



MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE ÚSTRAŠICE

státní podnik

390 02 Tábor 2

Česká republika

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International Poultry Testing Station Ustrašice Mezinárodní testování drůbeže Ústrašice

Czech Republic
Česká republika

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Zpracovatel studie:

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Associate Investigator:
Spoluzpracovatel studie:

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Study monitor:
Dohlížitel:

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Study sponsor :
Dohlížitel:

XXXXXXXXXX

November 2020
Listopad 2020

Aim of the Project

The objective of this study was to evaluate the effects of xxxxxxxxx on growth performance, intestinal integrity, and health status in broilers fed diets rich in rye.

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 sent for the contents of nutrients by xxxxxxxxx.

Trial period

Beginning of the trial:	16 September 2020
End of the trial:	20 October 2020
Finishing of the final report:	November 2020

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 xxxxxxxxx. Day-old chicks were randomly distributed into 4 dietary treatments with 15 replicates per treatment and 130 chicken per replicate.

Origin 1-day old chicks:

breeder company – xxxxxxxxx

parent flock – xxxxxxxxx

age of the breeding flock -59 weeks

Experimental treatments:

Tr. No.	Tr.	Description	No. of pen	No. of chick
1	T1	xxxxxxx	15	1950
2	T2	xxxxxxx	15	1950
3	T3	xxxxxxx	15	1950
4	T4	xxxxxxx	15	1950

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 xxxxxxxxx. 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 xxxxxxxxxx before the chick placement.

On days 1 and 12 the chicken were vaccinated with xxxxxxxxxx (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 Ústrašice. The composition of diets is shown in following tables.

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 twice 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.

Foot pad lesions

One third of the animals were recorded at the end of the feeding trial according to the scale.

Statistical analyses

Performance results of live weight (on days 1, 10, 24 and 35) were statistically evaluated using the ANOVA model (Duncan test) and the nonparametric model (Kruskal-Wallis test).

Results

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

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	87.78	82.22	93.67	1950	70.00	46.03
T2	2				1950		46.03
T3	3				1950		45.98
T4	4				1950		45.99

Body weight per phases

Tab. No. 2a

Treatment	Tr. No.	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	1950	46.03	1950	292.72	1902	1347.28	1887	2296.61
T2	2	1950	46.03	1950	288.54	1903	1311.06	1890	2154.46
T3	3	1950	45.98	1950	289.56	1891	1360.74	1878	2323.18
T4	4	1950	45.99	1950	290.21	1891	1303.45	1877	2185.30

Weight gain per phases

Tab. No. 2b

Treatment	Tr. No.	Day1 - 10		Day11 - 24		Day25 - 35		Day1 – 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	246.69	24.67	1054.56	75.33	949.33	86.30	2250.58	64.30
T2	2	242.51	24.25	1022.52	73.04	843.39	76.67	2108.42	60.24
T3	3	243.58	24.36	1071.17	76.51	962.45	87.50	2277.20	65.06
T4	4	244.22	24.42	1013.25	72.37	881.85	80.17	2139.31	61.12

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

Treatment	Tr. No.	Feed conversion ratio		
		Day 10	Day 24	Day 35
		g/kg live weight	g/kg live weight	g/kg live weight
T1	1	983.71	1233.17	1534.12
T2	2	1004.28	1234.94	1627.00
T3	3	980.61	1219.96	1515.16
T4	4	1001.94	1252.38	1612.82

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	1167.26	1018.98	1972.85	1565.96
T2	2	1194.91	1013.35	2253.50	1663.04
T3	3	1165.71	1009.99	1944.09	1546.34
T4	4	1190.63	1028.07	2162.95	1648.18

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

Treatment	Tr. No.	Feed consumption			
		Starter (d 0-10)	Grower (d 11-24)	Finisher (d 25-35)	Total (d 0-35)
		kg	kg	kg	kg
T1	1	561.50	2667.90	3543.90	6773.30
T2	2	565.06	2581.00	3592.60	6738.66
T3	3	553.70	2660.10	3524.70	6738.50
T4	4	567.00	2595.50	3578.50	6741.00

Mortality

Tab. No. 3

Treat.	Tr. No.	Mortality in the period									Mortality according causes														
		Day1 - 10		Day11 - 24		Day25 - 35		Day1 - 35			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		birds	g	birds	g	birds	g	birds	g	%															
T1	1	0	0	18	12439	15	25155	33	37594	1.69									1	29			3	30	
T2	2	0	0	17	10539	13	17262	30	27801	1.54									1	23			6	30	
T3	3	0	0	29	18627	13	23245	42	41872	2.15									1	39			2	30	
T4	4	0	0	29	18375	14	17470	43	35845	2.21									1	36			6	30	

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 othercauses

15 - Sampling (excluded of calculation)

Foot pad lesions

Tab. No. 4

Treatment	Tr. No.	Evaluation	
		Right foot	Left foot
T1	1	2.18	2.21
T2	2	2.20	2.27
T3	3	2.26	2.34
T4	4	2.14	2.27

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	%
T1	1	1887	2296.61	272.75	11.88
T2	2	1890	2154.46	265.20	12.31
T3	3	1878	2323.18	290.69	12.51
T4	4	1877	2185.30	274.71	12.57

Statistical analyses of performance results

Performance results were statistically evaluated using the ANOVA model (Duncan test) or nonparametric model (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
T1	1	15	46.03	0.39		o	o	o
T2	2	15	46.03	0.38	1.000000		o	o
T3	3	15	45.98	0.43	0.750946	0.741170		o
T4	4	15	45.99	0.37	0.791665	0.777485	0.943710	

Body weight - day 10

Tab. No. 6b

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test			
					T1	T2	T3	T4
T1	1	15	292.72	6.84		o	o	o
T2	2	15	288.54	6.58	0.143987		o	o
T3	3	15	289.56	5.89	0.253383	0.691546		o
T4	4	15	290.21	8.57	0.332641	0.546278	0.804098	

Body weight - day 24

Tab. No. 6c

Treatment	Treat. No.	No. of birds	Average (g)	Standard deviation	Kruskal-Wallis test			
					T1	T2	T3	T4
T1	1	1902	1347.28	199.65		***	o	***
T2	2	1903	1311.06	199.16	0.000000		***	o
T3	3	1891	1360.74	178.65	0.063900	0.000000		***
T4	4	1891	1303.45	197.75	0.000000	0.480873	0.000000	

Body weight - day 35

Tab. No. 6d

Treatment	Treat. No.	No. of birds	Average (g)	Standard deviation	Kruskal-Wallis test			
					T1	T2	T3	T4
T1	1	1887	2296.61	272.75		***	*	***
T2	2	1890	2154.46	265.20	0.000000		***	**
T3	3	1878	2323.18	290.69	0.040265	0.000000		***
T4	4	1877	2185.30	274.71	0.000000	0.001395	0.000000	

Performance results per replicate

Body weight per phases

Tab. No. 7a (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	46.15	130	296.92	126	1326.43	123	2248.70
		5	130	46.15	130	300.77	126	1337.30	125	2284.96
		9	130	45.77	130	290.00	128	1386.41	128	2269.22
		13	130	46.54	130	296.15	126	1322.38	126	2240.08
		17	130	45.38	130	284.23	127	1354.09	126	2305.87
		21	130	46.38	130	302.69	128	1362.73	126	2356.75
		25	130	46.15	130	288.46	128	1316.09	128	2459.92
		29	130	46.54	130	284.23	128	1301.95	128	2451.25
		34	130	45.77	130	301.54	126	1293.25	123	2238.62
		38	130	46.15	130	291.54	126	1287.54	126	2205.71
		42	130	45.77	130	293.08	126	1197.38	125	2245.68
		46	130	46.62	130	293.46	127	1393.39	125	2203.84
		50	130	45.92	130	300.00	128	1489.53	126	2262.94
		54	130	45.38	130	283.08	127	1426.85	127	2260.00
58	130	45.77	130	284.62	125	1411.44	125	2408.48		
T2	2	2	130	46.46	130	291.54	127	1239.69	126	2157.38
		6	130	46.15	130	293.08	127	1272.36	127	2144.57
		10	130	45.77	130	293.08	127	1341.81	127	2112.20
		14	130	46.54	130	288.85	128	1257.73	127	2070.08
		18	130	45.38	130	296.15	127	1318.82	126	2148.25
		22	130	46.46	130	280.00	125	1243.84	121	2085.29
		26	130	46.15	130	278.46	125	1263.04	123	2312.93
		30	130	46.54	130	273.85	127	1374.17	127	2301.18
		33	130	45.77	130	293.46	127	1201.97	127	2136.54
		37	130	46.15	130	293.85	126	1258.49	126	2116.03
		41	130	45.77	130	286.54	128	1254.38	126	2160.08
		45	130	46.15	130	287.69	128	1415.70	127	2146.54
		49	130	46.00	130	293.08	128	1453.28	127	2134.41
		53	130	45.38	130	293.08	127	1411.81	127	2048.11
57	130	45.77	130	285.38	126	1355.87	126	2245.40		

Body weight per phases

Tab. No. 7a (page2)

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
T3	3	3	130	46.54	130	296.15	125	1338.96	125	2274.96
		7	130	45.77	130	288.46	126	1389.13	125	2430.16
		11	130	45.77	130	300.00	126	1371.67	126	2331.98
		15	130	46.54	130	283.08	124	1351.29	123	2296.59
		19	130	45.38	130	286.15	127	1373.39	126	2320.32
		23	130	46.38	130	287.69	127	1384.72	123	2550.81
		27	130	46.15	130	291.54	127	1320.00	125	2493.12
		32	130	46.54	130	290.77	127	1307.01	126	2319.13
		36	130	45.77	130	281.92	126	1360.71	125	2369.92
		40	130	46.38	130	286.92	126	1321.19	125	2326.40
		44	130	45.77	130	293.85	128	1391.56	128	2135.23
		48	130	46.15	130	296.15	125	1363.52	125	2081.92
		52	130	45.38	130	295.38	128	1443.83	127	2276.85
56	130	45.38	130	285.38	128	1430.47	128	2388.20		
60	130	45.77	130	280.00	121	1256.69	121	2256.94		
T4	4	4	130	46.15	130	299.23	125	1305.68	124	2215.32
		8	130	46.31	130	286.15	127	1282.68	126	2049.13
		12	130	45.77	130	283.85	127	1373.07	127	2108.27
		16	130	46.54	130	276.15	126	1285.87	125	2113.28
		20	130	45.38	130	303.08	126	1347.86	125	2137.92
		24	130	46.31	130	293.08	128	1354.53	128	2278.28
		28	130	46.15	130	296.15	126	1184.29	126	2217.94
		31	130	46.54	130	300.77	127	1239.29	124	2267.26
		35	130	45.77	130	294.62	126	1243.02	126	2171.03
		39	130	46.15	130	298.46	126	1274.92	126	2131.90
		43	130	45.77	130	287.69	123	1332.52	122	2207.13
		47	130	46.15	130	289.23	126	1251.11	123	2086.67
		51	130	45.69	130	285.00	127	1401.18	124	2448.79
55	130	45.38	130	283.85	127	1383.15	127	2177.01		
59	130	45.77	130	275.77	124	1291.05	124	2171.94		

Weight gain per phases (WG) and daily weight gain

Tab. No. 7b (page 1)

Treatment	Tr. No.	Box	Day1 - 10		Day11 - 24		Day25 - 35		Day1 - 35	
			WG	DWG	WG	DWG	WG	DWG	WG	DWG
			g	g	g	g	g	g	g	g
T1	1	1	250.77	25.08	1029.51	73.54	922.27	83.84	2202.55	62.93
		5	254.62	25.46	1036.53	74.04	947.66	86.15	2238.81	63.97
		9	244.23	24.42	1096.41	78.31	882.81	80.26	2223.45	63.53
		13	249.62	24.96	1026.23	73.30	917.70	83.43	2193.54	62.67
		17	238.85	23.88	1069.86	76.42	951.78	86.53	2260.49	64.59
		21	256.31	25.63	1060.04	75.72	994.01	90.36	2310.36	66.01
		25	242.31	24.23	1027.63	73.40	1143.83	103.98	2413.77	68.96
		29	237.69	23.77	1017.72	72.69	1149.30	104.48	2404.71	68.71
		34	255.77	25.58	991.72	70.84	945.36	85.94	2192.85	62.65
		38	245.38	24.54	996.00	71.14	918.17	83.47	2159.56	61.70
		42	247.31	24.73	904.30	64.59	1048.30	95.30	2199.91	62.85
		46	246.85	24.68	1099.92	78.57	810.45	73.68	2157.22	61.63
		50	254.08	25.41	1189.53	84.97	773.41	70.31	2217.01	63.34
		54	237.69	23.77	1143.77	81.70	833.15	75.74	2214.62	63.27
58	238.85	23.88	1126.82	80.49	997.04	90.64	2362.71	67.51		
T2	2	2	245.08	24.51	948.15	67.72	917.70	83.43	2110.92	60.31
		6	246.92	24.69	979.29	69.95	872.20	79.29	2098.41	59.95
		10	247.31	24.73	1048.73	74.91	770.39	70.04	2066.44	59.04
		14	242.31	24.23	968.89	69.21	812.34	73.85	2023.54	57.82
		18	250.77	25.08	1022.67	73.05	829.44	75.40	2102.87	60.08
		22	233.54	23.35	963.84	68.85	841.45	76.50	2038.83	58.25
		26	232.31	23.23	984.58	70.33	1049.89	95.44	2266.77	64.76
		30	227.31	22.73	1100.33	78.59	927.01	84.27	2254.64	64.42
		33	247.69	24.77	908.51	64.89	934.57	84.96	2090.77	59.74
		37	247.69	24.77	964.65	68.90	857.54	77.96	2069.88	59.14
		41	240.77	24.08	967.84	69.13	905.70	82.34	2114.31	60.41
		45	241.54	24.15	1128.01	80.57	730.83	66.44	2100.38	60.01
		49	247.08	24.71	1160.20	82.87	681.13	61.92	2088.41	59.67
		53	247.69	24.77	1118.73	79.91	636.30	57.85	2002.73	57.22
57	239.62	23.96	1070.49	76.46	889.52	80.87	2199.63	62.85		

Weight gain per phases (WG) and daily weight gain

Tab. No. 7b (page2)

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
T3	3	3	249.62	24.96	1042.81	74.49	936.00	85.09	2228.42	63.67
		7	242.69	24.27	1100.67	78.62	1041.03	94.64	2384.39	68.13
		11	254.23	25.42	1071.67	76.55	960.32	87.30	2286.21	65.32
		15	236.54	23.65	1068.21	76.30	945.30	85.94	2250.05	64.29
		19	240.77	24.08	1087.23	77.66	946.93	86.08	2274.93	65.00
		23	241.31	24.13	1097.03	78.36	1166.09	106.01	2504.43	71.56
		27	245.38	24.54	1028.46	73.46	1173.12	106.65	2446.97	69.91
		32	244.23	24.42	1016.24	72.59	1012.12	92.01	2272.59	64.93
		36	236.15	23.62	1078.79	77.06	1009.21	91.75	2324.15	66.40
		40	240.54	24.05	1034.27	73.88	1005.21	91.38	2280.02	65.14
		44	248.08	24.81	1097.72	78.41	743.67	67.61	2089.47	59.70
		48	250.00	25.00	1067.37	76.24	718.40	65.31	2035.77	58.16
		52	250.00	25.00	1148.44	82.03	833.02	75.73	2231.47	63.76
56	240.00	24.00	1145.08	81.79	957.73	87.07	2342.82	66.94		
60	234.23	23.42	976.69	69.76	1000.25	90.93	2211.17	63.18		
T4	4	4	253.08	25.31	1006.45	71.89	909.64	82.69	2169.17	61.98
		8	239.85	23.98	996.52	71.18	766.45	69.68	2002.82	57.22
		12	238.08	23.81	1089.22	77.80	735.20	66.84	2062.50	58.93
		16	229.62	22.96	1009.72	72.12	827.41	75.22	2066.74	59.05
		20	257.69	25.77	1044.78	74.63	790.06	71.82	2092.54	59.79
		24	246.77	24.68	1061.45	75.82	923.75	83.98	2231.97	63.77
		28	250.00	25.00	888.13	63.44	1033.65	93.97	2171.78	62.05
		31	254.23	25.42	938.52	67.04	1027.97	93.45	2220.72	63.45
		35	248.85	24.88	948.40	67.74	928.02	84.37	2125.26	60.72
		39	252.31	25.23	976.46	69.75	856.98	77.91	2085.75	59.59
		43	241.92	24.19	1044.83	74.63	874.61	79.51	2161.36	61.75
		47	243.08	24.31	961.88	68.71	835.56	75.96	2040.51	58.30
		51	239.31	23.93	1116.18	79.73	1047.61	95.24	2403.10	68.66
55	238.46	23.85	1099.30	78.52	793.86	72.17	2131.62	60.90		
59	230.00	23.00	1015.28	72.52	880.89	80.08	2126.17	60.75		

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

Tab. No. 7c (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	927.46	1250.31	1559.55
		5	902.81	1252.84	1501.90
		9	992.04	1233.19	1614.74
		13	989.61	1270.45	1587.62
		17	982.41	1230.66	1523.08
		21	975.86	1246.05	1521.55
		25	992.00	1245.92	1437.20
		29	1017.59	1233.25	1420.54
		34	992.35	1314.09	1574.09
		38	1000.00	1265.88	1597.18
		42	1002.62	1385.57	1574.68
		46	977.72	1185.95	1575.25
		50	1005.13	1135.13	1570.91
54	997.28	1137.25	1545.08		
58	1005.41	1155.06	1437.96		
T2	2	2	1026.39	1286.45	1606.24
		6	916.01	1254.08	1591.36
		10	1059.32	1237.72	1683.51
		14	1030.63	1295.22	1683.90
		18	974.03	1250.89	1675.14
		22	986.26	1276.17	1668.42
		26	1016.57	1246.46	1495.80
		30	1157.30	1198.48	1539.03
		33	964.61	1362.85	1651.37
		37	1018.32	1248.88	1688.44
		41	1006.71	1292.87	1621.25
		45	1008.02	1179.74	1634.08
		49	955.38	1138.53	1665.02
53	960.63	1113.62	1676.75		
57	994.61	1189.93	1549.53		

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

Tab. No. 7c (page2)

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
T3	3	3	919.48	1209.00	1555.87
		7	968.00	1174.35	1497.97
		11	941.03	1208.41	1520.91
		15	1024.46	1241.08	1530.15
		19	1048.39	1219.59	1512.83
		23	989.30	1209.73	1408.34
		27	984.17	1255.71	1458.37
		32	947.09	1318.08	1538.45
		36	1050.48	1257.15	1503.73
		40	1018.77	1291.93	1515.36
		44	934.55	1191.17	1579.22
		48	929.87	1184.61	1639.26
		52	1010.42	1122.78	1521.00
		56	954.18	1156.87	1468.14
60	997.25	1283.41	1514.32		
T4	4	4	1053.98	1248.39	1598.01
		8	943.55	1226.64	1685.87
		12	1081.30	1224.82	1689.89
		16	1008.36	1232.21	1685.21
		20	967.01	1240.78	1673.76
		24	918.64	1215.36	1536.76
		28	1000.00	1359.44	1544.16
		31	987.21	1318.49	1538.73
		35	963.45	1263.31	1638.97
		39	994.85	1296.66	1647.41
		43	1000.00	1268.66	1617.93
		47	1013.30	1309.30	1710.77
		51	1017.54	1189.46	1442.08
		55	1024.39	1177.26	1641.56
59	1062.76	1242.79	1583.69		

Feed conversion per 1 kg of weight gain

Tab. No. 7d (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	1098.16	1042.84	2023.15	1592.81
		5	1066.47	1048.05	1863.28	1533.54
		9	1177.95	1026.39	2224.78	1648.13
		13	1174.11	1047.42	2055.69	1621.89
		17	1169.08	1023.96	1945.88	1553.97
		21	1152.46	1029.67	1911.72	1552.50
		25	1180.95	1029.05	1661.09	1464.86
		29	1216.83	1011.50	1636.19	1448.22
		34	1169.92	1081.56	1942.89	1607.67
		38	1188.09	1038.74	2074.51	1631.86
		42	1188.18	1140.13	1797.67	1607.98
		46	1162.36	979.25	2272.70	1609.99
		50	1186.80	932.96	2435.58	1603.78
		54	1187.70	938.98	2257.82	1577.09
58	1198.07	950.05	1849.47	1466.48		
T2	2	2	1220.97	1045.29	2050.85	1642.04
		6	1087.23	1043.09	2094.43	1626.72
		10	1255.37	1005.45	2474.45	1721.24
		14	1228.57	1059.36	2299.41	1722.88
		18	1150.31	1031.61	2371.62	1711.88
		22	1182.48	1051.83	2276.63	1707.64
		26	1218.54	1019.50	1808.63	1527.28
		30	1394.25	967.18	2053.85	1571.18
		33	1142.86	1128.22	2032.18	1687.84
		37	1208.07	1010.86	2352.61	1726.62
		41	1198.08	1063.88	2097.21	1656.91
		45	1200.64	974.79	2532.27	1670.30
		49	1133.25	945.97	2810.81	1701.95
		53	1136.65	912.93	2946.42	1715.23
57	1184.59	978.94	2110.10	1582.36		

Feed conversion per 1 kg of weight gain

Tab. No. 7d (page2)

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
T3	3	3	1090.91	1003.76	2066.67	1589.11
		7	1150.55	972.43	1941.74	1527.23
		11	1110.44	1001.88	1979.34	1551.84
		15	1226.02	1023.78	1959.62	1562.75
		19	1246.01	1000.00	1949.50	1543.54
		23	1179.47	1003.76	1654.46	1435.02
		27	1169.28	1037.27	1691.43	1486.34
		32	1127.56	1107.86	1833.56	1570.43
		36	1254.07	1039.45	1846.99	1533.79
		40	1215.22	1068.71	1816.32	1546.84
		44	1106.98	993.68	2315.37	1614.04
		48	1101.54	979.55	2522.27	1677.36
		52	1193.85	916.11	2223.58	1552.16
		56	1134.62	966.49	1939.80	1496.78
60	1192.12	1055.39	1817.73	1547.19		
T4	4	4	1246.20	1003.73	2121.23	1633.10
		8	1125.72	1016.13	2480.27	1725.39
		12	1289.18	1000.95	2576.84	1727.77
		16	1212.73	1013.98	2418.05	1724.11
		20	1137.31	1021.85	2430.27	1710.68
		24	1091.02	1016.80	2015.39	1568.85
		28	1184.62	1108.34	1761.36	1577.56
		31	1167.93	1078.91	1819.81	1571.86
		35	1140.65	1034.26	2155.99	1674.84
		39	1176.83	1063.14	2183.74	1684.41
		43	1189.19	1048.00	2172.38	1653.58
		47	1205.70	1075.90	2341.95	1750.13
		51	1211.83	981.19	1790.62	1470.08
		55	1219.35	966.26	2465.78	1676.92
59	1274.25	1012.37	2099.24	1618.78		

Feed consumption per phases

Tab. No. 7e (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	35.80	179.70	232.60	448.10
		5	35.30	180.40	221.10	436.80
		9	37.40	185.40	251.40	474.20
		13	38.10	178.70	237.70	454.50
		17	36.30	179.60	236.10	452.00
		21	38.40	182.50	239.30	460.20
		25	37.20	176.30	243.20	456.70
		29	37.60	171.30	240.70	449.60
		34	38.90	180.70	228.90	448.50
		38	37.90	173.10	240.00	451.00
		42	38.20	177.20	237.00	452.40
		46	37.30	176.50	228.70	442.50
		50	39.20	180.70	237.80	457.70
		54	36.70	173.60	238.90	449.20
58	37.20	172.20	230.50	439.90		
T2	2	2	38.90	168.40	237.70	445.00
		6	34.90	172.30	232.00	439.20
		10	40.36	174.50	242.10	456.96
		14	38.70	173.60	238.00	450.30
		18	37.50	176.20	246.80	460.50
		22	35.90	168.10	234.70	438.70
		26	36.80	165.10	233.50	435.40
		30	41.20	172.10	241.80	455.10
		33	36.80	176.70	241.20	454.70
		37	38.90	165.00	254.20	458.10
		41	37.50	174.00	236.70	448.20
		45	37.70	179.10	235.40	452.20
		49	36.40	178.60	243.90	458.90
		53	36.60	166.30	238.10	441.00
57	36.90	171.00	236.50	444.40		

Feed consumption per phases

Tab. No. 7e (page2)

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
T3	3	3	35.40	172.90	241.80	450.10
		7	36.30	174.60	254.30	465.20
		11	36.70	177.80	239.50	454.00
		15	37.70	177.40	228.60	443.70
		19	39.00	177.40	232.30	448.70
		23	37.00	180.10	239.60	456.70
		27	37.30	176.90	250.90	465.10
		32	35.80	188.40	232.90	457.10
		36	38.50	183.60	234.40	456.50
		40	38.00	181.70	229.30	449.00
		44	35.70	179.40	220.40	435.50
		48	35.80	170.80	226.50	433.10
		52	38.80	171.80	236.40	447.00
		56	35.40	179.50	237.80	452.70
60	36.30	167.80	220.00	424.10		
T4	4	4	41.00	168.00	237.30	446.30
		8	35.10	169.20	238.80	443.10
		12	39.90	178.20	240.60	458.70
		16	36.20	168.00	247.70	451.90
		20	38.10	177.60	241.80	457.50
		24	35.00	179.00	238.30	452.30
		28	38.50	169.70	229.40	437.60
		31	38.60	173.60	229.50	441.70
		35	36.90	166.40	252.10	455.40
		39	38.60	175.50	235.80	449.90
		43	37.40	177.40	231.70	446.50
		47	38.10	175.40	242.90	456.40
		51	37.70	177.40	234.70	449.80
		55	37.80	172.90	248.60	459.30
59	38.10	167.20	229.30	434.60		

Foot pad lesions

Tab. No. 7f (page 1)

Treatment	Tr. No.	Box	Evaluation	
			Right foot	Left foot
T1	1	1	1.63	1.95
		5	1.68	1.90
		9	1.83	2.13
		13	1.88	2.15
		17	1.95	2.33
		21	2.03	1.90
		25	2.15	2.05
		29	2.55	2.58
		34	1.75	1.73
		38	2.50	2.50
		42	2.75	2.80
		46	2.40	2.28
		50	2.85	2.65
		54	2.38	1.98
58	2.45	2.23		
T2	2	2	2.08	2.43
		6	1.50	1.80
		10	1.95	2.15
		14	2.48	2.85
		18	2.25	2.53
		22	1.00	1.05
		26	2.90	2.95
		30	2.40	2.20
		33	2.28	2.25
		37	3.08	2.93
		41	2.53	2.50
		45	2.28	2.15
		49	2.38	2.43
		53	1.03	0.90
57	2.90	2.90		

Foot pad lesions

Tab. No. 7f (page 2)

Treatment	Tr. No.	Box	evaluation	
			Right foot	Left foot
T3	3	3	2.15	2.45
		7	2.40	2.65
		11	1.63	1.95
		15	1.58	1.85
		19	2.08	2.45
		23	2.55	2.55
		27	2.33	2.30
		32	2.58	2.70
		36	2.43	2.35
		40	2.38	2.33
		44	2.20	2.10
		48	2.68	2.65
		52	2.25	2.08
		56	2.53	2.50
60	2.15	2.25		
T4	4	4	1.00	1.60
		8	2.30	2.65
		12	2.08	2.43
		16	1.80	2.18
		20	2.28	2.60
		24	2.15	2.13
		28	2.08	2.05
		31	2.03	1.93
		35	2.35	2.28
		39	2.23	2.40
		43	2.43	2.50
		47	2.30	2.18
		51	2.10	2.03
		55	2.20	2.20
59	2.85	2.90		