



# MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE ÚSTRAŠICE

státní podnik

390 02 Tábor 2

Česká republika

**Effects of graded levels of different methionine sources on live performance and carcass traits of xxxxxxx broilers**

**xxxxxxx (No. 1221)**

**Účinky různých úrovní methioninových zdrojů na živou hmotnost a jatečné parametry brojlerových kuřat xxxxxxx**

**xxxxxxx (VT č. 1221)**

**International Poultry Testing Station Ústředice  
Mezinárodní testování drůbeže Ústředice**

**Czech Republic  
Česká republika**

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Zpracovatel studie:

**Ing. Jan Tyl**

**Associate Investigator:**  
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**Ing. Hana Horná  
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**Study sponsor, and monitor:**  
Dohlížitel:

**xxxxxxxxxxxx**

**November 2021  
Listopad 2021**

## **Aim of the Project**

To determine the effect and bioefficacy of different methionine sources on live performance and carcass traits of broilers.

## **Study location**

The study was carried out on the test facility Mezinárodní testování drůbeže, s.p., (next MTD, s.p. only), Ústrašice, Czech Republic. Feed samples were sended for the contents of nutrients by xxxxxxxxxxxx.

## **Trial period**

Beginning of the trial:	11 August 2021
End of the trial:	14 September 2021
Finishing of the final report:	November 2021

## **Study responsibility**

Ing. Jan Tyl was the independent Study Director, responsible that the trial is conducted according to the protocol. Ing. Hana Horná was responsible for daily animal care at the test facility. Full details of study's responsibility are provided below.

## **Persons involved in the trial**

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## **Material and methods**

### **Birds**

In total there were 7800 day old chicks (males) of xxxxxxxxxxxx. Day-old chicks were randomly distributed into 6 dietary treatments with 10 replicates per treatment and 130 chicken per replicate.

Origin 1-day old chicks:

breeder company – xxxxxxxxxxxx

parent flock – xxxxxxxxxxxx

age of the breeding flock - 56 weeks

### **Experimental treatments:**

<b>Tr. No.</b>	<b>Tr.</b>	<b>Description</b>	<b>No. of pen</b>	<b>No. of chick</b>
1	T1	xxxxxxxxxxx	10	1300
2	T2	xxxxxxxxxxx	10	1300
3	T3	xxxxxxxxxxx	10	1300
4	T4	xxxxxxxxxxx	10	1300
5	T5	xxxxxxxxxxx	10	1300
6	T6	xxxxxxxxxxx	10	1300

### **Housing system**

Chickens were kept in the windowless chicken house with full climatic control, on deep litter. The heating program was conducted according to the xxxxxxxxxxxx. Drinking water was supplied ad libitum by nipple drinkers. Each pen was equipped with manually filled tube feeders. Bedding material was wood shaving.

Light was provided as follows during the experimental period:

<u>Lighting programme:</u>	Day 1 - 7	23 hours of light + 1 hour of darkness
	Day 8 - 32	18 hours of light + 6 hours of darkness
	Day 33 - 35	23 hours of light + 1 hour of darkness
<u>Stocking density:</u>	16 broilers per square meter	

The conduct of the trial was conformed to the national welfare legislation.

### **Veterinary precautions**

The chicken house was disinfected with xxxxxxxxxxx before the chick placement.

On days 1 and 12 the chicken were vaccinated with xxxxxxxxxxx (the spray in the eyes). On the first days old chickens was applied the water solution of permanganate.

### **Feeds and Diets**

Chickens were fed ad libitum according to three phase feeding programme. The test phases were 0-10 days of age for the starter BR1, 11-24 days of age for the grower BR2 and 25-35 days of age for the finisher BR3.

Feed was produced by International Poultry Testing Station Ústřašice. The composition of diets is shown in following tables.

## Composition of the feed

Ingredients (%)	Control diets		
	Starter	Grower	Finisher
Corn	26.00	33.50	43.00
Soyabean meal	40.00	33.00	24.00
Wheat	25.00	25.00	25.00
Soyabean oil	5.20	5.16	4.40
Limestone	1.64	1.37	1.32
Monocalciumphosphate	1.17	1.02	0.97
Salt	0.30	0.30	0.30
Sodium bicarbonate	0.11	0.12	0.12
xxxxxxxxxx	0.50	-	-
xxxxxxxxxx	-	0.50	-
xxxxxxxxxx	-	-	0.50
xxxxxxxxxx	0.47	0.33	0.61
<b>Nutritional composition (%)</b>			
crude protein	23.30	20.60	17.80
ME (MJ/kg)	12.65	13.00	13.10
Ca	1.05	0.90	0.85
P available	0.50	0.45	0.42
Na	0.16	0.16	0.16
Cl	0.23	0.23	0.23
Lys (dig.)	1.29	1.09	0.99
Met (dig.)	0.30	0.27	0.24
M+C (dig.)	0.60	0.55	0.49
Threonin (dig.)	0.82	0.70	0.65
Thryptophan (dig.)	0.26	0.23	0.18
Val (dig.)	1.02	0.87	0.80
Ile (dig.)	0.87	0.75	0.70
Arg (dig.)	1.43	1.24	1.05

## **Parameters recorded and methods applied**

### **Live weight**

Live weight was measured on day 1 and on day 10 (all the birds in each pen were weighed altogether). On day 24 of age birds were weighed individually, without fasting. On day 35 birds were weighed individually, after 12 hours of fasting.

### **Feed consumption**

Feed consumption was determined per pen for the feed – starter, grower and finisher.

### **Weight gain**

Weight gain per phase and average daily weight gains were calculated for the periods 1 – 10 days, 11 – 24 days, 25 – 35 days and for the overall experiment (1 – 35 days).

### **Feed conversion ratio**

Feed conversion ratio was calculated as feed consumption per 1 kg of live weight and per 1 kg of weight gain for the periods 1 – 10 days, 11 – 24 days, 25 – 35 days and for the overall experiment (1 – 35 days). The calculation was included weight of deaths.

### **Mortality**

All pens were checked three times a day to see if there were any dead or ill birds. Dead chickens were registered by date, weight and reason of mortality on the day of death. Mortality was recorded for the periods 1 – 10 days, 11 – 24 days, 25 – 35 days and 1 – 35 days.

### **Carcass analysis**

The carcass analysis was done in 5 birds per each pen on day 35. Breast muscles was weighed without skin and thigh muscles with skin.

### **Statistical analyses**

Performance results of Live weight (on days 1, 10, 24 and 35) and Feed conversion ratio were statistically evaluated using the ANOVA single-factor model (Duncan test, Scheffe test) or nonparametric method (Kruskal-Wallis test).

## **Results**

Tab. No.	<b>1 Hatchability</b>
	<b>2 Performance results:</b>
	<b>2a Body weight</b>
	<b>2b Weight gain</b>
	<b>2c Feed conversion per 1 kg of live weight</b>
	<b>2d Feed conversion per 1 kg of weight gain</b>
	<b>2e Feed consumption</b>
	<b>3 Carcass analysis</b>
	<b>4 Mortality</b>
	<b>5 Statistical analysis of body weight at the age of 35 days</b> (average body weight, standard deviation, coefficient of variation)
	<b>6 -7 Statistical analyses of performance results</b>
	<b>8 Performance results per pen:</b>
	<b>8a Body weight</b>
	<b>8b Weight gain</b>
	<b>8c Feed conversion per 1 kg of live weight</b>
	<b>8d Feed conversion per 1 kg of weight gain</b>
	<b>8e Feed consumption</b>



**Results of incubation and hatching**

**Tab. No. 1**

Treatment	Tr. No.	Fertility	Hatchability		Birds housed	Average weight	
			Set eggs	Fertile eggs		Hatching eggs	Day old chicks
		%	%	%		g	g
T1	1	82.22	77.78	94.59	1300	69.00	44.92
T2	2				1300		44.92
T3	3				1300		45.00
T4	4				1300		44.88
T5	5				1300		45.00
T6	6				1300		45.00

**Body weight per phases**

**Tab. No. 2a**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Day 1</b>		<b>Day 10</b>		<b>Day 24</b>		<b>Day 35</b>	
		Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight
			g		g		g		g
T1	1	1300	44.92	1294	314.93	1277	1409.19	1266	2522.83
T2	2	1300	44.92	1296	314.80	1284	1435.05	1279	2482.94
T3	3	1300	45.00	1296	313.00	1287	1396.50	1281	2465.91
T4	4	1300	44.88	1296	310.50	1295	1397.37	1289	2474.13
T5	5	1300	45.00	1296	314.17	1284	1422.28	1275	2500.26
T6	6	1300	45.00	1294	309.39	1284	1415.56	1274	2506.81

Weight gain per phases

Tab. No. 2b

Treatment	Tr. No.	Day 1 - 10		Day 11 - 24		Day 25 - 35		Day 1 – 35	
		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
T1	1	270.02	27.00	1094.26	78.16	1113.63	101.24	2477.90	70.80
T2	2	269.87	26.99	1120.25	80.02	1047.89	95.26	2438.02	69.66
T3	3	268.00	26.80	1083.50	77.39	1069.41	97.22	2420.91	69.17
T4	4	265.62	26.56	1086.87	77.63	1076.76	97.89	2429.25	69.41
T5	5	269.12	26.91	1108.11	79.15	1077.98	98.00	2455.26	70.15
T6	6	264.42	26.44	1106.17	79.01	1091.25	99.20	2461.81	70.34

**Feed conversion per 1 kg of live weight****Tab. No. 2c**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Feed conversion ratio</b>		
		<b>Day 10</b>	<b>Day 24</b>	<b>Day 35</b>
		<b>g/kg live weight</b>	<b>g/kg live weight</b>	<b>g/kg live weight</b>
T1	1	951.29	1274.11	1516.49
T2	2	949.25	1255.44	1541.85
T3	3	952.03	1270.64	1545.14
T4	4	960.41	1278.45	1530.47
T5	5	950.97	1282.46	1526.26
T6	6	966.04	1277.07	1544.07

**Feed conversion per 1 kg of weight gain**

**Tab. No. 2d**

Treatment	Tr. No.	Feed conversion ratio			
		Day 1-10	Day 11-24	Day 25-35	Day 1-35
		g/kg weight gain	g/kg weight gain	g/kg weight gain	g/kg weight gain
T1	1	1110.02	1368.20	1827.35	1544.50
T2	2	1107.45	1342.31	1937.18	1570.60
T3	3	1112.14	1363.28	1906.80	1574.17
T4	4	1123.05	1369.46	1859.76	1558.92
T5	5	1110.24	1377.17	1852.04	1554.60
T6	6	1131.04	1364.66	1894.27	1572.67

**Feed consumption per phases****Tab. No. 2e**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Feed consumption</b>			
		<b>Starter (d 1-10)</b>	<b>Grower (d 11-24)</b>	<b>Finisher (d 25-35)</b>	<b>Total (d 1-35)</b>
		kg	kg	kg	kg
T1	1	388.50	1917.20	2578.35	4884.05
T2	2	388.07	1934.28	2596.10	4918.45
T3	3	386.86	1905.20	2610.70	4902.76
T4	4	386.97	1928.33	2577.75	4893.05
T5	5	387.80	1965.70	2543.45	4896.95
T6	6	387.39	1943.06	2635.45	4965.90

Results of carcass analysis

Tab. No. 3

Treatment	Tr. No.	Weight				Ratio of abd. fat to live weight	Breast muscles without skin			Thigh muscles with skin			Total muscles			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	%	%	%
T1	1	2541	1789	145	35	1.38	560	22.03	31.29	559	22.00	31.25	1119	44.04	62.54	70.41	76.10
T2	2	2518	1760	143	33	1.31	546	21.67	31.00	560	22.25	31.83	1106	43.93	62.84	69.90	75.60
T3	3	2520	1760	145	35	1.40	549	21.80	31.22	555	22.03	31.54	1105	43.83	62.76	69.84	75.60
T4	4	2513	1762	144	35	1.39	551	21.93	31.29	555	22.09	31.52	1107	44.02	62.81	70.09	75.81
T5	5	2516	1764	144	35	1.41	549	21.82	31.12	560	22.26	31.75	1109	44.08	62.87	70.12	75.83
T6	6	2528	1784	145	38	1.50	554	21.90	31.04	557	22.05	31.25	1111	43.95	62.29	70.56	76.27

**Mortality**

**Tab. No. 4**

Treat.	Tr. No.	Mortality in the period									Mortality according causes													
		Day 1 - 10		Day 11 - 24		Day 25 - 35		Day 1 - 35			1	2	3	4	5	6	7	8	9	10	11	12	13	14
		birds	g	birds	g	birds	g	birds	g	%														
T1	1	6	893	17	9217	11	16614	34	26724	2.62											34			
T2	2	4	818	12	6412	5	7061	21	14291	1.62											20			1
T3	3	4	702	9	5868	6	7612	19	14182	1.46											19			
T4	4	4	522	1	897	6	6506	11	7925	0.85											11			
T5	5	4	645	12	8292	9	11707	25	20644	1.92											24			1
T6	6	6	659	10	6609	10	15173	26	22441	2.00											26			

**Causes:**

- 1 - Viral diseases
- 2 - Bacterial diseases
- 3 - Fungal diseases
- 4 - Parasitary diseases
- 5 - Tumors

- 6 - Injuries
- 7 - Digestive tract diseases
- 8 - Respiratory tract diseases
- 9 - Reproduction tract diseases
- 10 - Locomotion apparatus diseases

- 11 - Sudden death syndrome
- 12 - Cannibalism
- 13 - Diverticulus inflammation
- 14 - Culling and other causes



**Statistical analysis - Body weight at 35 days of age**

**Tab. No. 5**

Treatment	Tr. No.	Cocks			
		No. of birds	Average body weight	Standard deviation	Coefficient of variation
			g/birds	g/birds	%
T 1	1	1266	2522.83	290.03	11.50
T 2	2	1279	2482.94	293.63	11.83
T 3	3	1281	2465.91	291.93	11.84
T 4	4	1289	2474.13	282.07	11.40
T 5	5	1275	2500.26	279.72	11.19
T 6	6	1274	2506.81	270.56	10.79

## Statistical analyses of performance results

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

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

### Body weight - day 1

Tab. No. 6a

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test					
					T1	T2	T3	T4	T5	T6
T1	1	10	44.92	0.60		o	o	o	o	o
T2	2	10	44.92	0.60	1.000000		o	o	o	o
T3	3	10	45.00	0.54	0.776927	0.782969		o	o	o
T4	4	10	44.88	0.55	0.882968	0.874647	0.684178		o	o
T5	5	10	45.00	0.48	0.752409	0.768008	1.000000	0.670270		o
T6	6	10	45.00	0.48	0.768008	0.776927	1.000000	0.678339	1.000000	

**Body weight - day 10**

**Tab. No. 6b**

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test					
					T1	T2	T3	T4	T5	T6
T1	1	10	314.93	5.90		o	o	o	o	*
T2	2	10	314.80	6.63	0.957537		o	o	o	o
T3	3	10	313.00	6.45	0.477209	0.491081		o	o	o
T4	4	10	310.50	5.27	0.111078	0.113296	0.311511		o	o
T5	5	10	314.17	4.25	0.771132	0.796548	0.632785	0.162053		o
T6	6	10	309.39	3.48	0.049426	0.051034	0.169172	0.650587	0.078180	

**Body weight - day 24**

**Tab. No. 6c**

Treatment	Treat. No.	No. of birds	Average (g)	Standard deviation	Kruskal-Wallis test					
					T1	T2	T3	T4	T5	T6
T1	1	1277	1409.19	182.67		**	o	o	o	o
T2	2	1284	1435.05	184.18	0.002418		***	***	o	o
T3	3	1287	1396.50	169.05	1.000000	0.000001		o	**	*
T4	4	1295	1397.37	160.22	1.000000	0.000057	1.000000		*	o
T5	5	1284	1422.28	160.91	0.459449	1.000000	0.001556	0.036456		o
T6	6	1284	1415.56	155.50	1.000000	0.160015	0.049291	0.549624	1.000000	

**Body weight - day 35**

**Tab. No. 6d**

Treatment	Treat. No.	No. of birds	Average (g)	Standard deviation	Scheffe test					
					T1	T2	T3	T4	T5	T6
T1	1	1266	2522.83	290.03		*	***	**	o	o
T2	2	1279	2482.94	293.63	0.028832		o	o	o	o
T3	3	1281	2465.91	291.93	0.000117	0.807882		o	o	*
T4	4	1289	2474.13	282.07	0.002229	0.987362	0.990741		o	o
T5	5	1275	2500.26	279.72	0.550910	0.797166	0.097933	0.369797		o
T6	6	1274	2506.81	270.56	0.847996	0.481879	0.021843	0.133884	0.996875	

**FCR - day 10****Tab. No. 7a**

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test					
					T1	T2	T3	T4	T5	T6
T1	1	10	952.28	18.51		o	o	o	o	o
T2	2	10	948.85	17.05	0.716562		o	o	o	o
T3	3	10	952.38	24.01	0.991221	0.719552		o	o	o
T4	4	10	960.69	22.00	0.373742	0.238701	0.349211		o	o
T5	5	10	950.51	14.41	0.841260	0.850970	0.843417	0.299430		o
T6	6	10	964.62	20.54	0.208359	0.122402	0.195658	0.657551	0.159963	

**FCR - day 24****Tab. No. 7b**

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test					
					T1	T2	T3	T4	T5	T6
T1	1	10	1274.54	28.84		o	o	o	o	o
T2	2	10	1256.49	40.30	0.295023		o	o	o	o
T3	3	10	1271.54	43.59	0.852832	0.352236		o	o	o
T4	4	10	1278.79	34.09	0.805265	0.223491	0.686076		o	o
T5	5	10	1283.02	30.09	0.636110	0.154337	0.532335	0.793283		o
T6	6	10	1277.77	36.02	0.841182	0.233893	0.718154	0.949494	0.760899	

**FCR - day 35****Tab. No. 7c**

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test					
					T1	T2	T3	T4	T5	T6
T1	1	10	1517.86	46.99		o	o	o	o	o
T2	2	10	1543.56	58.90	0.248249		o	o	o	o
T3	3	10	1546.63	51.57	0.215283	0.886672		o	o	o
T4	4	10	1531.12	36.84	0.536546	0.536176	0.486805		o	o
T5	5	10	1526.75	26.65	0.657983	0.433479	0.384392	0.827690		o
T6	6	10	1544.81	39.55	0.237462	0.950376	0.927906	0.523619	0.417798	

**Performance results per replicate**

**Body weight per phases**

**Tab. No. 8a (page 1)**

Treatment	Tr. No.	Pen	Day 1		Day 10		Day 24		Day 35	
			Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight
				g		g		g		g
T1	1	1	130	44.62	128	311.33	122	1449.67	122	2526.72
		7	130	45.00	130	309.23	129	1380.85	128	2505.39
		13	130	43.85	129	310.47	129	1434.57	127	2635.98
		19	130	45.38	129	311.24	128	1466.33	127	2484.80
		25	130	45.00	129	315.89	125	1430.16	124	2512.50
		36	130	45.38	130	320.77	128	1442.50	126	2667.86
		42	130	44.23	130	307.31	129	1286.05	126	2472.06
		48	130	44.62	130	320.77	130	1384.69	130	2467.31
		54	130	45.77	130	317.31	128	1400.94	127	2373.70
		60	130	45.38	129	325.00	129	1419.84	129	2583.10
T2	2	2	130	44.62	130	316.92	129	1426.59	128	2424.77
		8	130	45.00	129	309.69	128	1416.72	126	2474.21
		14	130	43.85	130	314.23	128	1498.52	127	2626.61
		20	130	45.38	129	309.30	127	1503.46	127	2393.39
		26	130	45.00	130	323.08	129	1461.32	129	2566.20
		35	130	45.38	129	310.47	129	1445.19	129	2327.67
		41	130	44.23	130	323.46	130	1311.23	130	2466.00
		47	130	44.62	129	310.85	127	1443.62	127	2592.20
		53	130	45.77	130	323.85	130	1374.31	130	2487.23
		59	130	45.38	130	306.15	127	1473.07	126	2472.86
T3	3	3	130	44.62	129	309.30	127	1449.21	126	2453.49
		9	130	45.00	129	315.89	129	1424.03	129	2501.01
		15	130	43.85	129	317.83	129	1437.75	127	2487.17
		21	130	45.38	129	301.94	128	1402.42	126	2374.05
		27	130	45.00	130	303.85	130	1386.31	130	2503.15
		34	130	45.38	130	315.77	130	1311.69	130	2307.62
		40	130	45.00	130	309.62	129	1422.17	128	2597.58
		46	130	44.62	130	321.15	128	1383.20	128	2494.30
		52	130	45.77	130	317.69	129	1386.98	129	2507.52
		58	130	45.38	130	316.92	128	1362.42	128	2433.05

**Body weight per phases**

**Tab. No. 8a (page 2)**

Treatment	Tr. No.	Pen	Day 1		Day 10		Day 24		Day 35	
			Birds	Average body weight	Birds	Average body weight	Birds	Average body weight	Birds	Average body weight
				g		g		g		g
T4	4	4	130	44.62	129	318.60	129	1425.04	128	2496.72
		10	130	45.00	130	306.54	130	1412.38	128	2506.17
		16	130	43.85	130	306.92	130	1402.23	130	2454.08
		22	130	45.38	130	305.77	130	1373.54	129	2371.16
		28	130	45.00	128	313.28	128	1427.27	127	2552.28
		33	130	45.38	130	308.46	130	1391.08	130	2399.85
		39	130	44.23	130	311.54	130	1420.92	129	2567.75
		45	130	44.62	130	319.23	130	1347.31	130	2496.77
		51	130	45.38	129	310.85	129	1413.64	129	2462.71
		57	130	45.38	130	303.85	129	1360.85	129	2436.05
T5	5	5	130	44.62	129	315.50	129	1350.08	128	2379.14
		11	130	45.00	130	315.38	128	1385.86	126	2498.33
		17	130	44.23	130	308.08	129	1453.10	129	2470.47
		23	130	45.77	130	311.92	128	1467.19	127	2562.28
		29	130	45.00	130	317.69	129	1408.37	127	2439.69
		32	130	45.38	129	320.54	128	1435.94	128	2523.05
		38	130	44.62	129	315.50	127	1434.57	126	2564.05
		44	130	44.62	129	317.05	128	1411.48	128	2512.19
		50	130	45.38	130	306.92	130	1468.62	129	2525.74
		56	130	45.38	130	313.08	128	1407.42	127	2528.90
T6	6	6	130	44.62	129	311.24	129	1422.79	129	2395.27
		12	130	45.00	130	307.69	127	1412.36	124	2566.37
		18	130	44.23	130	316.92	130	1363.31	127	2441.65
		24	130	45.77	130	307.31	129	1467.60	129	2521.78
		30	130	45.00	130	303.85	129	1403.02	129	2591.78
		31	130	45.38	129	310.47	129	1447.91	128	2511.25
		37	130	44.62	128	310.16	127	1430.87	127	2517.24
		43	130	44.62	129	310.47	126	1340.32	125	2491.68
		49	130	45.38	130	306.54	130	1447.46	130	2530.62
		55	130	45.38	129	309.30	128	1418.59	126	2501.19

Weight gain per phases (WG) and daily weight gain

Tab. No. 8b (page 1)

Treatment	Tr. No.	Box	Day 1 - 10		Day 11 - 24		Day 25 - 35		Day 1 - 35	
			WG	DWG	WG	DWG	WG	DWG	WG	DWG
			g	g	g	g	g	g	g	g
T1	1	1	266.71	26.67	1138.34	81.31	1077.05	97.91	2482.11	70.92
		7	264.30	26.43	1071.62	76.54	1124.54	102.23	2460.39	70.30
		13	266.62	26.66	1124.11	80.29	1201.41	109.22	2592.14	74.06
		19	265.86	26.59	1155.09	82.51	1018.48	92.59	2439.42	69.70
		25	270.89	27.09	1114.27	79.59	1082.34	98.39	2467.50	70.50
		36	275.38	27.54	1121.73	80.12	1225.36	111.40	2622.47	74.93
		42	263.08	26.31	978.74	69.91	1186.02	107.82	2427.83	69.37
		48	276.15	27.62	1063.92	75.99	1082.62	98.42	2422.69	69.22
		54	271.54	27.15	1083.63	77.40	972.76	88.43	2327.93	66.51
		60	279.62	27.96	1094.84	78.20	1163.26	105.75	2537.72	72.51
T2	2	2	272.31	27.23	1109.67	79.26	998.18	90.74	2380.15	68.00
		8	264.69	26.47	1107.03	79.07	1057.49	96.14	2429.21	69.41
		14	270.38	27.04	1184.28	84.59	1128.10	102.55	2582.77	73.79
		20	263.85	26.38	1194.16	85.30	889.92	80.90	2348.00	67.09
		26	278.08	27.81	1138.24	81.30	1104.88	100.44	2521.20	72.03
		35	265.08	26.51	1134.73	81.05	882.48	80.23	2282.29	65.21
		41	279.23	27.92	987.77	70.55	1154.77	104.98	2421.77	69.19
		47	266.24	26.62	1132.77	80.91	1148.58	104.42	2547.59	72.79
		53	278.08	27.81	1050.46	75.03	1112.92	101.17	2441.46	69.76
		59	260.77	26.08	1166.92	83.35	999.79	90.89	2427.47	69.36
T3	3	3	264.69	26.47	1139.91	81.42	1004.28	91.30	2408.88	68.83
		9	270.89	27.09	1108.14	79.15	1076.98	97.91	2456.01	70.17
		15	273.98	27.40	1119.92	79.99	1049.41	95.40	2443.32	69.81
		21	256.55	25.66	1100.48	78.61	971.63	88.33	2328.66	66.53
		27	258.85	25.88	1082.46	77.32	1116.85	101.53	2458.15	70.23
		34	270.38	27.04	995.92	71.14	995.92	90.54	2262.23	64.64
		40	264.62	26.46	1112.56	79.47	1175.41	106.86	2552.58	72.93
		46	276.54	27.65	1062.05	75.86	1111.09	101.01	2449.68	69.99
		52	271.92	27.19	1069.28	76.38	1120.54	101.87	2461.75	70.34
		58	271.54	27.15	1045.50	74.68	1070.63	97.33	2387.66	68.22



Weight gain per phases (WG) and daily weight gain

Tab. No. 8b (page 2)

Treatment	Tr. No.	Box	Day 1 - 10		Day 11 - 24		Day 25 - 35		Day 1 - 35	
			WG	DWG	WG	DWG	WG	DWG	WG	DWG
			g	g	g	g	g	g	g	g
T4	4	4	273.99	27.40	1106.43	79.03	1071.68	97.43	2452.10	70.06
		10	261.54	26.15	1105.85	78.99	1093.79	99.44	2461.17	70.32
		16	263.08	26.31	1095.31	78.24	1051.85	95.62	2410.23	68.86
		22	260.38	26.04	1067.77	76.27	997.62	90.69	2325.78	66.45
		28	268.28	26.83	1113.98	79.57	1125.02	102.27	2507.28	71.64
		33	263.08	26.31	1082.62	77.33	1008.77	91.71	2354.46	67.27
		39	267.31	26.73	1109.38	79.24	1146.83	104.26	2523.52	72.10
		45	274.62	27.46	1028.08	73.43	1149.46	104.50	2452.15	70.06
		51	265.47	26.55	1102.79	78.77	1049.07	95.37	2417.33	69.07
		57	258.46	25.85	1057.01	75.50	1075.19	97.74	2390.66	68.30
T5	5	5	270.89	27.09	1034.57	73.90	1029.06	93.55	2334.53	66.70
		11	270.38	27.04	1070.47	76.46	1112.47	101.13	2453.33	70.10
		17	263.85	26.38	1145.02	81.79	1017.36	92.49	2426.23	69.32
		23	266.15	26.62	1155.26	82.52	1095.10	99.55	2516.51	71.90
		29	272.69	27.27	1090.68	77.91	1031.31	93.76	2394.69	68.42
		32	275.16	27.52	1115.39	79.67	1087.11	98.83	2477.66	70.79
		38	270.89	27.09	1119.06	79.93	1129.48	102.68	2519.43	71.98
		44	271.92	27.19	1094.43	78.17	1100.70	100.06	2467.57	70.50
		50	261.54	26.15	1161.69	82.98	1057.12	96.10	2480.35	70.87
		56	267.69	26.77	1094.34	78.17	1121.48	101.95	2483.51	70.96
T6	6	6	266.62	26.66	1111.55	79.40	972.48	88.41	2350.66	67.16
		12	262.69	26.27	1104.67	78.90	1154.01	104.91	2521.37	72.04
		18	272.69	27.27	1046.38	74.74	1078.35	98.03	2397.42	68.50
		24	261.54	26.15	1160.29	82.88	1054.19	95.84	2476.01	70.74
		30	258.85	25.88	1099.18	78.51	1188.76	108.07	2546.78	72.77
		31	265.08	26.51	1137.44	81.25	1063.34	96.67	2465.87	70.45
		37	265.77	26.58	1120.71	80.05	1086.38	98.76	2472.63	70.65
		43	265.85	26.58	1029.85	73.56	1151.36	104.67	2447.06	69.92
		49	261.15	26.12	1140.92	81.49	1083.15	98.47	2485.23	71.01
		55	263.92	26.39	1109.29	79.24	1082.60	98.42	2455.81	70.17

**Feed conversion ratio (Feed consum. per 1 kg of live weight)**

**Tab. No. 8c (page 1)**

Treatment	Tr. No.	Box	Feed conversion ratio		
			Day 10	Day 24	Day 35
			g/kg live weight	g/kg live weight	g/kg live weight
T1	1	1	976.28	1275.45	1596.11
		7	974.63	1261.96	1514.08
		13	965.65	1290.03	1466.93
		19	957.47	1286.20	1567.61
		25	944.34	1287.32	1534.03
		36	932.85	1255.32	1434.21
		42	958.20	1333.21	1521.67
		48	928.54	1273.26	1505.38
		54	935.76	1221.71	1544.07
		60	941.78	1260.90	1494.47
T2	2	2	952.67	1241.06	1550.57
		8	955.94	1251.35	1547.25
		14	942.47	1186.89	1465.04
		20	965.60	1227.60	1598.87
		26	926.19	1249.31	1475.56
		35	974.65	1230.31	1633.16
		41	934.60	1331.10	1534.09
		47	962.11	1268.35	1509.83
		53	921.62	1284.00	1499.51
59	959.80	1294.88	1621.72		
T3	3	3	978.11	1238.63	1560.11
		9	926.79	1245.08	1531.41
		15	953.52	1228.57	1557.29
		21	981.14	1287.04	1612.40
		27	967.09	1231.83	1495.50
		34	922.05	1348.23	1646.39
		40	982.61	1254.78	1483.56
		46	926.47	1285.85	1513.46
		52	951.57	1253.47	1509.94
58	934.47	1341.96	1556.24		

**Feed conversion per 1 kg of live weight**

**Tab. No. 8c (page 2)**

Treatment	Tr. No.	Box	Feed conversion ratio		
			Day 10	Day 24	Day 35
			g/kg live weight	g/kg live weight	g/kg live weight
T4	4	4	920.75	1286.03	1546.23
		10	971.64	1289.15	1545.70
		16	967.42	1215.65	1512.08
		22	978.62	1286.96	1583.86
		28	942.88	1291.47	1518.54
		33	965.09	1290.09	1566.93
		39	960.49	1220.23	1453.49
		45	940.96	1320.01	1505.18
		51	959.07	1280.86	1552.78
		57	1000.00	1307.47	1526.43
T5	5	5	940.39	1334.69	1587.47
		11	945.12	1305.67	1512.90
		17	967.54	1231.30	1531.39
		23	961.78	1263.50	1487.67
		29	944.31	1261.13	1545.82
		32	931.29	1308.54	1532.92
		38	932.23	1270.88	1508.48
		44	954.04	1283.17	1528.45
		50	963.66	1268.07	1517.33
		56	970.52	1303.23	1515.08
T6	6	6	950.76	1235.95	1595.80
		12	965.00	1271.07	1502.74
		18	953.40	1270.67	1570.64
		24	993.74	1225.58	1496.85
		30	1002.53	1286.59	1487.33
		31	959.22	1311.80	1577.71
		37	948.13	1287.02	1561.05
		43	960.75	1350.22	1567.50
		49	972.40	1255.25	1516.20
		55	955.45	1283.55	1572.27

**Feed conversion per 1 kg of weight gain**

**Tab. No. 8d (page 1)**

Treatment	Tr. No.	Box	Feed conversion ratio			
			Day 1-10	Day 11-24	Day 25-35	Day 1-35
			g/kg weight gain	g/kg weight gain	g/kg weight gain	g/kg weight gain
T1	1	1	1141.21	1362.16	2031.96	1626.55
		7	1140.61	1345.41	1825.73	1542.00
		13	1125.29	1379.90	1680.14	1492.02
		19	1121.91	1375.72	1978.39	1597.35
		25	1101.12	1386.56	1870.44	1562.84
		36	1086.59	1348.56	1649.82	1459.52
		42	1119.30	1451.79	1730.68	1549.85
		48	1078.55	1377.20	1802.26	1533.10
		54	1093.48	1306.32	2016.28	1574.89
		60	1095.94	1355.66	1779.62	1521.40
T2	2	2	1108.76	1323.85	1996.09	1579.84
		8	1117.90	1335.55	1950.41	1576.47
		14	1095.31	1252.43	1842.96	1490.37
		20	1132.80	1296.41	2230.14	1630.39
		26	1076.07	1341.69	1775.42	1502.07
		35	1142.11	1300.59	2293.57	1665.87
		41	1082.64	1460.95	1764.59	1562.11
		47	1124.22	1354.21	1813.94	1536.88
		53	1073.31	1395.72	1765.62	1527.62
		59	1126.84	1384.05	2113.11	1652.65
T3	3	3	1143.71	1310.43	2031.44	1589.67
		9	1081.50	1336.13	1910.31	1559.68
		15	1107.00	1306.85	2017.80	1585.71
		21	1154.77	1372.17	2090.47	1644.42
		27	1135.22	1306.14	1822.78	1522.88
		34	1076.81	1483.36	2039.08	1679.42
		40	1149.71	1330.86	1764.32	1509.98
		46	1075.94	1395.64	1798.97	1541.34
		52	1111.74	1343.69	1828.43	1538.19
		58	1090.65	1466.63	1831.22	1586.15

Feed conversion per 1 kg of weight gain

Tab. No. 8d (page 2)

Treatment	Tr. No.	Box	Feed conversion ratio			
			Day 1-10	Day 11-24	Day 25-35	Day 1-35
			g/kg weight gain	g/kg weight gain	g/kg weight gain	g/kg weight gain
T4	4	4	1071.08	1391.79	1895.35	1574.66
		10	1138.82	1377.16	1883.51	1574.21
		16	1128.65	1285.20	1907.27	1539.59
		22	1149.19	1375.26	1998.65	1614.96
		28	1102.98	1390.00	1808.98	1546.30
		33	1131.58	1382.69	1948.68	1597.13
		39	1119.42	1293.16	1745.99	1479.10
		45	1093.84	1437.71	1722.21	1532.56
		51	1124.07	1371.78	1919.38	1582.15
		57	1175.60	1396.16	1804.97	1555.55
T5	5	5	1096.16	1455.27	1922.07	1618.14
		11	1102.42	1412.56	1776.32	1541.04
		17	1129.74	1302.77	1960.91	1559.49
		23	1127.17	1345.18	1793.55	1515.00
		29	1100.14	1354.15	1946.14	1575.41
		32	1085.86	1417.86	1830.40	1561.39
		38	1085.94	1368.41	1815.17	1535.87
		44	1110.99	1379.28	1844.70	1556.44
		50	1130.88	1348.50	1867.84	1545.24
		56	1135.06	1399.69	1783.94	1543.20
T6	6	6	1110.53	1316.13	2122.76	1626.31
		12	1130.31	1357.83	1794.31	1530.29
		18	1108.04	1366.76	1958.95	1599.92
		24	1167.65	1286.93	1877.71	1524.60
		30	1176.82	1365.65	1724.81	1513.79
		31	1124.27	1408.37	1942.97	1607.07
		37	1109.55	1381.48	1924.33	1589.79
		43	1122.95	1470.01	1824.54	1596.91
		49	1141.38	1331.24	1864.92	1543.89
		55	1120.86	1376.08	1956.72	1601.97

Feed consumption per phases

Tab. No. 8e (page 1)

Treatment	Tr. No.	Box	Feed consumption			
			Starter (D 1-10)	Grower (D 11-24)	Finisher (D 25-35)	Total (D 1-35)
			kg	kg	kg	kg
T1	1	1	39.18	188.62	267.00	494.80
		7	39.18	186.22	263.80	489.20
		13	38.80	200.10	258.15	497.05
		19	38.54	203.36	254.90	496.80
		25	38.80	196.90	251.15	486.85
		36	38.90	194.50	254.50	487.90
		42	38.28	183.42	259.50	481.20
		48	38.72	190.48	253.65	482.85
		54	38.60	182.10	248.65	469.35
		60	39.50	191.50	267.05	498.05
T2	2	2	39.25	190.00	256.15	485.40
		8	38.60	189.20	260.60	488.40
		14	38.50	190.80	262.05	491.35
		20	38.60	197.30	252.05	487.95
		26	38.90	197.10	253.05	489.05
		35	39.22	190.38	261.10	490.70
		41	39.30	187.60	264.90	491.80
		47	38.70	194.30	264.60	497.60
		53	38.80	190.60	255.45	484.85
		59	38.20	207.00	266.15	511.35
T3	3	3	39.18	190.48	256.90	486.56
		9	37.90	191.00	265.40	494.30
		15	39.20	188.80	267.30	495.30
		21	38.50	193.50	256.45	488.45
		27	38.20	183.80	264.65	486.65
		34	37.85	192.05	264.00	493.90
		40	39.55	191.65	264.90	496.10
		46	38.68	190.72	255.85	485.25
		52	39.30	185.70	264.30	489.30
		58	38.50	197.50	250.95	486.95

Feed consumption per phases

Tab. No. 8e (page 2)

Treatment	Tr. No.	Box	Feed consumption			
			Starter (D 1-10)	Grower (D 11-24)	Finisher (D 25-35)	Total (D 1-35)
			kg	kg	kg	kg
T4	4	4	38.05	198.65	260.00	496.70
		10	38.72	197.98	262.65	499.35
		16	38.60	183.00	260.80	482.40
		22	38.90	190.90	255.45	485.25
		28	38.00	198.20	258.65	494.85
		33	38.70	194.60	255.55	488.85
		39	38.90	186.50	257.20	482.60
		45	39.05	192.15	257.35	488.55
		51	38.55	195.15	259.75	493.45
		57	39.50	191.20	250.35	481.05
T5	5	5	38.38	194.22	253.05	485.65
		11	38.75	195.35	250.55	484.65
		17	38.75	192.55	257.35	488.65
		23	39.00	201.50	250.20	490.70
		29	39.00	190.50	251.85	481.35
		32	38.60	202.80	254.70	496.10
		38	38.20	194.70	257.70	490.60
		44	39.17	193.93	259.90	493.00
		50	38.45	203.65	253.60	495.70
		56	39.50	196.50	254.55	490.55
T6	6	6	38.33	188.72	266.30	493.35
		12	38.60	191.60	258.20	488.40
		18	39.28	185.92	268.20	493.40
		24	39.70	194.30	255.35	489.35
		30	39.60	193.80	264.50	497.90
		31	38.55	206.65	264.40	509.60
		37	37.80	197.60	265.50	500.90
		43	38.58	191.92	263.30	493.80
		49	38.75	197.45	262.60	498.80
		55	38.20	195.10	267.10	500.40