



MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE ÚSTRAŠICE

státní podnik

390 02 Tábor 2

Česká republika

**Effects xxxxx on health status and live performance of broilers fed
diets containing increased levels of rapeseed meal**

Trial No. xxxxx

**Vliv aditiva na zdraví a užitkovost kuřat krmených směsí s
přídavkem řepkového šrotu**

Test č. xxxxx

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

**Czech Republic
Česká republika**

Study Investigator:
Zpracovatel studie:

Ing. Jan Tyl

Associate Investigator:
Spoluzpracovatel studie:

**Ing. Hana Horná
Ing. Hana Koželuhová
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Study monitor:
Dohlížel:

xxxxx

Study sponsor :
Dohlížel:

xxxxx

**February 2022
Únor 2022**

Aim of the Project

Effects of xxxxx on health status and live performance of broilers fed diets containing increased levels of rapeseed meal.

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 xxxxx

Trial period

Beginning of the trial:	11 January 2022
End of the trial:	15 February 2022

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 xxxxx. 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 – xxxxx

parent flock – xxxxx

age of the breeding flock - 34 weeks

Experimental treatments:

Tr. No.	Tr.	Description	No. of pen	No. of chick
1	T1	xxxxxx	15	1950
2	T2	xxxxxx	15	1950
3	T3	xxxxxx	15	1950
4	T4	xxxxxx	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 Manual of xxxxx. 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
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The conduct of the trial was conformed to the national welfare legislation.

Veterinary precautions

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

On day 1 the chicken were vaccinated with xxxxx (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 (T1 + T3)			Rapeseed diet (T2 + T4)		
	Starter	Grower	Finisher	Starter	Grower	Finisher
Soyabean meal	37.08	28.87	24.39	32.77	21.77	16.14
Corn	34.00	42.74	47.89	31.54	38.87	42.63
Wheat	20.00	20.00	20.00	20.00	20.00	20.00
Rapeseed meal	-	-	-	6.00	10.00	11.93
Soyabean oil	4.20	3.98	3.51	4.97	5.23	5.05
Limestone	1.66	1.39	1.33	1.62	1.31	1.25
Monocalciumphosphate	1.17	1.05	0.95	1.08	0.89	0.79
BioLys	0.98	1.06	1.01	1.11	1.03	1.29
Salt	0.30	0.30	0.30	0.30	0.29	0.30
Sodium bicarbonate	0.11	0.11	0.12	0.11	0.11	0.12
xxxxx	0.50	-	-	0.50	-	-
xxxxx	-	0.50	-	-	0.50	-
xxxxx	-	-	0.50	-	-	0.50
Nutritional composition						
Crude protein (g/kg)	208.17	180.89	166.33	209.14	183.04	169.28
ME (MJ/kg)	11.76	12.02	12.10	11.77	12.06	12.10
Ca (g/kg)	10.35	8.73	8.14	10.22	8.43	7.92
P available (g/kg)	3.38	5.91	2.92	3.31	2.99	2.82
Na (g/kg)	1.54	1.53	1.55	1.64	1.67	1.77
Lys (g/kg)	17.28	15.60	14.18	17.89	15.31	15.61
Met (g/kg)	5.45	4.68	4.19	5.57	4.88	4.43
M+C (g/kg)	9.21	8.02	7.31	9.50	8.53	7.92
Threonin (g/kg)	8.29	7.06	6.40	8.35	7.19	6.58
Thryptophan (g/kg)	2.76	2.31	2.06	2.74	2.28	2.04
Arg (g/kg)	14.99	12.57	11.26	14.64	12.03	10.67
Val (g/kg)	10.48	9.05	8.29	10.52	9.14	8.41

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.

Foot pad lesions

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

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) or nonparametric method (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 -7 Statistical analyses of performance results
	8 Performance results per pen:
	8a Body weight
	8b Weight gain
	8c Feed conversion per 1 kg of live weight
	8d Feed conversion per 1 kg of weight gain
	8e Feed consumption
	8f 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	91.11	85.56	93.90	1950	60.00	41.00
T2	2				1950		41.03
T3	3				1950		41.03
T4	4				1950		41.05

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	41.00	1950	289.49	1890	1300.05	1867	2338.52
T2	2	1950	41.03	1950	285.52	1892	1235.11	1871	2224.54
T3	3	1950	41.03	1950	287.18	1894	1291.57	1879	2316.60
T4	4	1950	41.05	1950	285.67	1887	1254.26	1861	2244.93

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	248.49	24.85	1010.56	72.18	1038.47	94.41	2297.52	65.64
T2	2	244.49	24.45	949.59	67.83	989.43	89.95	2183.51	62.39
T3	3	246.15	24.62	1004.39	71.74	1025.03	93.18	2275.58	65.02
T4	4	244.62	24.46	968.59	69.19	990.67	90.06	2203.88	62.97

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	985.47	1279.18	1527.99
T2	2	1012.82	1327.15	1588.30
T3	3	1007.68	1291.07	1541.01
T4	4	1027.20	1328.68	1595.88

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	1148.08	1363.94	1849.83	1555.82
T2	2	1182.78	1422.33	1924.61	1618.73
T3	3	1175.63	1372.63	1865.47	1569.32
T4	4	1199.58	1418.46	1946.17	1626.30

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

Treatment	Tr. No.	Feed consumption			
		Starter (d 1-10)	Grower (d 11-24)	Finisher (d 25-35)	Total (d 1-35)
		kg	kg	kg	kg
T1	1	556.30	2668.00	3604.50	6828.80
T2	2	563.90	2615.20	3580.00	6759.10
T3	3	564.30	2670.80	3600.90	6836.00
T4	4	572.20	2653.50	3604.00	6829.70

Mortality

Tab. No. 3

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	15
		birds	g	birds	g	birds	g	birds	g	%															
T1	1	0	0	30	19401	23	39631	53	59032	2.72											52			1	30
T2	2	0	0	28	16229	21	34833	49	51062	2.51											48			1	30
T3	3	0	0	26	15925	15	23626	41	39551	2.10											41				30
T4	4	0	0	33	18959	26	40814	59	59773	3.03											58			1	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 other causes

15 - Sampling (excluded of calculation)

Foot pad lesions**Tab. No. 4**

Treatment	Tr. No.	Evaluation	
		right foot	left foot
T1	1	1.85	1.87
T2	2	1.89	1.90
T3	3	1.83	1.81
T4	4	1.84	1.81

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	1867	2338.52	279.15	11.94
T2	2	1871	2224.54	252.94	11.37
T3	3	1879	2316.60	277.47	11.98
T4	4	1861	2244.93	266.43	11.87

Statistical analyses of performance results

Performance results were statistically evaluated using the ANOVA single-factor model (Duncan 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
T1	1	15	41.00	0.52		o	o	o
T2	2	15	41.03	0.47	0.895649		o	o
T3	3	15	41.03	0.47	0.888065	1.000000		o
T4	4	15	41.05	0.51	0.800627	0.888065	0.895649	

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	289.49	5.20		o	o	o
T2	2	15	285.52	4.68	0.056271		o	o
T3	3	15	287.18	4.84	0.223017	0.408840		o
T4	4	15	285.67	5.73	0.057730	0.937066	0.422687	

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	1890	1300.05	171.26		***	o	***
T2	2	1892	1235.11	167.53	0.000000		***	**
T3	3	1894	1291.57	187.20	0.796969	0.000000		***
T4	4	1887	1254.26	166.43	0.000000	0.001232	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	1867	2338.52	279.15		***	*	***
T2	2	1871	2224.54	252.94	0.000000		***	o
T3	3	1879	2316.60	277.47	0.035289	0.000000		***
T4	4	1861	2244.93	266.43	0.000000	0.088393	0.000000	

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

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test			
					T1	T2	T3	T4
T1	1	15	985.77	52.04		o	o	*
T2	2	15	1013.24	44.81	0.116736		o	o
T3	3	15	1007.80	43.71	0.182116	0.739823		o
T4	4	15	1027.43	36.64	0.021207	0.387657	0.262019	

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

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Duncan test			
					T1	T2	T3	T4
T1	1	15	1281.37	55.14		*	o	*
T2	2	15	1328.16	42.99	0.022772		o	o
T3	3	15	1293.11	49.26	0.540865	0.071562		o
T4	4	15	1331.38	60.04	0.018126	0.866983	0.062073	

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

Treatment	Treat. No.	No. of box	Average (g)	Standard deviation	Kruskal-Wallis test			
					T1	T2	T3	T4
T1	1	15	1528.58	36.32		**	o	***
T2	2	15	1588.47	22.97	0.001583		*	o
T3	3	15	1542.58	48.57	1.000000	0.046081		*
T4	4	15	1597.33	45.85	0.000262	1.000000	0.011421	

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	40.38	130	291.92	127	1283.62	124	2274.60
		5	130	41.15	130	299.62	128	1273.52	126	2312.22
		9	130	40.77	130	292.31	126	1317.14	125	2419.68
		13	130	41.15	130	285.77	126	1297.54	124	2412.66
		17	130	40.77	130	282.69	128	1156.48	124	2209.35
		21	130	41.54	130	284.23	124	1272.34	123	2307.15
		25	130	41.92	130	283.08	127	1304.65	126	2268.97
		29	130	41.54	130	290.00	126	1258.25	124	2320.16
		34	130	40.77	130	288.46	126	1378.11	125	2332.72
		38	130	41.15	130	286.15	125	1311.62	125	2373.04
		42	130	40.77	130	287.69	123	1359.73	122	2486.64
		46	130	41.54	130	285.38	125	1267.54	124	2353.55
		50	130	40.38	130	293.08	128	1389.02	127	2343.86
		54	130	41.15	130	294.62	127	1267.48	124	2328.71
		58	130	40.00	130	297.31	124	1367.26	124	2337.18
T2	2	2	130	40.38	130	283.85	125	1226.80	121	2242.40
		6	130	41.15	130	289.62	125	1261.28	124	2230.73
		10	130	40.77	130	290.00	126	1234.21	125	2247.68
		14	130	41.15	130	289.23	127	1241.81	127	2192.13
		18	130	40.77	130	290.38	121	1308.76	120	2240.42
		22	130	41.54	130	287.38	125	1206.24	124	2202.82
		26	130	41.92	130	288.46	128	1233.36	126	2211.83
		30	130	41.54	130	279.23	127	1256.61	125	2252.56
		33	130	40.77	130	283.85	127	1256.32	125	2213.36
		37	130	41.15	130	283.85	124	1207.59	124	2238.55
		41	130	40.77	130	283.08	128	1247.63	127	2197.01
		45	130	41.54	130	278.46	128	1210.82	127	2207.80
		49	130	40.38	130	291.15	126	1239.06	124	2220.65
		53	130	41.15	130	287.69	128	1131.02	128	2293.36
		57	130	40.38	130	276.54	127	1268.74	124	2177.26

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
T3	3	3	130	40.38	130	286.15	128	1265.94	126	2271.90
		7	130	41.15	130	284.23	126	1376.03	125	2391.60
		11	130	40.77	130	292.31	125	1282.80	125	2343.68
		15	130	41.15	130	283.85	128	1234.06	128	2375.63
		19	130	40.77	130	282.69	127	1248.03	126	2465.56
		23	130	41.54	130	293.08	127	1324.17	127	2318.90
		27	130	41.92	130	295.77	127	1294.80	127	2378.66
		32	130	41.54	130	293.85	127	1360.84	124	2305.97
		36	130	40.77	130	291.54	126	1370.15	126	2442.94
		40	130	41.15	130	288.46	126	1332.04	124	2363.06
		44	130	40.77	130	284.23	128	1297.96	126	2270.56
		48	130	41.54	130	281.54	125	1223.94	125	2255.92
		52	130	40.38	130	284.23	123	1180.24	120	2190.33
		56	130	41.15	130	282.31	126	1320.71	126	2263.02
		60	130	40.38	130	283.46	125	1259.04	124	2101.37
T4	4	4	130	40.38	130	296.15	128	1223.20	127	2208.90
		8	130	41.15	130	286.92	126	1289.05	119	2339.92
		12	130	40.77	130	283.85	123	1212.68	122	2197.30
		16	130	41.15	130	287.69	125	1302.48	121	2259.67
		20	130	40.77	130	291.92	126	1378.57	124	2407.58
		24	130	41.54	130	290.00	120	1260.42	119	2234.87
		28	130	41.92	130	283.85	126	1264.84	125	2288.00
		31	130	41.54	130	291.15	128	1285.57	127	2259.69
		35	130	40.77	130	284.23	128	1272.37	127	2209.37
		39	130	41.92	130	283.08	127	1326.80	127	2379.76
		43	130	40.77	130	283.08	126	1254.29	124	2273.79
		47	130	41.15	130	276.00	128	1167.45	128	2169.61
		51	130	40.38	130	285.38	126	1153.65	124	2141.05
		55	130	41.15	130	287.69	126	1172.62	125	2165.04
		59	130	40.38	130	274.00	124	1250.00	122	2141.56

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	251.54	25.15	991.70	70.84	990.97	90.09	2234.21	63.83
		5	258.46	25.85	973.90	69.56	1038.71	94.43	2271.07	64.89
		9	251.54	25.15	1024.84	73.20	1102.54	100.23	2378.91	67.97
		13	244.62	24.46	1011.77	72.27	1115.12	101.37	2371.51	67.76
		17	241.92	24.19	873.79	62.41	1052.87	95.72	2168.59	61.96
		21	242.69	24.27	988.11	70.58	1034.82	94.07	2265.62	64.73
		25	241.15	24.12	1021.57	72.97	964.32	87.67	2227.05	63.63
		29	248.46	24.85	968.25	69.16	1061.91	96.54	2278.62	65.10
		34	247.69	24.77	1089.65	77.83	954.61	86.78	2291.95	65.48
		38	245.00	24.50	1025.46	73.25	1061.42	96.49	2331.89	66.63
		42	246.92	24.69	1072.04	76.57	1126.91	102.45	2445.87	69.88
		46	243.85	24.38	982.16	70.15	1086.00	98.73	2312.01	66.06
		50	252.69	25.27	1095.94	78.28	954.84	86.80	2303.47	65.81
		54	253.46	25.35	972.86	69.49	1061.23	96.48	2287.56	65.36
		58	257.31	25.73	1069.95	76.43	969.92	88.17	2297.18	65.63
T2	2	2	243.46	24.35	942.95	67.35	1015.60	92.33	2202.01	62.91
		6	248.46	24.85	971.66	69.40	969.45	88.13	2189.57	62.56
		10	249.23	24.92	944.21	67.44	1013.47	92.13	2206.91	63.05
		14	248.08	24.81	952.58	68.04	950.31	86.39	2150.97	61.46
		18	249.62	24.96	1018.38	72.74	931.66	84.70	2199.65	62.85
		22	245.85	24.58	918.86	65.63	996.58	90.60	2161.28	61.75
		26	246.54	24.65	944.90	67.49	978.47	88.95	2169.90	62.00
		30	237.69	23.77	977.38	69.81	995.95	90.54	2211.02	63.17
		33	243.08	24.31	972.48	69.46	957.04	87.00	2172.59	62.07
		37	242.69	24.27	923.74	65.98	1030.96	93.72	2197.39	62.78
		41	242.31	24.23	964.55	68.90	949.38	86.31	2156.24	61.61
		45	236.92	23.69	932.36	66.60	996.97	90.63	2166.26	61.89
		49	250.77	25.08	947.90	67.71	981.59	89.24	2180.26	62.29
		53	246.54	24.65	843.32	60.24	1162.34	105.67	2252.21	64.35
		57	236.15	23.62	992.20	70.87	908.52	82.59	2136.87	61.05

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
T3	3	3	245.77	24.58	979.78	69.98	1005.97	91.45	2231.52	63.76
		7	243.08	24.31	1091.80	77.99	1015.57	92.32	2350.45	67.16
		11	251.54	25.15	990.49	70.75	1060.88	96.44	2302.91	65.80
		15	242.69	24.27	950.22	67.87	1141.56	103.78	2334.47	66.70
		19	241.92	24.19	965.34	68.95	1217.52	110.68	2424.79	69.28
		23	251.54	25.15	1031.10	73.65	994.72	90.43	2277.36	65.07
		27	253.85	25.38	999.03	71.36	1083.86	98.53	2336.74	66.76
		32	252.31	25.23	1067.00	76.21	945.13	85.92	2264.43	64.70
		36	250.77	25.08	1078.61	77.04	1072.79	97.53	2402.17	68.63
		40	247.31	24.73	1043.58	74.54	1031.02	93.73	2321.91	66.34
		44	243.46	24.35	1013.73	72.41	972.59	88.42	2229.79	63.71
		48	240.00	24.00	942.41	67.31	1031.98	93.82	2214.38	63.27
		52	243.85	24.38	896.01	64.00	1010.09	91.83	2149.95	61.43
		56	241.15	24.12	1038.41	74.17	942.30	85.66	2221.86	63.48
		60	243.08	24.31	975.58	69.68	842.33	76.58	2060.99	58.89
T4	4	4	255.77	25.58	927.05	66.22	985.69	89.61	2168.51	61.96
		8	245.77	24.58	1002.12	71.58	1050.87	95.53	2298.76	65.68
		12	243.08	24.31	928.84	66.35	984.61	89.51	2156.53	61.62
		16	246.54	24.65	1014.79	72.48	957.19	87.02	2218.52	63.39
		20	251.15	25.12	1086.65	77.62	1029.01	93.55	2366.81	67.62
		24	248.46	24.85	970.42	69.32	974.46	88.59	2193.34	62.67
		28	241.92	24.19	981.00	70.07	1023.16	93.01	2246.08	64.17
		31	249.62	24.96	994.42	71.03	974.11	88.56	2218.15	63.38
		35	243.46	24.35	988.14	70.58	937.00	85.18	2168.60	61.96
		39	241.15	24.12	1043.73	74.55	1052.96	95.72	2337.84	66.80
		43	242.31	24.23	971.22	69.37	1019.50	92.68	2233.02	63.80
		47	234.85	23.48	891.45	63.67	1002.16	91.11	2128.46	60.81
		51	245.00	24.50	868.27	62.02	987.40	89.76	2100.66	60.02
		55	246.54	24.65	884.93	63.21	992.42	90.22	2123.89	60.68
		59	233.62	23.36	976.00	69.71	891.56	81.05	2101.17	60.03

Feed conversion 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	1051.38	1309.66	1540.27
		5	942.23	1291.20	1547.22
		9	965.79	1271.86	1510.09
		13	982.50	1271.99	1479.94
		17	1004.08	1421.28	1545.17
		21	1012.18	1306.25	1557.34
		25	1086.96	1282.76	1595.99
		29	1047.75	1325.41	1507.25
		34	930.67	1199.80	1546.71
		38	1010.75	1266.91	1495.75
		42	938.50	1231.89	1451.30
		46	940.70	1314.06	1506.19
		50	963.25	1205.98	1542.25
		54	900.78	1295.60	1546.75
		58	1009.06	1225.83	1556.48
T2	2	2	1032.52	1340.87	1559.20
		6	990.70	1341.63	1593.69
		10	946.95	1297.32	1579.29
		14	1029.26	1299.56	1595.92
		18	1022.52	1257.68	1599.01
		22	1030.51	1353.01	1598.74
		26	1034.67	1321.52	1574.27
		30	1074.38	1332.37	1596.93
		33	1059.62	1302.02	1593.29
		37	978.32	1353.97	1590.97
		41	970.11	1297.82	1595.94
		45	1077.35	1360.45	1620.01
		49	940.55	1309.13	1544.64
		53	965.24	1446.67	1554.87
		57	1045.90	1308.42	1630.23

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
T3	3	3	1018.82	1319.19	1516.13
		7	1120.43	1248.51	1563.27
		11	1000.00	1305.65	1516.86
		15	1051.49	1324.31	1492.95
		19	1028.57	1339.47	1438.48
		23	994.75	1262.89	1555.12
		27	1016.91	1294.36	1541.63
		32	979.06	1218.10	1553.22
		36	955.15	1228.93	1480.68
		40	1040.00	1253.84	1547.23
		44	1006.77	1292.10	1604.61
		48	1019.13	1328.82	1530.92
		52	971.58	1410.03	1610.82
		56	950.95	1265.88	1591.42
		60	963.36	1304.54	1595.32
T4	4	4	971.43	1325.55	1570.03
		8	1048.26	1307.67	1556.39
		12	1024.39	1364.74	1613.96
		16	1010.70	1289.34	1578.68
		20	1027.67	1226.55	1487.24
		24	1031.83	1365.35	1643.12
		28	1078.59	1309.31	1576.13
		31	1014.53	1270.81	1571.78
		35	1025.71	1304.66	1619.17
		39	948.37	1257.12	1555.24
		43	1024.46	1347.16	1634.03
		47	1075.21	1387.98	1618.46
		51	1086.25	1444.53	1648.53
		55	1016.04	1420.16	1651.32
		59	1028.09	1349.70	1635.84

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	1220.18	1385.79	1848.88	1568.55
		5	1092.26	1398.28	1871.69	1575.62
		9	1122.32	1360.13	1802.21	1536.52
		13	1147.80	1354.22	1729.16	1506.10
		17	1173.29	1555.58	1687.13	1574.70
		21	1185.42	1392.10	1879.71	1586.80
		25	1275.92	1336.85	2029.99	1626.27
		29	1222.91	1409.27	1728.79	1535.26
		34	1083.85	1271.58	2061.33	1574.70
		38	1180.53	1339.52	1786.28	1522.81
		42	1093.46	1312.82	1726.80	1476.49
		46	1100.95	1424.14	1737.89	1533.99
		50	1117.20	1270.76	2043.05	1569.51
		54	1047.04	1415.59	1859.31	1575.19
		58	1165.92	1286.95	2039.58	1584.32
T2	2	2	1203.79	1434.28	1838.46	1588.69
		6	1154.80	1448.23	1929.56	1624.42
		10	1101.85	1405.78	1932.92	1609.04
		14	1200.00	1381.53	1992.71	1626.75
		18	1189.52	1327.28	2102.81	1630.17
		22	1204.63	1455.76	1904.29	1630.30
		26	1210.61	1408.76	1902.97	1605.02
		30	1262.14	1406.53	1942.61	1627.56
		33	1237.34	1373.18	1989.10	1623.78
		37	1144.22	1471.02	1878.93	1621.61
		41	1133.33	1393.58	1994.87	1626.25
		45	1266.23	1444.67	1940.86	1651.23
		49	1092.02	1423.03	1851.40	1573.80
		53	1126.37	1610.09	1662.19	1583.45
		57	1224.76	1381.94	2094.88	1661.59

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
T3	3	3	1186.23	1406.65	1769.72	1543.79
		7	1310.13	1282.01	2002.60	1591.10
		11	1162.08	1397.79	1778.15	1544.45
		15	1229.79	1405.43	1678.76	1519.42
		19	1201.91	1430.47	1543.31	1463.05
		23	1159.02	1339.43	1952.03	1583.82
		27	1184.85	1376.83	1843.08	1569.64
		32	1140.24	1284.24	2056.39	1582.32
		36	1110.43	1303.54	1810.30	1506.25
		40	1213.06	1313.27	1938.78	1575.17
		44	1175.36	1371.87	2036.03	1634.31
		48	1195.51	1422.62	1777.56	1560.33
		52	1132.49	1552.54	1859.57	1642.49
		56	1113.24	1351.98	2060.14	1621.37
		60	1123.42	1404.95	2044.45	1627.32
T4	4	4	1124.81	1438.38	1880.88	1599.53
		8	1223.79	1382.75	1883.64	1585.39
		12	1196.20	1470.58	1936.60	1645.59
		16	1179.41	1369.29	1993.44	1608.91
		20	1194.49	1280.42	1848.15	1513.40
		24	1204.33	1470.21	2018.32	1676.11
		28	1265.50	1376.47	1915.32	1606.06
		31	1183.36	1345.71	1977.56	1601.45
		35	1197.47	1384.61	2056.98	1649.85
		39	1113.24	1341.27	1938.29	1583.49
		43	1196.83	1442.25	2000.46	1664.63
		47	1263.50	1484.49	1892.00	1649.93
		51	1265.31	1562.97	1894.17	1680.82
		55	1185.65	1552.66	1931.19	1683.90
		59	1205.93	1441.88	2059.26	1668.55

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	39.90	178.40	230.30	448.60
		5	36.70	177.50	245.00	459.20
		9	36.70	179.20	249.50	465.40
		13	36.50	177.10	242.30	455.90
		17	36.90	177.60	222.20	436.70
		21	37.40	176.20	239.40	453.00
		25	40.00	178.10	249.10	467.20
		29	39.50	175.90	230.60	446.00
		34	34.90	178.80	247.50	461.20
		38	37.60	175.80	237.00	450.40
		42	35.10	178.00	237.90	451.00
		46	34.90	179.20	234.80	448.90
		50	36.70	181.40	248.10	466.20
		54	34.50	178.40	245.50	458.40
		58	39.00	176.40	245.30	460.70
T2	2	2	38.10	174.70	228.10	440.90
		6	37.30	179.50	234.00	450.80
		10	35.70	171.20	245.80	452.70
		14	38.70	171.30	240.50	450.50
		18	38.60	169.30	235.50	443.40
		22	38.50	170.70	236.80	446.00
		26	38.80	173.70	235.30	447.80
		30	39.00	177.60	241.70	458.30
		33	39.10	172.60	238.00	449.70
		37	36.10	174.20	240.20	450.50
		41	35.70	175.50	242.60	453.80
		45	39.00	175.80	247.90	462.70
		49	35.60	174.30	227.90	437.80
		53	36.10	177.40	247.30	460.80
		57	37.60	177.40	238.40	453.40

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
T3	3	3	37.90	179.70	226.70	444.30
		7	41.40	181.10	255.70	478.20
		11	38.00	176.20	235.80	450.00
		15	38.80	174.40	245.30	458.50
		19	37.80	179.60	236.60	454.00
		23	37.90	178.80	246.60	463.30
		27	39.10	178.10	253.70	470.90
		32	37.40	177.30	241.40	456.10
		36	36.20	181.30	244.70	462.20
		40	39.00	177.20	250.50	466.70
		44	37.20	181.30	249.40	467.90
		48	37.30	171.90	229.30	438.50
		52	35.90	176.50	226.10	438.50
		56	34.90	181.50	244.60	461.00
		60	35.50	175.90	214.50	425.90
T4	4	4	37.40	173.80	235.70	446.90
		8	39.10	178.20	237.90	455.20
		12	37.80	174.50	232.70	445.00
		16	37.80	178.50	233.30	449.60
		20	39.00	179.40	237.70	456.10
		24	38.90	176.30	235.50	450.70
		28	39.80	174.50	246.60	460.90
		31	38.40	174.30	245.50	458.20
		35	37.90	178.50	245.10	461.50
		39	34.90	181.10	259.20	475.20
		43	37.70	180.10	253.20	471.00
		47	38.60	172.70	242.70	454.00
		51	40.30	175.40	234.90	450.60
		55	38.00	177.10	241.60	456.70
		59	36.60	179.10	222.40	438.10

Foot pad lesions

Tab. No. 8f (page 1)

Treatment	Tr. No.	Box	Evaluation	
			right foot	left foot
T1	1	1	2.10	2.15
		5	1.83	1.93
		9	1.95	1.98
		13	1.83	1.78
		17	2.08	2.10
		21	1.78	1.88
		25	1.85	1.73
		29	1.85	1.90
		34	1.88	1.90
		38	1.88	2.05
		42	1.75	1.73
		46	1.58	1.53
		50	1.70	1.83
		54	1.85	1.70
		58	1.93	1.93
T2	2	2	2.18	2.30
		6	2.15	2.25
		10	1.93	1.90
		14	1.90	1.95
		18	2.03	1.98
		22	1.93	2.00
		26	1.90	1.90
		30	1.75	1.65
		33	1.90	1.90
		37	1.95	1.93
		41	1.75	1.68
		45	1.75	1.80
		49	1.83	1.90
		53	1.78	1.60
		57	1.70	1.80

Foot pad lesions

Tab. No. 8f (page 2)

Treatment	Tr. No.	Box	Evaluation	
			right foot	left foot
T3	3	3	1.80	1.85
		7	1.90	1.80
		11	1.98	1.95
		15	1.75	1.75
		19	2.23	2.18
		23	1.98	1.88
		27	1.75	1.78
		32	1.88	1.95
		36	1.85	1.88
		40	1.75	1.73
		44	1.60	1.48
		48	1.55	1.70
		52	1.85	1.65
		56	1.83	1.83
		60	1.75	1.83
T4	4	4	2.18	2.28
		8	1.55	1.43
		12	2.08	1.98
		16	2.23	2.23
		20	1.75	1.68
		24	2.00	1.78
		28	1.80	1.80
		31	1.78	1.78
		35	1.80	1.88
		39	1.48	1.43
		43	1.83	1.83
		47	1.50	1.50
		51	1.80	1.75
		55	1.80	1.78
		59	2.00	2.08