



MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE
ÚSTRAŠICE státní podnik

390 02 Tábor 2

Česká republika

Final report

PEKIN – TEST no. 166

2021



23 March – 10 May 2021

Study Investigator: **Jana Härtelová**
Ing. Markéta Krekulová

Ústřašice, June 2021

Basic tests information

The basic dates

Beginning of the test: 21 February 2021 (put into the incubator)
23 March 2021 (day old ducklings)

End of the test: 3 May 2021 – 42 days of age
10 May 2021 – 49 days of age

Location

Mezinárodní testování drůbeže, s.p. Ústrašice – Testační stanice vodní drůbeže (Test station of water fowl).

Material and methods

Material

280 ducklings in each treatment – divided in 4 pens (2 pens by 70 males and 2 pens by 70 females). Total there were 1680 ducklings.

Origin of hatching eggs:

Sample	Cross	Breeding organization	State
1			Czech Republic
2			France
3			France
4			France
5			France
6			France

Housing system

Ducklings were housed in deep litter rearing. Drinking water was supplied ad libitum by automatic nipple drinkers. Each pen was equipped with manually filled tube feeders.

Lighting program

Day 1 – 7	23 hours of light
Day 8 – 42	18 hours of light
Day 43 – 49	23 hours of light

Stocking density Day 1 – 49 7.3 birds/m²

Feeding

Feed was produced in [REDACTED].

Day 1 – 21 Starter „VKCH 1“

Day 22 – 35 Grower „VKCH 2”

Day 36 – 49 Finisher „VKCH 3“

The diets were calculated following Czech feeding recommendations.

Formulas of the feed

Components (%)	VKCH 1	VKCH 2	VKCH 3
Maize	10.000	10.000	7.000
Wheat	45.710	59.520	63.280
Extr. soybean meal	27.500	14.500	11.500
Rape seed meal	5.000	5.000	5.000
Wheat brans	5.000	4.000	7.000
Soybean oil	2.400	3.200	2.500
DL-methionine	0.290	0.160	0.170
L-lysine HCl	0.310	0.300	0.230
L-threonine	0.130	0.160	0.200
Limestone	1.410	1.750	1.750
MCP-monocalciumphosphate	1.200	0.400	0.400
Soda bicarbona	0.100	0.180	0.180
NaCl	0.400	0.300	0.260
Aminovitan VKCH-1 spec 0,2%	0.200	-	-
Aminovitan VKCH-2 spec 0,2%	-	0.200	0.200
[REDACTED]	0.300	0.300	0.300
[REDACTED]	0.050	-	-
[REDACTED]	-	0.030	0.030
Nutrients (calculated values):			
CP (%)	22.369	18.088	17.285
ME (MJ/kg)	11.912	12.875	12.589
Lysine (g/kg)	13.411	10.054	8.862
Methionine (g/kg)	6.090	4.255	4.253
Threonine (g/kg)	9.052	7.503	7.546
Ca (g/kg)	10.482	10.258	10.240
P (g/kg)	7.463	5.138	5.337
Na (g/kg)	1.989	1.823	1.669

Veterinary precautions

The house were disinfected by [REDACTED] before the duck placement. There was used the wet disinfection and the gaseous disinfection.

Parameters recorded and Methods applied

Live weight

Live weight was measured on day 1 (all the birds in each pen were weighed altogether). On days 21, 28 and 35 (all the birds were weighed individually, without fasting) and 42 and 49 (all the birds were weighed individually after 12 hours of fasting).

Weight gain and average daily weight gain

Weight gains were calculated for the periods 1-21 days, 22-28 days, 29-35 days, 36-42 days, 43-49 days and for the overall experiment (1-49 days).

Feed conversion ratio

Feed consumption per 1 kg of live weight was recorded per pen on days 21, 28, 35, 42 and 49.

Feed consumption

Feed consumption was calculated for the periods 1-21 days, 22-28 days, 29-35 days, 36-42 days, 43-49 days and for the overall experiment (1-49 days).

Mortality

All pens were checked twice a day to see if there were any dead or ill birds. Dead chickens were registered by date and reason of mortality on the day of death.

Carcass analysis

The carcass analysis was done at 42 days and 49 days. The breast muscles were weighed with skin and thigh muscles were weighed with skin.

Scheme of carcass analysis

Day of carcass analysis	Treatment no.	Pen no.	Ducks per pen	Total ducks per treatment	Total ducks per day
42	1	19 (♂)	70	140	840
		13 (♀)	70		
	2	20 (♂)	70	140	
		14 (♀)	70		
	3	21 (♂)	70	140	
		15 (♀)	70		
	4	22 (♂)	70	140	
		16 (♀)	70		
	5	23 (♂)	70	140	
		17 (♀)	70		
	6	24 (♂)	70	140	
		18 (♀)	70		
49	1	7 (♂)	70	140	840
		1 (♀)	70		
	2	8 (♂)	70	140	
		2 (♀)	70		
	3	9 (♂)	70	140	
		3 (♀)	70		
	4	10 (♂)	70	140	
		4 (♀)	70		
	5	11 (♂)	70	140	
		5 (♀)	70		
	6	12 (♂)	70	140	
		6 (♀)	70		

Statistical analyses

Performance results of live weight (on days 35, 42 and 49) and results of carcass analysis (on days 42 and 49) were statistically evaluated using the ANOVA model (Scheffe test) or Kruskal-Wallis test (nonparametric method).

Results

Tab. No.	1 Hatching results
	2 Performance results:
	2a Body weight
	2b Weight gain
	2c Feed conversion ratio
	2d Feed consumption
	3a Results of carcass analysis at the age 42
	3b Results of carcass analysis at the age 49
	4 Mortality
	5 Statistical analysis
	(For a detailed analysis of results the following methods were applied: divergence valuation. variations coeff. valuation. average divergence.)
	6 Statistical analyses of performance results – live weight
	7 Statistical analyses – carcass analysis at 42 days
	8 Statistical analyses – carcass analysis at 49 days
	9 Performance results per pen:
	9a Body weight
	9b Weight gain
	9c Feed conversion ratio
	9d Feed consumption

Hatching results

Tab. No. 1

Treatment	Treat. no.	Fertility	Hatchability		Birds housed		Average weight		
			Set eggs	Fertilized eggs	Males	Females	Hatching eggs	Day old males	Day old females
		%	%	%	number	number	g	g	g
■	1	96,50	79,50	82,38	140	140	91,80	56,21	57,36
■	2	95,50	77,75	81,41	140	140	97,98	61,79	60,00
■	3	96,50	78,50	81,35	140	140	97,90	60,29	59,79
■	4	96,25	79,00	82,08	140	140	97,63	57,21	58,00
■	5	96,75	78,50	81,14	140	140	96,95	60,86	59,07
■	6	96,50	78,75	81,61	140	140	96,48	58,43	58,93

Performance results
Body weight per phases

Tab. No. 2a

Treatment	Tr. no.	Day 1		Day 21		Day 28		Day 35		Day 42		Day 49	
		Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight
			g		g		g		g		g		g
█	1	280	56,79	280	1419,71	278	2154,36	278	2945,29	278	3310,85	138	3723,08
█	2	280	60,89	280	1515,91	280	2314,50	278	3100,88	278	3585,24	136	3985,04
█	3	280	60,04	280	1529,22	280	2293,21	280	3120,03	280	3556,62	140	3976,56
█	4	280	57,61	280	1478,37	279	2208,77	279	3007,77	279	3416,32	139	3850,60
█	5	280	59,96	280	1477,39	280	2212,34	279	2991,52	279	3390,28	140	3787,72
█	6	280	58,68	280	1487,29	280	2224,75	280	3009,30	280	3408,76	140	3850,59

Treatment	Tr. no.	Sex	Day 1		Day 21		Day 28		Day 35		Day 42		Day 49	
			Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight
				g		g		g		g		g		g
█	1	♂	140	56,21	140	1443,55	140	2156,40	140	2986,66	140	3408,85	69	3845,58
		♀	140	57,36	140	1395,87	138	2152,28	138	2903,33	138	3211,42	69	3600,58
█	2	♂	140	61,79	140	1558,32	140	2328,68	139	3096,00	139	3652,04	67	4030,45
		♀	140	60,00	140	1473,51	140	2300,33	139	3105,77	139	3518,45	69	3940,94
█	3	♂	140	60,29	140	1564,16	140	2330,10	140	3194,39	140	3699,45	70	4175,27
		♀	140	59,79	140	1494,28	140	2256,32	140	3045,68	140	3413,79	70	3777,86
█	4	♂	140	57,21	140	1490,88	139	2223,29	139	2998,32	139	3477,09	69	4001,35
		♀	140	58,00	140	1465,86	140	2194,36	140	3017,16	140	3355,98	70	3702,01
█	5	♂	140	60,86	140	1482,81	140	2236,54	140	2985,19	140	3480,54	70	3961,64
		♀	140	59,07	140	1471,96	140	2188,15	139	2997,89	139	3299,37	70	3613,80
█	6	♂	140	58,43	140	1513,76	140	2239,55	140	3016,33	140	3468,94	70	3977,21
		♀	140	58,93	140	1460,81	140	2209,95	140	3002,28	140	3348,58	70	3723,96

Weight gain per phases

Tab. No. 2b

Treatment	Tr. no.	Day 1 - 21		Day 22 - 28		Day 29 - 35		Day 36 - 42		Day 43-49		Day 1 – 49	
		Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Weight gain per phase	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain
		g	g	g	g	g	g	g	g	g	g	g	g
█	1	1362,93	64,90	734,65	104,95	790,94	112,99	365,55	52,22	412,23	58,89	3666,29	74,82
█	2	1455,02	69,29	798,59	114,08	786,38	112,34	484,36	69,19	399,79	57,11	3924,14	80,08
█	3	1469,18	69,96	763,99	109,14	826,82	118,12	436,59	62,37	419,94	59,99	3916,53	79,93
█	4	1420,76	67,66	730,40	104,34	799,00	114,14	408,55	58,36	434,29	62,04	3793,00	77,41
█	5	1417,42	67,50	734,96	104,99	779,17	111,31	398,76	56,97	397,44	56,78	3727,76	76,08
█	6	1428,61	68,03	737,46	105,35	784,55	112,08	399,45	57,06	441,83	63,12	3791,91	77,39

Treatment	Tr. no.	Sex	Day 1 - 21		Day 22 - 28		Day 29 - 35		Day 36 - 42		Day 43 - 49		Day 1 – 49	
			Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain
			g	g	g	g	g	g	g	g	g	g	g	g
█	1	♂	1387,34	66,06	712,85	101,84	830,26	118,61	422,19	60,31	436,73	62,39	3789,37	77,33
		♀	1338,51	63,74	756,41	108,06	751,04	107,29	308,09	44,01	389,16	55,59	3543,22	72,31
█	2	♂	1496,54	71,26	770,36	110,05	767,32	109,62	556,04	79,43	378,40	54,06	3968,66	80,99
		♀	1413,51	67,31	826,82	118,12	805,44	115,06	412,68	58,95	422,50	60,36	3880,94	79,20
█	3	♂	1503,87	71,61	765,94	109,42	864,29	123,47	505,06	72,15	475,82	67,97	4114,99	83,98
		♀	1434,49	68,31	762,04	108,86	789,36	112,77	368,11	52,59	364,06	52,01	3718,07	75,88
█	4	♂	1433,66	68,27	732,42	104,63	775,02	110,72	478,78	68,40	524,25	74,89	3944,13	80,49
		♀	1407,86	67,04	728,49	104,07	822,80	117,54	338,82	48,40	346,04	49,43	3644,01	74,37
█	5	♂	1421,95	67,71	753,73	107,68	748,65	106,95	495,36	70,77	481,10	68,73	3900,79	79,61
		♀	1412,89	67,28	716,19	102,31	809,74	115,68	301,47	43,07	314,43	44,92	3554,73	72,55
█	6	♂	1455,34	69,30	725,79	103,68	776,78	110,97	452,61	64,66	508,28	72,61	3918,79	79,98
		♀	1401,89	66,76	749,14	107,02	792,33	113,19	346,30	49,47	375,38	53,63	3665,03	74,80

Feed conversion ratio (Feed consumption per 1 kg of live weight)

Tab. No. 2c

Treatment	Tr. no.	Feed conversion ratio				
		Day 21	Day 28	Day 35	Day 42	Day 49
		g/kg LW	g/kg LW	g/kg LW	g/kg LW	g/kg LW
█	1	1585,58	1722,29	1828,79	2187,38	2492,09
█	2	1483,78	1653,55	1826,24	2117,89	2462,71
█	3	1472,51	1653,17	1800,00	2124,81	2385,76
█	4	1511,32	1697,37	1818,71	2167,96	2426,98
█	5	1521,27	1713,92	1858,66	2198,89	2481,14
█	6	1520,26	1695,54	1826,48	2172,77	2399,82

Treatment	Tr. no.	Sex	Feed conversion ratio				
			Day 21	Day 28	Day 35	Day 42	Day 49
			g/kg LW	g/kg LW	g/kg LW	g/kg LW	g/kg LW
█	1	♂	1565,09	1697,60	1783,16	2107,96	2392,36
		♀	1606,78	1747,39	1876,41	2272,91	2598,62
█	2	♂	1456,24	1646,24	1827,14	2069,80	2436,31
		♀	1512,91	1660,94	1825,33	2167,81	2488,92
█	3	♂	1459,02	1654,13	1774,32	2062,66	2311,91
		♀	1486,62	1652,18	1826,94	2192,16	2467,39
█	4	♂	1519,24	1697,85	1824,05	2129,46	2386,15
		♀	1503,26	1696,88	1813,44	2207,57	2470,47
█	5	♂	1534,73	1715,66	1869,47	2147,24	2399,80
		♀	1507,70	1712,14	1847,82	2253,76	2570,31
█	6	♂	1512,79	1696,13	1816,30	2130,13	2323,23
		♀	1528,01	1694,93	1836,70	2216,93	2481,62

Feed consumption per phases

Tab. No. 2d

Treatment	Tr.. no.	Feed consumption					
		Starter (1-21 days)	Grower (22-28 days)	Grower (29-35 days)	Finisher (36-42 days)	Finisher (43-49 days)	Total
		kg	kg	kg	kg	kg	kg
█	1	630,30	401,20	465,90	515,90	280,40	2293,70
█	2	629,80	441,80	502,70	536,60	283,30	2394,20
█	3	630,50	431,00	511,00	543,50	274,00	2390,00
█	4	625,60	420,40	480,20	540,20	282,50	2348,90
█	5	629,30	432,40	489,60	528,60	283,00	2362,90
█	6	633,10	423,10	482,80	534,80	263,60	2337,40

Treatment	Tr.. no.	Sex	Feed consumption					
			Starter (1-21 days)	Grower (22-28 days)	Grower (29-35 days)	Finisher (36-42 days)	Finisher (43-49 days)	Total
			kg	kg	kg	kg	kg	kg
█	1	♂	316,30	196,20	233,10	260,40	139,60	1145,60
		♀	314,00	205,00	232,80	255,50	140,80	1148,10
█	2	♂	317,70	219,00	249,60	264,40	140,70	1191,40
		♀	312,10	222,80	253,10	272,20	142,60	1202,80
█	3	♂	319,50	220,10	253,90	274,80	140,00	1208,30
		♀	311,00	210,90	257,10	268,70	134,00	1181,70
█	4	♂	317,10	207,60	235,50	269,00	146,00	1175,20
		♀	308,50	212,80	244,70	271,20	136,50	1173,70
█	5	♂	318,60	218,60	244,10	265,00	138,70	1185,00
		♀	310,70	213,80	245,50	263,60	144,30	1177,90
█	6	♂	320,60	211,20	235,20	267,50	133,70	1168,20
		♀	312,50	211,90	247,60	267,30	129,90	1169,20

Results of carcass analysis with skin at the age 42 days

Tab. No. 3a

Treatment	Tr. no.	Sex	Weight				Ratio of abd. fat to live weight	Breast muscles with skin			Thigh muscles with skin			Total muscles with skin			Carcass	
			Total	Body	Gibl.	Abd. fat		Weight	Percentage		Weight	Percentage		Weight	Percentage		Value	Yield
									Total weight	Body carcass		Total weight	Body carcass		Total weight	Body carcass		
			g	g	g	g		g	%	%	%	g	%	%	g	%	%	%
■	1	♂	3429	2260	326	29	0,85	637	18,57	28,18	545	15,90	24,13	1182	34,47	52,31	65,89	75,40
		♀	3177	2156	295	30	0,94	642	20,20	29,77	515	16,22	23,90	1157	36,42	53,67	67,86	77,15
		♂	3305	2208	311	29	0,89	639	19,34	28,95	530	16,05	24,02	1170	35,39	52,97	66,82	76,23
■	2	♂	3670	2441	327	33	0,91	638	17,40	26,16	613	16,70	25,12	1252	34,10	51,28	66,49	75,41
		♀	3511	2406	323	37	1,05	678	19,31	28,17	607	17,29	25,22	1285	36,59	53,39	68,54	77,76
		♂	3591	2424	325	35	0,98	658	18,33	27,16	610	16,99	25,17	1268	35,32	52,33	67,50	76,56
■	3	♂	3665	2441	327	33	0,91	651	17,76	26,67	620	16,92	25,41	1271	34,68	52,07	66,59	75,53
		♀	3406	2341	329	33	0,98	659	19,36	28,17	586	17,20	25,03	1245	36,56	53,20	68,72	78,38
		♂	3536	2391	328	33	0,94	655	18,53	27,40	603	17,05	25,22	1258	35,58	52,62	67,61	76,90
■	4	♂	3411	2206	314	21	0,63	552	16,18	25,01	579	16,99	26,26	1131	33,17	51,27	64,69	73,89
		♀	3374	2259	306	34	1,01	616	18,26	27,26	571	16,92	25,26	1187	35,18	52,52	66,98	76,04
		♂	3392	2233	310	28	0,82	584	17,21	26,15	575	16,95	25,75	1159	34,17	51,90	65,83	74,96
■	5	♂	3455	2237	324	27	0,78	562	16,28	25,14	593	17,18	26,53	1156	33,46	51,67	64,76	74,14
		♀	3320	2279	308	34	1,04	640	19,29	28,11	572	17,23	25,10	1213	36,53	53,21	68,65	77,93
		♂	3388	2258	316	31	0,91	601	17,75	26,63	583	17,20	25,81	1184	34,95	52,44	66,65	75,98
■	6	♂	3439	2240	330	29	0,86	564	16,42	25,20	581	16,90	25,95	1146	33,32	51,15	65,13	74,72
		♀	3329	2296	321	33	0,99	641	19,27	27,93	581	17,44	25,28	1222	36,71	53,22	68,98	78,61
		♂	3384	2268	325	31	0,92	603	17,82	26,58	581	17,17	25,61	1184	34,98	52,20	67,02	76,63

Results of carcass analysis with skin at the age 49 days

Tab. No. 3b

Treatment	Tr. no.	Sex	Weight				Ratio of abd. fat to live weight	Breast muscles with skin			Thigh muscles with skin			Total muscles with skin			Carcass	
			Total	Body	Gibl.	Abd. fat		Weight	Percentage		Weight	Percentage		Weight	Percentage		Value	Yield
									Total weight	Body carcass		Total weight	Body carcass		Total weight	Body carcass		
			g	g	g	g		%	g	%	%	g	%	%	g	%	%	%
■	1	♂	3846	2564	377	33	0,87	799	20,78	31,17	576	14,97	22,45	1375	35,74	53,62	66,67	76,47
		♀	3598	2430	329	41	1,15	753	20,94	31,00	554	15,39	22,79	1307	36,33	53,79	67,55	76,69
		♂	3722	2497	353	37	1,00	776	20,86	31,09	565	15,17	22,61	1341	36,03	53,70	67,09	76,58
■	2	♂	4030	2681	388	35	0,87	787	19,53	29,36	654	16,24	24,41	1441	35,77	53,77	66,51	76,14
		♀	3941	2691	347	46	1,18	817	20,74	30,38	641	16,28	23,84	1459	37,02	54,22	68,28	77,07
		♂	3985	2686	367	41	1,02	802	20,14	29,88	648	16,26	24,12	1450	36,39	54,00	67,40	76,60
■	3	♂	4175	2825	397	34	0,80	836	20,03	29,60	668	16,01	23,65	1505	36,04	53,25	67,67	77,17
		♀	3778	2569	330	43	1,14	793	20,99	30,87	611	16,18	23,79	1404	37,17	54,67	68,00	76,73
		♂	3977	2697	363	38	0,96	815	20,49	30,21	640	16,09	23,72	1454	36,58	53,93	67,83	76,96
■	4	♂	4001	2671	388	33	0,82	770	19,25	28,84	644	16,09	24,10	1414	35,34	52,94	66,76	76,45
		♀	3702	2519	336	32	0,86	738	19,93	29,28	606	16,38	24,07	1344	36,31	53,35	68,05	77,13
		♂	3851	2595	362	32	0,84	754	19,58	29,06	625	16,23	24,08	1379	35,81	53,14	67,39	76,78
■	5	♂	3962	2603	379	32	0,82	753	19,02	28,95	628	15,84	24,11	1381	34,86	53,06	65,70	75,28
		♀	3614	2466	332	33	0,92	717	19,84	29,08	598	16,56	24,26	1315	36,40	53,34	68,24	77,43
		♂	3788	2534	356	33	0,87	735	19,41	29,01	613	16,18	24,19	1348	35,59	53,20	66,91	76,31
■	6	♂	3977	2608	378	33	0,84	768	19,32	29,46	638	16,03	24,45	1406	35,35	53,91	65,56	75,06
		♀	3724	2539	335	34	0,93	751	20,17	29,59	615	16,51	24,21	1366	36,68	53,80	68,18	77,17
		♂	3851	2573	356	34	0,88	760	19,73	29,52	626	16,26	24,33	1386	35,99	53,86	66,83	76,08

Mortality

Tab. No. 4

Treatment	Tr. no.	Mortality in the period						Mortality according causes														
		Day 1-21	Day 22-35	Day 36-42	Day 43-49	Day 1-49		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
		birds	birds	birds	birds	birds	%															
█	1	0	2	0	2	4	1,43										4					
█	2	0	2	0	2	4	1,43										2	2				
█	3	0	0	0	0	0	0,00															
█	4	0	1	0	0	1	0,36										1					
█	5	0	1	0	0	1	0,36											1				
█	6	0	0	0	0	0	0,00															

Treatment	Tr. no.	Sex	Mortality in the period						Mortality according causes														
			Day 1-21	Day 22-35	Day 36-42	Day 43-49	Day 1-49		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
			birds	birds	birds	birds	birds	%															
█	1	♂	0	0	0	1	1	0,71										1					
			0	2	0	1	3	2,14										3					
█	2	♂	0	1	0	2	3	2,14										1	2				
			0	1	0	0	1	0,71										1					
█	3	♂	0	0	0	0	0	0,00															
			0	0	0	0	0	0,00															
█	4	♂	0	1	0	0	1	0,71										1					
			0	0	0	0	0	0,00															
█	5	♂	0	0	0	0	0	0,00															
			0	1	0	0	1	0,71											1				
█	6	♂	0	0	0	0	0	0,00															
			0	0	0	0	0	0,00															

Diagnostic:

- 1 - Virus caused diseases
- 2 - Bacteria caused diseases
- 3 - Moulds caused diseases
- 4 - Parasite caused diseases
- 5 - Tumors

- 6 - Injuries
- 7 - Gastrointest diseases
- 8 - Respiratory diseases
- 9 - Reproduct. org. diseases
- 10 - Mobility app. diseases

- 11 - Sudden death syndrome
- 12 - Cannibalism
- 13 - Yolk sac. inflam.
- 14 - Other causes

Statistical analysis of body weight on day 49

Tab. No. 5

Treatment	Tr. No.	Males				Females			
		Number of birds	Average body weight	Divergence valuation	Variations coeff. valuation	Number of birds	Average body weight	Divergence valuation	Variations coeff. valuation
			g/birds	g/birds	%		g/birds	g/birds	%
■	1	69	3845,58	251,39	6,54	69	3600,58	239,67	6,66
■	2	67	4030,45	325,55	8,08	69	3940,94	264,94	6,72
■	3	70	4175,27	261,52	6,26	70	3777,86	232,91	6,17
■	4	69	4001,35	302,25	7,55	70	3702,01	293,85	7,94
■	5	70	3961,64	260,15	6,57	70	3613,80	289,75	8,02
■	6	70	3977,21	285,09	7,17	70	3723,96	249,82	6,71

Statistical analyses of performance results – live weight

Performance results were statistically evaluated using the ANOVA model (Sheffe test) or Kruskal-Wallis test (nonparametric method).

The following symbols are used for levels of significance:

- $p \leq 0.001$ * * * - differences are very high significant
- $p \leq 0.01$ * * - differences are high significant
- $p \leq 0.05$ * - differences are significant
- $p > 0.05$ o - differences are not significant

Average body weight on day 35 (by sex)

Tab. No. 6a

Treatment	Treat. No.	Sex	No. of birds	Average (g)	Standard deviation	Kruskal-Wallis test					
	1	♂	140	2986,66	276,59		*	***	o	o	o
	2		139	3096,00	315,77	0,018922		*	*	**	o
	3		140	3194,39	201,53	0,000000	0,010855		***	***	***
	4		139	2998,32	279,71	1,000000	0,040023	0,000000		o	o
	5		140	2985,19	222,90	1,000000	0,006017	0,000000	1,000000		o
	6		140	3016,33	241,65	1,000000	0,217513	0,000000	1,000000	1,000000	

Treatment	Treat. No.	Sex	No. of birds	Average (g)	Standard deviation	Scheffe test					
	1	♀	138	2903,33	260,55		***	**	*	o	o
	2		139	3105,77	229,71	0,000000		o	o	*	o
	3		140	3045,68	278,86	0,001319	0,609872		o	o	o
	4		140	3017,16	233,32	0,025698	0,168424	0,976201		o	o
	5		139	2997,89	291,29	0,117375	0,042769	0,810391	0,996124		o
	6		140	3002,28	288,24	0,085365	0,059862	0,865340	0,998867	0,999997	

Average body weight on day 35 (both sexes together)

Treatment	Treat. No.	No. of birds	Average	Standard deviation	Scheffe test					
			(g)							
	1	278	2945,29	271,49		***	***	o	o	o
	2	278	3100,88	275,66	0,000000		o	**	***	**
	3	280	3120,03	254,02	0,000000	0,981000		***	***	***
	4	279	3007,77	257,19	0,167998	0,004028	0,000132		o	o
	5	279	2991,52	258,85	0,511212	0,000240	0,000004	0,990998		o
	6	280	3009,30	265,58	0,145857	0,005039	0,000175	1,000000	0,986327	

Average body weight on day 42 (by sex)

Tab. No. 6b

Treatment	Treat. No.	Sex	No. of birds	Average	Standard deviation	Kruskal-Wallis test					
				(g)							
	1	♂	140	3408,85	253,77		***	***	o	o	o
	2		139	3652,04	298,11	0,000000		o	***	***	***
	3		140	3699,45	229,45	0,000000	1,000000		***	***	***
	4		139	3477,09	299,41	0,434513	0,000004	0,000000		o	o
	5		140	3480,54	244,64	0,558720	0,000003	0,000000	1,000000		o
	6		140	3468,94	259,93	0,782397	0,000001	0,000000	1,000000	1,000000	

Treatment	Treat. No.	Sex	No. of birds	Average	Standard deviation	Scheffe test					
				(g)							
	1	♀	138	3211,42	310,51		***	***	***	o	***
	2		139	3518,45	234,25	0,000000		*	***	***	***
	3		140	3413,79	246,51	0,000000	0,033628		o	*	o
	4		140	3355,98	226,86	0,000364	0,000025	0,590322		o	o
	5		139	3299,37	256,39	0,131104	0,000000	0,013106	0,615104		o
	6		140	3348,58	219,90	0,000973	0,000008	0,449591	0,999952	0,748007	

Average body weight on day 42 (both sexes together)

Treatment	Treat. No.	No. of birds	Average	Standard deviation	Scheffe test					
			(g)							
	1	278	3310,85	299,63		***	***	***	*	**
	2	278	3585,24	275,84	0,000000		o	***	***	***
	3	280	3556,62	277,45	0,000000	0,909761		***	***	***
	4	279	3416,32	271,87	0,000964	0,000000	0,000001		o	o
	5	279	3390,28	266,07	0,038911	0,000000	0,000000	0,938482		o
	6	280	3408,76	247,76	0,003210	0,000000	0,000000	0,999809	0,986184	

Average body weight on day 49 (by sex)

Tab. No. 6c

Treatment	Treat. No.	Sex	No. of birds	Average	Standard deviation	Scheffe test					
				(g)							
	1	♂	69	3845,58	251,39		*	***	o	o	o
	2		67	4030,45	325,55	0,013168		o	o	o	o
	3		70	4175,27	261,52	0,000000	0,110270		*	**	**
	4		69	4001,35	302,25	0,063714	0,996278	0,022772		o	o
	5		70	3961,64	260,15	0,319094	0,843325	0,001426	0,983442		o
	6		70	3977,21	285,09	0,183785	0,942608	0,004530	0,998397	0,999807	

Treatment	Treat. No.	Sex	No. of birds	Average	Standard deviation	Scheffe test					
				(g)							
	1	♀	69	3600,58	239,67		***	**	o	o	o
	2		69	3940,94	264,94	0,000000		*	***	***	***
	3		70	3777,86	232,91	0,008223	0,021530		o	*	o
	4		70	3702,01	293,85	0,396832	0,000039	0,713431		o	o
	5		70	3613,80	289,75	0,999881	0,000000	0,019462	0,558716		o
	6		70	3723,96	249,82	0,179127	0,000324	0,916083	0,998557	0,294633	

Average body weight on day 49 (both sexes together)

Treatment	Treat. No.	No. of birds	Average	Standard deviation	Scheffe test					
			(g)							
█	1	138	3723,08	273,85		***	***	*	o	*
█	2	136	3985,04	298,65	0,000000		o	*	***	*
█	3	140	3976,56	317,25	0,000000	0,999967		*	***	*
█	4	139	3850,60	332,79	0,037494	0,023212	0,040603		o	o
█	5	140	3787,72	325,17	0,690527	0,000038	0,000091	0,714193		o
█	6	140	3850,59	295,77	0,036932	0,022757	0,039896	1,000000	0,712850	

Statistical analyses of performance results – carcass analysis

Performance results were statistically evaluated using the ANOVA model (Scheffe test) or Kruskal-Wallis test (nonparametric method).

The following symbols are used for levels of significance:

- $p \leq 0.001$ * * * - differences are very high significant
- $p \leq 0.01$ * * - differences are high significant
- $p \leq 0.05$ * - differences are significant
- $p > 0.05$ o - differences are not significant

Weight of Breast muscles with skin at 42 days (by sex)

Tab. No. 7a

Treatment	Treat. No.	Sex	No. of measurement	Average	Standard deviation	Scheffe test					
				(g)							
	1	♂	70	636,83	65,30		o	o	***	***	***
	2		70	638,49	78,06	0,999998		o	***	***	***
	3		70	650,86	65,09	0,932011	0,959839		***	***	***
	4		70	551,91	78,58	0,000000	0,000000	0,000000		o	o
	5		70	562,46	69,08	0,000001	0,000001	0,000000	0,980074		o
	6		70	564,46	75,11	0,000002	0,000001	0,000000	0,957407	0,999994	

Treatment	Treat. No.	Sex	No. of measurement	Average	Standard deviation	Scheffe test					
				(g)							
	1	♀	68	641,76	90,64		o	o	o	o	o
	2		70	677,80	77,87	0,228993		o	**	o	o
	3		70	659,40	96,79	0,893832	0,871620		o	o	o
	4		70	615,89	62,19	0,613185	0,001097	0,071007		o	o
	5		69	640,49	73,42	1,000000	0,190302	0,859795	0,661403		o
	6		70	641,34	77,16	1,000000	0,209501	0,880441	0,622891	1,000000	

Weight of Breast muscles with skin at 42 days (both sexes together)

Treatment	Treat. No.	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	138	639,26	78,56		o	o	***	**	*
	2	140	658,14	80,15	0,580022		o	***	***	***
	3	140	655,13	82,29	0,749427	0,999847		***	***	***
	4	140	583,90	77,56	0,000006	0,000000	0,000000		o	o
	5	139	601,19	81,09	0,009369	0,000002	0,000012	0,670387		o
	6	140	602,90	85,11	0,015809	0,000006	0,000026	0,568981	0,999991	

Weight of Thigh muscles with skin at 42 days (by sex)

Tab. No. 7b

Treatment	Treat. No.	Sex	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	♂	70	545,29	42,70		***	***	***	***	***
	2		70	613,03	49,98	0,000000		o	**	o	**
	3		70	620,03	36,25	0,000000	0,970597		***	*	***
	4		70	579,31	48,20	0,000945	0,001109	0,000021		o	o
	5		70	593,41	41,98	0,000000	0,222574	0,025829	0,605524		o
	6		70	581,11	42,52	0,000364	0,002690	0,000062	0,999956	0,737460	

Treatment	Treat. No.	Sex	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	+o	68	515,21	50,51		***	***	***	***	***
	2		70	606,97	44,51	0,000000		o	***	***	*
	3		70	585,80	42,05	0,000000	0,164373		o	o	o
	4		70	570,86	40,50	0,000000	0,000429	0,559239		o	o
	5		69	572,09	44,48	0,000000	0,000868	0,655341	0,999994		o
	6		70	580,54	44,82	0,000000	0,032440	0,992530	0,894322	0,939578	

Weight of Thigh muscles with skin at 42 days (both sexes together)

Treatment	Treat. No.	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	138	530,46	48,93		***	***	***	***	***
	2	140	610,00	47,25	0,000000		o	***	***	***
	3	140	602,91	42,72	0,000000	0,886878		***	*	**
	4	140	575,09	44,56	0,000000	0,000000	0,000086		o	o
	5	139	582,83	44,39	0,000000	0,000152	0,018045	0,843492		o
	6	140	580,83	43,53	0,000000	0,000028	0,005498	0,951631	0,999653	

Weight of Breast muscles with skin at 49 days (by sex)

Tab. No. 8a

Treatment	Treat. No.	Sex	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	♂	69	799,07	69,93		o	o	o	o	o
	2		67	787,01	86,16	0,982401		*	o	o	o
	3		70	836,31	86,04	0,230139	0,037679		***	***	***
	4		69	770,41	95,76	0,541089	0,930058	0,000756		o	o
	5		70	753,44	74,71	0,067755	0,356533	0,000003	0,920367		o
	6		70	768,23	86,12	0,449994	0,884557	0,000385	0,999995	0,954177	

Treatment	Treat. No.	Sex	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	+o	69	753,45	60,66		***	o	o	o	o
	2		69	817,39	79,37	0,000082		o	***	***	***
	3		70	793,10	72,49	0,066013	0,561959		**	***	*
	4		70	737,77	71,92	0,897031	0,000000	0,001222		o	o
	5		70	717,03	83,47	0,119645	0,000000	0,000001	0,718815		o
	6		70	751,26	63,41	0,999990	0,000034	0,040903	0,943057	0,168216	

Weight of Breast muscles with skin at 49 days (both sexes together)

Treatment	Treat. No.	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	138	776,26	69,12		o	**	o	**	o
	2	136	802,43	83,87	0,196763		o	***	***	**
	3	140	814,71	82,18	0,006879	0,897184		***	***	***
	4	139	753,97	85,87	0,370257	0,000140	0,000000		o	o
	5	140	735,24	81,02	0,002729	0,000000	0,000000	0,572878		o
	6	140	759,74	75,83	0,703922	0,001538	0,000005	0,996238	0,253742	

Weight of Thigh muscles with skin at 49 days (by sex)

Tab. No. 8b

Treatment	Treat. No.	Sex	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	♂	69	575,51	43,79		***	***	***	***	***
	2		67	654,48	62,03	0,000000		o	o	o	o
	3		70	668,26	55,54	0,000000	0,801500		o	**	*
	4		69	643,74	49,46	0,000000	0,923424	0,189365		o	o
	5		70	627,63	55,98	0,000004	0,117934	0,001107	0,664173		o
	6		70	637,60	48,30	0,000000	0,624279	0,039608	0,993147	0,939956	

Treatment	Treat. No.	Sex	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	♀	69	553,83	46,50		***	***	***	***	***
	2		69	641,45	48,00	0,000000		*	**	***	o
	3		70	611,19	48,25	0,000000	0,020560		o	o	o
	4		70	606,37	51,54	0,000000	0,003212	0,996712		o	o
	5		70	598,31	48,76	0,000032	0,000068	0,782648	0,965316		o
	6		70	614,66	48,23	0,000000	0,062832	0,999320	0,960872	0,555600	

Weight of Thigh muscles with skin at 49 days (both sexes together)

Treatment	Treat. No.	No. of measurement	Average (g)	Standard deviation	Scheffe test					
	1	138	564,67	46,30		***	***	***	***	***
	2	136	647,87	55,54	0,000000		o	*	***	*
	3	140	639,72	59,22	0,000000	0,899406		o	**	o
	4	139	624,92	53,72	0,000000	0,026510	0,371452		o	o
	5	140	612,97	54,33	0,000000	0,000022	0,003637	0,621895		o
	6	140	626,13	49,45	0,000000	0,043415	0,472539	0,999987	0,511436	

Performance results per pen

Body weight per phases

Tab. No. 9a

Treatment	Tr. no.	Pen	Sex	Day 1		Day 21		Day 28		Day 35		Day 42		Day 49	
				Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight
					g		g		g		g				
■	1	7 19	♂	70	55,86	70	1429,37	70	2141,20	70	2938,76	70	3388,26	69	3845,58
				70	56,57	70	1457,73	70	2171,60	70	3034,57	70	3429,44		
		1 13	+0	70	57,14	70	1399,24	70	2157,40	70	2909,03	70	3245,03	69	3600,58
70	57,57			70	1392,50	68	2147,01	68	2897,46	68	3176,82				
■	2	8 20	♂	70	60,71	70	1599,70	70	2362,66	69	3195,14	69	3633,33	67	4030,45
				70	62,86	70	1516,94	70	2294,70	70	2998,27	70	3670,49		
		2 14	+0	70	59,57	70	1480,23	70	2300,41	69	3099,03	69	3526,22	69	3940,94
70	60,43			70	1466,79	70	2300,24	70	3112,41	70	3510,79				
■	3	9 21	♂	70	60,57	70	1556,79	70	2316,63	70	3194,54	70	3719,67	70	4175,27
				70	60,00	70	1571,53	70	2343,57	70	3194,23	70	3679,23		
		3 15	+0	70	59,71	70	1514,14	70	2282,79	70	3035,91	70	3421,27	70	3777,86
70	59,86			70	1474,41	70	2229,86	70	3055,44	70	3406,31				
■	4	10 22	♂	70	56,57	70	1520,26	69	2239,00	69	3011,93	69	3544,48	69	4001,35
				70	57,86	70	1461,50	70	2207,81	70	2984,90	70	3410,67		
		4 16	+0	70	58,00	70	1478,80	70	2179,61	70	2987,87	70	3338,46	70	3702,01
70	58,00			70	1452,93	70	2209,10	70	3046,44	70	3373,50				
■	5	11 23	♂	70	60,57	70	1515,31	70	2242,54	70	3059,71	70	3506,33	70	3961,64
				70	61,14	70	1450,30	70	2230,53	70	2910,66	70	3454,76		
		5 17	+0	70	59,00	70	1478,73	70	2172,41	70	2986,99	70	3279,33	70	3613,80
70	59,14			70	1465,20	70	2203,89	69	3008,96	69	3319,70				
■	6	12 24	♂	70	57,71	70	1523,40	70	2265,69	70	3052,74	70	3499,27	70	3977,21
				70	59,14	70	1504,13	70	2213,41	70	2979,91	70	3438,60		
		6 18	+0	70	58,86	70	1454,77	70	2222,66	70	3004,97	70	3368,23	70	3723,96
70	59,00			70	1466,86	70	2197,24	70	2999,59	70	3328,93				

Weight gain per phases

Tab. No. 9b

Treat.	Tr. no.	Pen	Sex	Day 1 - 21		Day 22 - 28		Day 29 - 35		Day 36 - 42		Day 43 - 49		Day 1 - 49 (42*)	
				Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain	Weight gain per phase	Daily weight gain
				g	g	g	g	g	g	g	g	g	g	g	g
■	1	7 19	♂	1373,51	65,41	711,83	101,69	797,56	113,94	449,50	64,21	457,32	65,33	3789,72	77,34
				1401,16	66,72	713,87	101,98	862,97	123,28	394,87	56,41		3372,87*	80,31*	
		1 13	+0	1342,10	63,91	758,16	108,31	751,63	107,38	336,00	48,00	355,55	50,79	3543,44	72,32
				1334,93	63,57	754,51	107,79	750,44	107,21	279,37	39,91		3119,25*	74,27*	
■	2	8 20	♂	1538,99	73,29	762,96	108,99	832,49	118,93	438,19	62,60	397,11	56,73	3969,73	81,01
				1454,09	69,24	777,76	111,11	703,57	100,51	672,21	96,03		3607,63*	85,90*	
		2 14	+0	1420,66	67,65	820,19	117,17	798,61	114,09	427,19	61,03	414,72	59,25	3881,37	79,21
				1406,36	66,97	833,46	119,07	812,17	116,02	398,37	56,91		3450,36*	82,15*	
■	3	9 21	♂	1496,21	71,25	759,84	108,55	877,91	125,42	525,13	75,02	455,60	65,09	4114,70	83,97
				1511,53	71,98	772,04	110,29	850,66	121,52	485,00	69,29		3619,23*	86,17*	
		3 15	+0	1454,43	69,26	768,64	109,81	753,13	107,59	385,36	55,05	356,59	50,94	3718,14	75,88
				1414,56	67,36	755,44	107,92	825,59	117,94	350,87	50,12		3346,46*	79,68*	
■	4	10 22	♂	1463,69	69,70	718,74	102,68	772,93	110,42	532,55	76,08	456,87	65,27	3944,78	80,51
				1403,64	66,84	746,31	106,62	777,09	111,01	425,77	60,82		3352,81*	79,83*	
		4 16	+0	1420,80	67,66	700,81	100,12	808,26	115,47	350,59	50,08	363,56	51,94	3644,01	74,37
				1394,93	66,43	756,17	108,02	837,34	119,62	327,06	46,72		3315,50*	78,94*	
■	5	11 23	♂	1454,74	69,27	727,23	103,89	817,17	116,74	446,61	63,80	455,31	65,04	3901,07	79,61
				1389,16	66,15	780,23	111,46	680,13	97,16	544,10	77,73		3393,61*	80,80*	
		5 17	+0	1419,73	67,61	693,69	99,10	814,57	116,37	292,34	41,76	334,47	47,78	3554,80	72,55
				1406,06	66,96	738,69	105,53	805,07	115,01	310,74	44,39		3260,55*	77,63*	
■	6	12 24	♂	1465,69	69,79	742,29	106,04	787,06	112,44	446,53	63,79	477,94	68,28	3919,50	79,99
				1444,99	68,81	709,29	101,33	766,50	109,50	458,69	65,53		3379,46*	80,46*	
		6 18	+0	1395,91	66,47	767,89	109,70	782,31	111,76	363,26	51,89	355,73	50,82	3665,10	74,80
				1407,86	67,04	730,39	104,34	802,34	114,62	329,34	47,05		3269,93*	77,86*	

Feed conversion ratio (Feed consumption per 1 kg of live weight)

Tab. No. 9c

Treatment	Tr. no.	Pen	Sex	Feed conversion ratio				
				Day 21	Day 28	Day 35	Day 42	Day 49
				g/kg LW	g/kg LW	g/kg LW	g/kg LW	g/kg LW
█	1	7	♂	1587,11	1721,33	1806,40	2087,88	2392,36
		19		1543,50	1674,21	1760,66	2127,79	
█	1	1	♀	1616,18	1715,03	1857,76	2222,30	2598,62
		13		1597,33	1780,86	1895,68	2326,13	
█	2	8	♂	1415,44	1610,17	1758,10	2063,02	2436,31
		20		1499,26	1683,38	1899,67	2076,41	
█	2	2	♀	1505,56	1654,98	1863,60	2195,56	2488,92
		14		1520,33	1666,90	1787,77	2140,34	
█	3	9	♂	1474,65	1675,46	1786,53	2057,40	2311,91
		21		1443,54	1633,04	1762,11	2067,98	
█	3	3	♀	1467,12	1636,47	1832,82	2165,03	2467,39
		15		1506,65	1668,27	1821,11	2219,41	
█	4	10	♂	1480,01	1721,14	1817,89	2096,75	2386,15
		22		1560,04	1674,57	1830,16	2162,96	
█	4	4	♀	1494,45	1687,72	1788,18	2155,40	2470,47
		16		1512,22	1705,93	1838,21	2259,21	
█	5	11	♂	1515,01	1727,63	1816,23	2146,32	2399,80
		23		1555,34	1703,63	1925,44	2148,18	
█	5	5	♀	1492,59	1709,75	1815,02	2203,85	2570,31
		17		1522,95	1714,50	1880,86	2303,77	
█	6	12	♂	1486,34	1664,59	1768,90	2094,72	2323,23
		24		1539,57	1728,42	1864,87	2166,16	
█	6	6	♀	1551,54	1680,10	1813,66	2192,76	2481,62
		18		1504,67	1709,94	1859,78	2241,39	

Feed consumption per phases

Tab. No. 9d

Treatment	Tr. no.	Pen	Sex	Feed consumption					
				Starter (1-21 days)	Grower (22-28 days)	Grower (29-35 days)	Finisher (36-42 days)	Finisher (43-49 days)	Total
				kg	kg	kg	kg	kg	kg
■	1	7	♂	158,80	99,20	113,60	123,60	139,60	634,80
		19	♂	157,50	97,00	119,50	136,80		510,80
		1	♀	158,30	100,70	119,30	126,50	140,80	645,60
		13	♀	155,70	104,30	113,50	129,00		502,50
■	2	8	♂	158,50	107,80	121,30	129,60	140,70	657,90
		20	♂	159,20	111,20	128,30	134,80		533,50
		2	♀	156,00	110,50	132,00	135,70	142,60	676,80
		14	♀	156,10	112,30	121,10	136,50		526,00
■	3	9	♂	160,70	111,00	127,80	136,20	140,00	675,70
		21	♂	158,80	109,10	126,10	138,60		532,60
		3	♀	155,50	106,00	128,00	129,00	134,00	652,50
		15	♀	155,50	104,90	129,10	139,70		529,20
■	4	10	♂	157,50	108,40	111,90	135,00	146,00	658,80
		22	♂	159,60	99,20	123,60	134,00		516,40
		4	♀	154,70	102,80	116,50	129,70	136,50	640,20
		16	♀	153,80	110,00	128,20	141,50		533,50
■	5	11	♂	160,70	110,50	117,80	137,80	138,70	665,50
		23	♂	157,90	108,10	126,30	127,20		519,50
		5	♀	154,50	105,50	119,50	126,40	144,30	650,20
		17	♀	156,20	108,30	126,00	137,20		527,70
■	6	12	♂	158,50	105,50	114,00	135,10	133,70	646,80
		24	♂	162,10	105,70	121,20	132,40		521,40
		6	♀	158,00	103,40	120,10	135,50	129,90	646,90
		18	♀	154,50	108,50	127,50	131,80		522,30