menționate au fost urmăriți în ceea ce privește creșterea și dezvoltarea în dinamică prin determinări biometrice și cântăririi periodice la intervale de 3 luni, până la vârsta de 12 luni. Sporul mediu zilnic (SMZ) a înregistrat variații la 6 luni, între 418,52±60,97 g (Lot E3-BBB) și 486,67±108,66 g (Lot E2-AA), iar la 12 luni, între 997,22 g (Lot E2-AA) și 1311,11 g (Lot E3-BBB). Randamentul la sacrificare, la vârsta de 12 luni, a prezentat variații în funcție de rasă și de regimul termic: la cald, valorile au oscilat între 56,62 % (BNRxAA) și 60,60 % (BNRxBBB), iar la rece (la 24 ore), între 55,68 % (BNRxAA) și 59,73 % (BNRxBBB). Indicii de dezvoltare ai carcaselor au prezentat valori, în majoritatea cazurilor, în favoarea hibridului BNRxAA, cu diferențe distinct semnificative ($p \leq 0,01$) în ceea ce privește indicele lărgimii carcabei (201,43 cm față de 175,84 cm, cu o diferență de +25,59 cm) și indicele de dezvoltare a pulpei (129,27 cm față de 110,64 cm). Din analiza rezultatelor se

poate concluziona că vacile locale, aflate în pericol de abandon din cauza reformei productive sau pentru că nu prezintă interes din punct de vedere al producției de lapte, pot fi utilizate în încrucișări de prima generație cu tauri din rase specializate pentru producția de carne, în vederea obținerii unor hibrizi de carne cu însușiri morfoproductive, cu un randament la sacrificare și o structura a carcabei calitativ superioare rasei materne.

Cuvinte cheie: vaci de lapte; material seminal congelat; tauri de carne; hibrizi de carne; prima generație; parametri morfologici; randament sacrificare.

INTRODUCTION

The cattle breeding represents a important branch of world agriculture, due to its volume, diversity, production value and the products obtained from this activity. In Romania, cattle breeding is a traditional activity of the population, production diversity, low energy consumption and feed nature that they capitalize, giving to this domain the character of a sustainable and future activity (Gâlcă, 2004, Maciuc, 2006).

It has been determined that in the new socio-economical context, the Romanian farmers are increasingly oriented towards the cattle breeding for meat production, because of the possibilities offered by herdal structures, geo-climatically conditions and the increased demands for bovine meat in the European market (Acatincăi, 2004).

The orientation towards cattle breeding for meat production at a national level will contribute to the reduction of livestock imposed by milk quota, using the hybridization,

RESEARCHES ON CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED

which will result in the increase of biological and technological quality of hybrids for the European market and its level of demands (Ujică, 2011).

In the national strategy for improving the cattle breeds are set clear objectives for cattle growth in relation with the wanted directions; milk and meat. The main objectives for cattle meat production are the production criteria (selective reform) can be used in first generation industrial crossings with bulls specialized in meat production, the resulting products being grown, fattened and slaughtered for meat entirely. The results showed that the hybrids have inherited superior characteristics for meat production (Gregory, 1994, Schenkel, 2004).

Given the deficit of beef meat in the E.U., the increasing trend of meat consumption, favorable climatic conditions of our country by the existence of large areas of grassland and limitation of production by milk quota, cattle breeding for meat production and their hybrids with local breeds can be a profitable opportunity for Romanian farmers (Neață, 2009).

The aim of these researches was the achievement of hybrids for superior quality meat production by crossing between Bălțată cu Negru Românească (BNR) and different meat breeds.

Given the deficit of beef meat in the E.U., the increase of animal weight at slaughter, which would result a higher yield of carcasses and a more efficient exploitation (Viziteu, 2009).

The researches in this domain showed that bovine meat breeds may be used with good results in half-breeding with local breeds for the improvement of meat production, having in mind the increased supply-and-demand preferences. The cows from local breeds that are annually reformed because of milk

MATERIALS AND METHOD

Studies were performed on first generation of meat hybrids obtained from cows of Bălțată cu Negru Românească (BNR) breed, into four experimental groups with five animals/group, divided in relation to meat bulls breeds from which was used the frozen semen material in the artificial insemination process, of dairy cows, namely: Group E1 - Limousine (Li), E2 - Aberdeen Angus (AA), E3 - Blue Blanch Belgian (BBB) and E4 - Charolaise (CH). The selection criteria of Bălțată cu Negru Românească cows for hybridization with the meat breeds was the low production level and good body development, especially of the pelvic area, by biometric and pelvic measurements. The hybrids obtained from dairy cows from the experimental groups were raised in individual boxes until the age of 2 months and then into group boxes until 12 months of age.

The calves feeding process was made using whole milk administered with a bucket, 6 liters/day each, in two meals, from the birth until three months of age, when it made their weaning. From 2-3 weeks after birth was given 0.5 kg of alfalfa hay and a mixture of milled grain 0.3 kg (50% corn, 25% sunflower grist, 25% wheat husk).

The nutrient requirements provided for the calves was determined by their age, as follows: for 3 - 6 months of age:

4.10 kg DM (Dry Substances), 3.2 UFC (Meat Fodder Units), 419.5 g PDIN (Intestinal Digestible Protein on Nitrogen), 383.15 g PDIE (Intestinal Digestible Protein on Energy), 26.59 g calcium 17.32 g phosphorus and 2.9 UIDC (Loading Units Digestive Meat); for 6 - 12 months of age: 6.089 kg DM, 4.8 UFC, 598.97 g PDIN, 559.93 g PDIE, 37.83 g calcium, 24.77 g phosphorus and 4,424 UIDC; for 12 months of age: 7.305 kg DM, 5.8 UFC, 660 g PDIN, 660 g PDIE, 37.83 g calcium, 24.77 g phosphorus and 7.5 UIDC.

The basic fodder which composed the feeding rations for meat hybrids were the following: fodder volume (alfalfa and grass hay, corn silage) and milled cereal mixture. The quantities of each fodder were differentiated in relation to nutrient requirements, appropriate to the age category, basically: for 3 - 6 months of age: alfalfa hay 1.920 kg, corn silage 3.33 kg and milled grain mixture (wheat husk 0.378 kg, sunflower 0.411 kg and maize grains 0.981 kg); for - 12 months of age: alfalfa hay 2.641 kg, corn silage 5.833 kg and milled grain mixture (wheat husk 0.505 kg, sunflower meal 0.548 kg and maize grains 1.336 kg); for 12 - 18 months of age: alfalfa hay 3.121 kg, corn silage 7.5 kg and milled grain mixture (wheat husk 0.631 kg, sunflower meal 0.822 kg and maize grains 1.425 kg).

The meat hybrids obtained were followed in terms of growth and development dynamics through biometric measurements and periodic weightings at 3 months intervals until to 12 months of age. Based on the results from these measurements it was calculated the main body indices: Relative Growth Rate (RGR), Absolute Growth Rate (AGR), Increase Intensity (II), Growth Coefficient (GC) and Daily Average Gain (DAG).

At the age of 12 months there were performed control slaughters, settling slaughter rates at hot and cold, (after 24 hours), carcass measurements were carried out (length, depth, circumference, thickness) and calculated the carcass development indices and evaluation of their quality.

The results on the growth and development of hybrids for meat production obtained from Bălțată cu Negru Românească (BNR) cows hybridized with meat breeds were processed and statistically interpreted using the ANOVA test, and average values of the main parameters determined were presented and compared into the experimental groups and with those recorded by other authors.

RESULTS AND DISCUSSION

Results regarding the growth and development of hybrids for meat production from BNR cows, which were artificially inseminated with frozen semen material from meat bulls showed the different variations of main morphological parameters according to age and breed (*Table 1*).

The height at the withers of meat hybrids varied at birth between 73.5 ± 0.7 cm (Group E1 - Li) and 78.17 ± 1.61 cm (Group E3 - BBB), whit not determined statistically significant differences; at the age of 6 months between 93.5 ± 2.12 cm (Group E1 - Li) and 98.5 ± 0.7 cm (Group E4 - CH) and at the age of 12 month between 108.13 ± 2.17 cm (Group E2 - AA) and 111 cm (Group E3 - BBB); the differences being statistically insignificant.

RESEARCHES ON CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED

Table 1 - Average values ($\bar{X} \pm s$) and statistical significance of differences regarding the parameters of body development at different meat hybrids obtained from cows of Băltață cu Negru Românească breed

Specification	U.M.	Height at withers	Height to base of the tail	The depth of thorax	Orizantal length	Oblique length of the trunk	Thorax length	Thorax perimeter	Perimeter of whistle	Thorax width	Chest width	Body weight		
		cm	cm	cm	cm	cm	cm	cm	cm	cm	cm	Kg		
calving	*BNR x Li	\bar{X}	73.50	81.50	44.50	58.50	69.50	39.00	77.00	10.75	15.00	17.50	47.00	
		$\pm s$	0.70	0.70	0.70	6.36	7.77	2.82	1.41	0.35	0.00	2.12	1.41	
	BNR x AA	\bar{X}	76.25	78.50	40.63	59.75	71.06	39.63	80.38	11.63	15.63	20.63	51.00	
		$\pm s$	3.77	3.78	8.14	1.75	3.76	2.56	3.81	0.44	1.19	0.52	5.98	
	BNR x BBB	\bar{X}	78.17	78.67	46.67	52.67	71.17	41.00	80.33	11.50	14.33	20.67	49.00	
		$\pm s$	1.61	3.51	2.31	10.41	4.54	1.73	5.03	0.50	2.08	0.58	8.72	
	BNR x CH	\bar{X}	76.88	80.50	37.75	61.00	70.00	39.50	81.75	11.75	16.25	19.75	51.75	
		$\pm s$	3.57	4.12	8.26	5.60	7.35	4.36	2.06	0.96	2.22	2.63	5.74	
	ANOVA		Ns	Ns	*	*	*	Ns	Ns	Ns	Ns	Ns	*	
	6 months	BNR x Li	\bar{X}	93.50	95.00	40.75	81.00	101.00	52.00	110.50	14.75	23.00	28.25	122.00
			$\pm s$	2.12	4.24	4.60	2.83	1.41	1.41	3.54	0.35	1.41	1.06	12.73
		BNR x AA	\bar{X}	96.80	100.80	49.20	91.80	104.80	59.20	123.60	14.90	30.60	31.40	164.40
		$\pm s$	0.84	1.04	0.91	5.26	9.68	4.82	3.29	0.74	2.51	1.14	13.15	
BNR x BBB		\bar{X}	98.33	102.17	50.67	88.00	102.67	58.67	119.00	13.50	30.00	27.67	147.33	
		$\pm s$	1.15	0.76	4.16	4.36	1.53	3.21	2.65	0.50	0.00	2.52	8.33	
BNR x CH		\bar{X}	98.50	97.50	50.50	87.50	99.50	54.50	121.00	16.50	31.00	31.00	154.00	
		$\pm s$	0.70	0.70	0.70	0.70	0.70	0.70	1.41	0.70	1.41	1.41	5.65	
ANOVA			Ns	Ns	*	*	Ns	Ns	Ns	Ns	Ns	Ns	Ns	
12 months		BNR x Li	\bar{X}	110.50	108.00	55.50	109.00	125.50	65.00	153.50	17.50	35.50	40.00	316.50
			$\pm s$	0.70	1.41	0.70	1.41	0.70	0.00	0.70	0.70	0.70	0.00	4.94
		BNR x AA	\bar{X}	108.13	113.63	54.13	109.00	131.00	68.00	154.25	17.38	36.50	36.75	321.50
		$\pm s$	2.17	1.80	1.44	1.83	5.29	2.94	2.63	1.11	3.03	3.77	16.42	
	BNR x BBB	\bar{X}	111.003	108.00	56.00	107.50	125.50	66.50	154.50	17.003	37.00	40.003	324.00	
		$\pm s$	0.00	0.00	0.00	0.70	0.70	0.70	0.70	0.00	0.00	0.00	5.65	
	BNR x CH	\bar{X}	-	-	-	-	-	-	-	-	-	-	-	
		$\pm s$	-	-	-	-	-	-	-	-	-	-	-	
	ANOVA		Ns	Ns	Ns	Ns	Ns	Ns	*	*	Ns	Ns	Ns	

*BNR = Băltață cu Negru Românească; Li = Limousine; AA = Aberdeen Angus; BBB = Blue Blanch Belgian; CH = Charolaise; Ns = difference not significant; * = significant differences $P \leq 0.05$

Oblique length of the trunk showed at birth between 69.5 ± 7.77 cm (Group E1 - Li) and 71.17 ± 4.54

cm (Group E3 - BBB) with significant variations differences between groups; at 6 months between $99.5 \pm$

0.7 cm (Group E4 - CH) and 104.8 ± 9.68 cm Group (E2 - AA); at 12 months between 125.5 cm (Group E1 - Li) and 131 ± 5.29 cm (Group E2 - AA) (differences statistically insignificant).

Thorax perimeter varied: at birth between 77 ± 1.41 cm (Group E1 - Li) and 81.75 ± 2.06 cm (Group E4 - CH); at 6 months between 110.5 ± 3.5 cm (Group E1 - Li) and 123.6 ± 3.29 cm (Group E2 - AA); (non significant differences between groups); at 12 months between 153.5 ± 0.70 cm (Group E1 - Li) and 154.5 ± 0.7 cm (Group E3 - BBB), with significant differences between groups.

Body weight oscillations presented: at birth between 47 ± 1.41 kg (Group E1 - Li) and 51.75 ± 5.74 (Group E4 - CH); at 6 months between 122 ± 12.73 kg (Group E1 - Li) and 164.4 ± 13.15 kg (Group E2 - AA), with significant differences between groups; and at 12 months between 316.5 ± 4.94 kg (Group E1 - Li) and 324 ± 5.64 kg (Group E3 - BBB) (non significant differences between groups).

The main body indices analysis of hybrids for meat production from experimental cow groups showed different variations in report to breed and animals age (Table 2).

Corporeal Format Index (IFC) presented variations: at birth between $90.89 \pm 6.21\%$ (Group E4 - CH) and $94.51 \pm 9.67\%$ (Group E1 - Li); at 3 months between $98.84 \pm 1.16\%$

(Group E1 - Li) and $107.96 \pm 2.56\%$ (Group E2 - AA); at 6 months between $101.02 \pm 0.01\%$ (Group E4 - CH) and $108.27 \pm 10.03\%$ (Group E2 - AA); at 9 months between 108.74% (Group E3 - BBB) and $119.31 \pm 0.50\%$ (Group E1 - Li); at 12 months between $113.06 \pm 0.45\%$ (Group E3 - BBB) and $121.14 \pm 3.76\%$ (Group E2 - AAA).

Massiveness Index (MI) showed oscillations: at birth between $102.72 \pm 4.69\%$ (Group E3 - BBB) and $105.53 \pm 5.17\%$ (Group E2 - AA); at 3 months between $112.70 \pm 2.24\%$ (Group E1 - Li) and $125.04 \pm 1.50\%$ (Group E2 - AA); at 6 months between $118.17 \pm 1.10\%$ (Group E1 - Li) and $127.70 \pm 3.80\%$ (Group E2 - AA); at 9 months between $129.70 \pm 0.99\%$ (Group E1 - Li) and $138.77 \pm 1.66\%$ (Group E2 - AA); at 12 months between $138.91 \pm 0.25\%$ (Group E1 - Li) and $142.70 \pm 3.65\%$ (Group E2 - AA).

Bones Index (BI) recorded variations: at birth between $14.62 \pm 0.34\%$ (Group E1 - Li) and $15.30 \pm 1.24\%$ (Group E4 - CH); at 3 months between $14.65 \pm 0.61\%$ (Group E3 - BBB) and $15.61 \pm 0.34\%$ (Group E4 - CH); at 6 months between $14.67 \pm 0.66\%$ (Group E3 - BBB) and $16.75 \pm 0.84\%$ (Group E4 - CH); at 9 months between 14.67% (Group E3 - BBB) and $16.83 \pm 0.0\%$ (Group E1 - Li); at 12 months between 15.32% (Group E4 - CH) and $16.07 \pm 1.07\%$ (Group E2 - AA).

RESEARCHES ON CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED

Table 2 - Average values ($\bar{X} \pm s$) and statistical significance of differences regarding body indices at different meat hybrids obtained from cows of Bălțată cu Negru Românească breed

Specification	U.M.	CFI	CDI	MI	HDI	IVS	BI	CI	DTI	WLI	RKI	
		%	%	%	%	%	%	%	%	%	%	
calving	*BNR x Li	\bar{X}	94.51	60.55	104.76	114.97	39.45	14.62	111.38	13.96	22.87	84.11
		$\pm s$	9.67	1.54	0.92	0.14	1.54	0.34	10.43	0.20	0.06	2.27
	BNR x AA	\bar{X}	93.29	53.45	105.53	104.18	47.91	15.27	113.41	14.48	23.00	83.20
		$\pm s$	4.69	11.32	5.17	3.06	10.36	0.78	8.63	0.47	2.08	5.90
	BNR x BBB	\bar{X}	91.01	59.69	102.72	103.59	40.09	14.72	112.90	14.37	23.91	74.90
		$\pm s$	4.62	2.41	4.69	4.24	0.15	0.76	1.69	1.41	3.87	3.42
	BNR x CH	\bar{X}	90.89	49.00	104.69	103.42	51.00	15.30	115.53	14.60	22.83	81.08
		$\pm s$	6.21	10.01	2.27	1.41	10.01	1.24	6.98	0.95	2.10	6.07
	ANOVA		Ns	Ns	Ns	Ns	Ns	Ns	Ns	*	*	Ns
	6 months	BNR x Li	\bar{X}	108.03	43.65	118.17	102.95	56.35	15.78	109.39	13.36	12.17
		$\pm s$	0.94	5.91	1.10	0.44	5.91	0.74	1.97	0.75	1.56	8.42
BNR x AA		\bar{X}	108.27	50.83	127.70	103.11	49.17	15.39	118.90	12.06	9.11	83.59
		$\pm s$	10.03	1.01	3.80	2.21	1.01	0.73	13.34	0.66	0.80	4.80
BNR x BBB		\bar{X}	104.40	51.55	121.01	104.08	48.45	14.67	115.90	11.35	9.19	77.20
		$\pm s$	0.56	4.68	1.33	1.06	4.68	0.66	0.91	0.64	0.83	5.41
BNR x CH		\bar{X}	101,02	51,27	122,84	100,51	48,73	16,75	121,61	13,64	10,73	87,69
		$\pm s$	0,01	1,09	0,55	0,72	1,09	0,84	0,56	0,74	0,85	0,27
ANOVA			*	*	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns
12 months		BNR x Li	\bar{X}	113,57	50,23	138,91	98,19	49,77	15,84	122,31	11,40	5,53
		$\pm s$	0,09	0,96	0,25	0,01	0,96	0,54	0,13	0,41	0,14	1,90
	BNR x AA	\bar{X}	121.14	50.09	142.70	104.41	49.91	16.07	117.90	11.26	5.41	101.67
		$\pm s$	3.76	2.11	3.65	1.79	2.11	1.07	5.49	0.62	0.27	12.63
	BNR x BBB	\bar{X}	113,06	50,45	139,19	95,05	49,55	15,32	123,11	11,00	5,25	87,69
		$\pm s$	0,45	0,00	0,45	0,45	0,00	0,00	0,09	0,04	0,06	1,20
	BNR x CH	\bar{X}	-	-	-	-	-	-	-	-	-	-
		$\pm s$	-	-	-	-	-	-	-	-	-	-
	ANOVA		Ns	*	*	Ns	Ns	Ns	Ns	Ns	Ns	Ns

*BNR = Bălțată cu Negru Românească; Li = Limousine; AA = Aberdeen Angus; BBB = Blue Blanch Belgian; CH = Charolaise; Ns = difference not significant; * = significant differences $P \leq 0.05$

CFI - Corporal Format Index; CDI - Chest Depth Index; MI - Massiveness Index; HDI - Height Difference Index; IVS - Substernal Void Index; BI - Bones Index; CI - Compact Index; DTI - Dactilo Thoracic Index; WLI - Whistled Load Index; RKI - Rump Keeness Index.

Results regarding the growth indices of hybrids for meat production showed higher values in the first growth period (3 months) and lower values in the subsequent

periods, more specifically at 6, 9 and 12 months, with some variations of average values in report to breed (Table 3, Fig. 1, A, B, C, D).

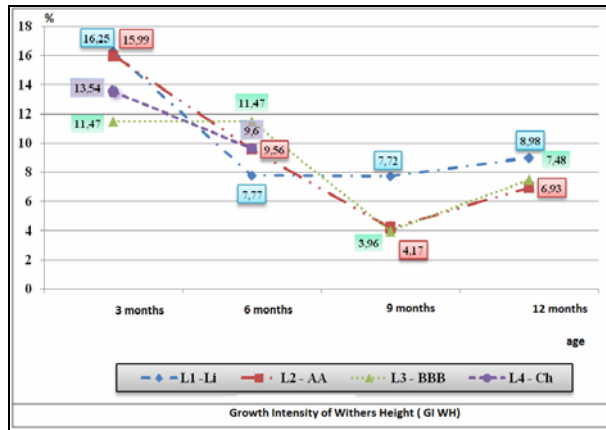
Table 3 - Average values ($\bar{X} \pm s$) and statistical significance of differences regarding growth indices at different meat hybrids obtained from cows of Bălțată cu Negru Românească breed

Specification		GAR	GRR	GIWH	ARTG	GRRT	GI	ARBWG	GRR	GIBW		
		WH	WH				OLT	(ADG)	BW			
		U.M.	%	%	%	%	%	g	%	%		
calving	BNR x Li	\bar{X}	14.44	17.69	16.25	17.78	23.63	20.92	411.11	78.58	56.33	
		$\pm s$	0.00	0.17	0.14	6.29	10.78	8.64	62.85	9.67	4.99	
	BNR x AA	\bar{X}	14.44	17.45	15.99	27.13	34.78	29.50	770.37	144.94	82.25	
		$\pm s$	3.44	4.48	3.77	5.10	7.04	5.17	192.92	45.08	16.50	
	BNR x BBB	\bar{X}	10.56	12.17	11.47	23.15	29.60	25.65	674.07	125.95	76.94	
		$\pm s$	0.56	0.87	0.78	4.72	7.90	5.97	54.81	21.27	7.91	
	BNR x CH	\bar{X}	12.36	14.63	13.54	21.11	28.05	24.19	586.11	102.84	67.49	
		$\pm s$	4.50	5.75	5.02	7.43	12.97	9.70	97.87	19.87	8.60	
	ANOVA		Ns	*	Ns	Ns	Ns	Ns	Ns	Ns	Ns	
	6 months	BNR x Li	\bar{X}	7.78	8.09	7.77	17.22	18.14	16.63	422.22	45.11	36.80
			$\pm s$	1.57	1.57	1.45	0.79	1.28	1.07	62.85	2.94	1.96
		BNR x AA	\bar{X}	9.78	10.06	9.56	10.89	10.49	9.52	486.67	38.20	30.95
$\pm s$			2.41	2.73	2.48	11.80	11.65	10.08	242.98	21.40	15.67	
BNR x BBB		\bar{X}	11.85	12.17	11.47	11.85	11.60	10.96	418.52	34.96	29.51	
		$\pm s$	1.28	1.41	1.25	1.28	1.38	1.23	105.60	10.81	7.99	
BNR x CH		\bar{X}	10,00	10,16	9,61	9,44	9,70	9,07	455,56	36,47	30,69	
		$\pm s$	4,71	5,14	4,66	8,64	9,30	8,47	109,99	10,13	7,25	
ANOVA			*	Ns	*	Ns	Ns	Ns	Ns	Ns	Ns	
12 months		BNR x Li	\bar{X}	10,56	9,41	8,98	5,56	4,15	4,07	1361,11	63,18	48,01
			$\pm s$	0,79	0,70	0,64	0,00	0,02	0,02	7,86	2,21	1,27
		BNR x AA	\bar{X}	8,06	7,19	6,93	12,22	9,18	8,77	997,22	39,86	32,49
	$\pm s$		1,84	1,66	1,55	1,28	1,06	0,97	380,53	19,05	12,54	
	BNR x BBB	\bar{X}	8,89	7,77	7,48	15,56	12,56	11,81	1238,89	52,51	41,56	
		$\pm s$	0,00	0,00	0,00	0,00	0,08	0,07	102,14	5,20	3,26	
	BNR x CH	\bar{X}	-	-	-	-	-	-	-	-	-	
		$\pm s$	-	-	-	-	-	-	-	-	-	
	ANOVA		*	Ns	Ns	Ns	Ns	Ns	Ns	*	Ns	

*BNR = Bălțată cu Negru Românească; Li = Limousine; AA = Aberdeen Angus; BBB = Blue Blanch Belgian; CH = Charolaise; Ns = difference not significant; * = significant differences $P \leq 0.05$

Absolute Rate of Withers Height Growth (ABWHG); Relative Rate of Withers Height Growth (RRWHG); Growth Intensity of Withers Height (GIWH); Absolute Rate of Trunk Growth (ARTG); Growth Relative Rate of Trunk (GRRT); Growth Intensity in the Oblique Length of the Trunk (GIOLT); Growth Absolute Rate of Body Weight (GAR BW = Average Daily Gain- ADG); Growth Relative Rate of Body Weight (GRRBW); Growth Intensity of Body Weight (GIBW).

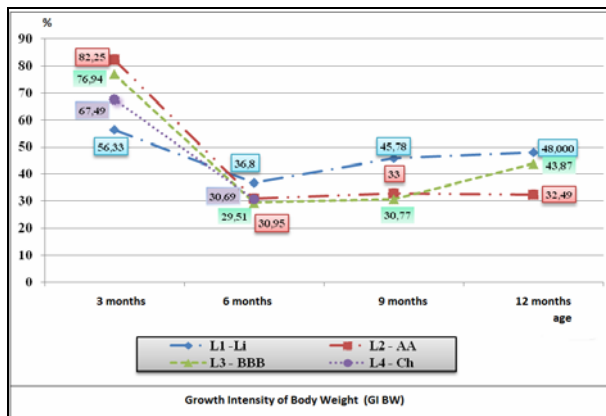
RESEARCHES ON CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED



A



B



C

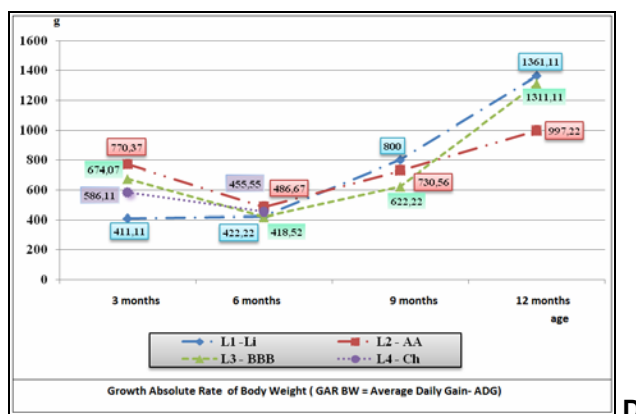


Figure 1 - Growth indices of meat hybrids obtained from cows of Bălțată cu Negru Românească breed

Absolute Growth Rate of Withers Height (AGRWH) varied: at 3 months between $10.56 \pm 0.32\%$ (Group E3 - BBB) and $14.44 \pm 1.41\%$ (Group E2 - AA); at 6 months between $7.78 \pm 1.11\%$ (Group E1 - Li) and $11.85 \pm 0.74\%$ (Group E3 - BBB); at 9 months between 4.44% (Group E3 - BBB) and $8.33 \pm 1.67\%$ (Group E1 - Li); at 12 months between $8.06 \pm 0.92\%$ (Group E2 - AA) and 8.89% (Group E3 - BBB).

Relative Growth Rate of Withers Height (RGRWH) presented variations: at 3 months between $12.17 \pm 0.50\%$ (Group E3 - BBB) and $17.69 \pm 0.12\%$ (Group E1 - Li); at 6 months between $8.09 \pm 1.11\%$ (Group E1 - Li) and $12.17 \pm 0.81\%$ (Group E3 - BBB); 9 months between 4.04% (Group E3 - BBB) and $8.05 \pm 1.73\%$ (Group E1 - Li); at 12 months between $7.19 \pm 0.83\%$ (Group E2 - AA) and 7.77% (Group E3 - BBB).

Relative Growth Rate of Trunk (RGRT) varied: at 3 months between $23.63 \pm 7.63\%$ (Group E1 - Li) and

$34.78 \pm 2.87\%$ (Group E2 - AA); at 6 months between $10.49 \pm 5.21\%$ (Group E2 - AA) and $18.14 \pm 0.90\%$ (Group E1 - Li); at 9 months between 7.69% (Group E3 - BBB) and $19.31 \pm 0.69\%$ (Group E1 - Li); at 12 months between $9.18 \pm 0.53\%$ (Group E2 - AA) and 12.50% (Group E1 - Li).

Growth Intensity of Withers Height (GIWH) recorded variations: at 3 months between $11.46 \pm 0.44\%$ (Group E3 - BBB) and $16.25 \pm 0.10\%$ (Group E1 - Li); at 6 months between $9.22 \pm 1.36\%$ (Group E2 - AA) and $11.88 \pm 1.01\%$ (Group E3 - BBB).

Growth Intensity of the Trunk (GIT) recorded variations: at 3 months between $20.92 \pm 6.11\%$ (Group E1 - Li) and $29.50 \pm 2.11\%$ (Group E2 - AA); at 6 months $9.52 \pm 4.51\%$ between (Group E2 - AA) and $16.63 \pm 0.76\%$ (Group E1 - Li); 9 months between 7.41% (Group E3 - BBB) and $17.61 \pm 0.57\%$ (Group E1 - Li); at 12 months between $8.77 \pm 0.49\%$ (Group E2 - AA) and 11.76% (Group E3 - BBB).

RESEARCHES ON CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED

Growth Intensity of Body Weight (GIBW) showed the following oscillations: at 3 months between $56.33 \pm 3.53\%$ (Group E1 - Li) and $82.25 \pm 6.73\%$ (Group E2 - AA); at 6 months between $29.51 \pm 4.61\%$ (Group E3 - BBB) and $36.80 \pm 1.38\%$ (Group E1 - Li); at 9 months between 30.77% (Group E3 - BBB) and $45.78 \pm 5.05\%$ (Group E1 - Li); at 12 months between $32.49 \pm 6.27\%$ (Group E2 - AA) and 43.87% (Group E3 - BBB).

Average Daily Gain (ADG) presented variations: at 3 months between 411.11 ± 44.44 g (Group E1 - Li) and 770.37 ± 78.76 g (Group E2 - AA) and at 6 months between 418.52 ± 60.97 g (Group E3 - BBB) and 486.67 ± 108.66 g (Group E2 - AA); at 9 months between 622.22 g (Group E3 - BBB) and 800 g (Group E1 - Li); at 12 months between 997.22 g (Group E2 - AA) and 1311.11 g (Group E3 - BBB).

The control slaughtering, made at 12 months of age, showed that live body weight of hybrids was ranged between 330 kg (BNRx BBB) and 340 kg (BNRxAA), hot carcass weight showed variations between 192.5 kg (BNRxAA) and 200 kg (BNRxBBB) and cold carcass weight (at 24 hours after slaughter) showed variations between 189.3 kg (BNRxAAA) and 197.1 kg (BNRxBBB).

Slaughter rate showed differences when compared the breed and thermal regime, the values in warmth regime varying between 56.62% (BNRxAA) and 60.60% (BNRxBBB) and in cold (24 hours)

between 55.68% (BNRxBBB) and 59.73% (BNRxBBB).

On the basis of carcass measurements (length, depth, perimeter, thickness), applying the formulas given in the field literature, the carcass development indices were calculated, highlighting some differences between meat hybrids in the control slaughtering area, most cases in favor of BNRxAA hybrids towards BNRxBBB hybrids, regarding to the following indices: Carcasse Width Index (201.43 cm to 175.84 cm, $P \leq 0.01$); Thigh Development Index (129.27 cm to 110.64 cm, $P \leq 0.01$), Compactness Index (74.53 cm to 72.09 cm).

The evaluation of carcass structure involving the meat hybrids that were control slaughtered according to the E.U.R.O.P. system established the following categories: Class U - Very good for BNRx BBB hybrids and Class R - Good for BNRxAA hybrids.

The carcasses analysis on quality categories showed the following percentage values of cold carcass weight: between 13.39% (BNRxBBB) and 13.86% (BNRxAA) in specialties category; between 56.73% (BNRxAA) and 57.33% (BNRxBBB) in the first grade and between 21.97% (BNRxBBB) and 22.00% (BNRxAA) for second quality.

The results obtained in this study showed a good growth and development of meat hybrids developed from cows of BNR breed, which have been crossed with

specialized bulls for meat production, with average values of the main body indices comparable with those obtained by other authors, corresponding breeds studied, a higher slaughter rate than maternal breed and a carcass structure of superior quality categories.

From the results analysis it can be concluded that local cows in risk of abandonment from reason of productive reform, or not relevant in terms of milk production, can be used in first generation crosses with bulls from specialized breeds for meat production to obtain meat hybrids that have good growth and development and a higher yield at slaughter.

CONCLUSIONS

Average values of main morphological parameters showed a good growth and development of meat hybrids from cows of Bălțată cu Negru Românească breed productive reformed, that were used in first generation crossed with specialized bulls for meat production.

Growth indices registered in meat hybrids showed higher values in the first growth period (3 months) and lower values in subsequent periods.

Average Daily Gain (ADG) recorded variations in report to age and breed: at 6 months between 418.52±60.97 g (Group E3 - Blue Blanch Belgian) and 486.67±108.66 g (Group E2 - Aberdeen Angus) and at 12 months between 997, 22 g (Group E2 - Aberdeen Angus) and 1311.11 g (Group E3 - Blue Blanch Belgian).

Slaughter rate of meat hybrids at the age of 12 months showed variations in report to breed and thermal regime, in heat regime the values were ranged between 56.62% (Bălțată cu Negru Românească x Aberdeen Angus) and 60.60% (Bălțată cu Negru Românească x Blue Blanch Belgian) and in cold (24 hours) between 55.68% (Bălțată cu Negru Românească x Aberdeen Angus) and 59.73% (Bălțată cu Negru Românească x Blue Blanch Belgian).

Carcass development indices were in most cases in favor of Bălțată cu Negru Românească x Aberdeen Angus hybrids, with significant differences ($P \leq 0.01$), regarding to carcass width index (201.43 cm to 175.84 cm) and pulp development index (129.27 cm to 110.64 cm).

Structure analysis of meat hybrids carcasses in the quality category indicated the following percentage values of cold carcass weight: between 13.39% (Bălțată cu Negru Românească x Blue Blanch Belgian) and 13.86% (Bălțată cu Negru Românească x Aberdeen Angus) at specialties category and between 56.73% (Bălțată cu Negru Românească x Aberdeen Angus) and 57.33% (Bălțată cu Negru Românească x Blue Blanch Belgian) at first quality.

REFERENCES

- Acatincăi S., 2004** - Producțiile bovinelor (Productions of cattle). Edit. Eurobit, Timișoara, România.

RESEARCHES ON CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED

- Gâlcă I., Maciuc V., 2004** - Tehnologia creșterii bovinelor (Technology of cattle). Edit. Alfa, Iași, România.
- Gregory K.E., Cundiff L.V., Koch R.M., Dikeman M.E., Koohmaraie M. 1994** - Breed effects, retained heterosis, and estimates of genetic and phenotypic parameters for carcass and meat traits of beef cattle". Journal of Animal Science, 72 (5): 1174-1183.
- Maciuc V., 2006** - Managementul creșterii bovinelor (Management of cattle). Edit. Alfa, Iași, România, pp. 103-119.
- Neață Gh., 2009** - Strategia pentru producția de carne de bovine (Strategy for bovine meat production). Lucrări științifice Zootehnie și Biotehnologii, Vol. 42 (2), pp. 305-312
- Schenkel F.S., Miller S.P., Wilton J.W., 2004** - Genetic parameters and breed differences for feed efficiency, growth, and body composition traits of young beef bulls. Canadian Journal of Animal Science (Agricultural Institute of Canada), 84 (2): 177-185.
- Ujică V., Maciuc V., Nistor I., Viziteu C., Nistor C.E., Popescu E.C., 2011** - Cercetări privind îmbunătățirea producției de carne la taurine prin folosirea încrucișărilor comerciale cu rase specializate (Research on improving of meat production in cattle breeds by using of commercial crossings with specialized meat breeds). Rev. de Zootehnie, nr.1, București, România pp.8-13.
- Viziteu C., 2009** - Contribuții la îmbunătățirea producției de carne la taurine prin folosirea încrucișărilor industriale cu rase de carne specializate (Contributions to the improvement of meat production in cattle by using industrial crossings with specialized meat breeds). PhD Thesis, UȘAMV Iași, Romania.