



# MEZINÁRODNÍ TESTOVÁNÍ DRŮBEŽE ÚSTRAŠICE

státní podnik

390 02 Tábor 2

Česká republika

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**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. Markéta Krekulová**  
**Ing. Hana Koželuhová**

**Study monitor:**  
Dohlížitel:

[REDACTED]

**Study sponsor :**  
Dohlížitel:

[REDACTED]

**December 2020**  
Prosinec 2020

## **Aim of the Project**

The effect of [REDACTED] on growth performance, intestinal integrity and health status in broilers fed diets rich in viscous cereals.

## **Study location**

The study was carried out on the test facility Mezinárodní testování drůbeže, s.p., (next MTD, s.p. only), Ústřašice, Czech Republic. Feed samples were sent for the contents of nutrients [REDACTED].

## **Trial period**

Beginning of the trial:	14 October 2020
End of the trial:	17 November 2020
Finishing of the final report:	December 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) [REDACTED]. Day-old chicks were randomly distributed into 5 dietary treatments with 12 replicates per treatment and 130 chicken per replicate.

Origin 1-day old chicks:

breeder company – [REDACTED]

parent flock – [REDACTED]

age of the breeding flock - 55 weeks

### **Experimental treatments:**

<b>Tr. No.</b>	<b>Tr.</b>	<b>Description</b>	<b>No. of</b>	<b>No. of chick</b>
1	T1	[REDACTED]	12	1560
2	T2	[REDACTED]	12	1560
3	T3	[REDACTED]	12	1560
4	T4	[REDACTED]	12	1560
5	T5	[REDACTED]	12	1560

### **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 [REDACTED]. 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 [REDACTED] before the chick placement.

On days 1 and 12 the chicken were vaccinated with [REDACTED] (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			Challenge diets		
	Starter	Grower	Finisher	Starter	Grower	Finisher
Corn	36.10	44.00	50.00	15.60	18.10	18.50
Soyabean meal	34.90	27.50	22.10	34.10	26.70	21.40
Wheat	20.00	20.00	20.00	30.00	30.00	30.00
Barley	-	-	-	10.00	15.00	20.00
Soyabean oil	4.05	4.01	3.41	5.27	5.71	5.60
Limestone	1.67	1.40	1.34	1.67	1.39	1.34
Monocalciumphosphate	1.18	1.05	0.97	1.17	1.04	0.96
Salt	0.30	0.30	0.30	0.28	0.28	0.27
Sodium bicarbonate	0.11	0.12	0.12	0.13	0.15	0.16
██████████	0.50	-	-	0.50	-	-
██████████	-	0.50	-	-	0.50	-
██████████	-	-	0.50	-	-	0.50
██████	1.19	-	-	1.27	-	-
██████████	-	1.13	1.26	-	1.14	1.27
<b>Nutritional composition (%)</b>						
crude protein	22.00	19.30	17.60	22.00	19.30	17.60
ME (MJ/kg)	12.65	13.00	13.10	12.65	13.00	13.10
Ca	1.05	0.90	0.85	1.05	0.90	0.85
P available	0.50	0.45	0.42	0.50	0.45	0.42
Na	0.16	0.16	0.16	0.16	0.16	0.16
Cl	0.23	0.23	0.23	0.23	0.23	0.23
Lys	1.27	1.09	1.00	1.27	1.09	1.00
Met	0.63	0.55	0.51	0.62	0.54	0.51
M+C	0.92	0.81	0.76	0.92	0.81	0.76
Threonin	0.80	0.70	0.65	0.80	0.70	0.65
Thryptophan	0.24	0.20	0.17	0.24	0.21	0.18
Val	1.00	0.87	0.80	1.00	0.87	0.80
Ile	0.86	0.75	0.71	0.86	0.754	0.71
Arg	1.30	1.13	1.05	1.30	1.13	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.

### **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) were statistically evaluated using the ANOVA single-factor model (Duncan test, Scheffe 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 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
T 1	1	83.89	80.00	95.36	1560	68.00	44.46
T 2	2				1560		44.49
T 3	3				1560		44.39
T 4	4				1560		44.39
T 5	5				1560		44.39

**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
T 1	1	1560	44.46	1560	276.79	1522	1256.24	1515	2294.03
T 2	2	1560	44.49	1560	281.33	1522	1281.06	1511	2316.83
T 3	3	1560	44.39	1560	278.69	1519	1263.67	1511	2264.64
T 4	4	1560	44.39	1560	277.04	1517	1263.22	1505	2283.31
T 5	5	1560	44.39	1560	280.90	1525	1258.35	1507	2275.53

**Weight gain per phases**

**Tab. No. 2b**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Day 1 - 10</b>		<b>Day 11 - 24</b>		<b>Day 25 - 35</b>		<b>Day 1 – 35</b>	
		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
T 1	1	232.34	23.23	979.44	69.96	1037.80	94.35	2249.58	64.27
T 2	2	236.85	23.68	999.72	71.41	1035.77	94.16	2272.34	64.92
T 3	3	234.29	23.43	984.98	70.36	1000.97	91.00	2220.24	63.44
T 4	4	232.65	23.26	986.18	70.44	1020.10	92.74	2238.92	63.97
T 5	5	236.51	23.65	977.45	69.82	1017.17	92.47	2231.13	63.75

**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
T 1	1	1164.03	1306.90	1550.21
T 2	2	1083.37	1295.59	1570.06
T 3	3	1066.71	1282.01	1569.97
T 4	4	1095.49	1314.49	1585.47
T 5	5	1062.16	1307.41	1586.37

**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
T 1	1	1386.76	1050.22	1852.83	1581.28
T 2	2	1286.86	1057.57	1919.55	1601.25
T 3	3	1268.81	1046.07	1943.38	1601.86
T 4	4	1304.52	1073.45	1931.49	1617.48
T 5	5	1261.52	1070.28	1942.97	1618.44

**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
T 1	1	502.63	2054.24	2914.65	5471.52
T 2	2	475.47	2110.16	3008.59	5594.22
T 3	3	463.75	2053.60	2942.70	5460.05
T 4	4	473.45	2105.90	2968.00	5547.35
T 5	5	465.45	2098.20	2980.40	5544.05

**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	%															
T 1	1	0	0	14	9324	7	9617	21	18941	1.35									1	18			2	24	
T 2	2	0	0	14	10711	11	16380	25	27091	1.60									1	23			1	24	
T 3	3	0	0	17	8870	8	11867	25	20737	1.60									2	17			6	24	
T 4	4	0	0	19	10022	12	16545	31	26567	1.99									1	26			4	24	
T 5	5	0	0	11	6700	18	23714	29	30414	1.86										27			2	24	

**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**

<b>Treatment</b>	<b>Tr. No.</b>	<b>Evaluation</b>	
		<b>right foot</b>	<b>left foot</b>
T 1	1	1.18	1.25
T 2	2	0.94	0.97
T 3	3	0.78	0.78
T 4	4	0.95	0.99
T 5	5	0.74	0.76



**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	1515	2294.03	320.66	13.98
T 2	2	1511	2316.83	293.31	12.66
T 3	3	1511	2264.64	301.99	13.34
T 4	4	1505	2283.31	313.97	13.75
T 5	5	1507	2275.53	307.45	13.51

## 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
T1	1	12	44.46	0.38		o	o	o	o
T2	2	12	44.49	0.41	0.848758		o	o	o
T3	3	12	44.39	0.42	0.721312	0.606684		o	o
T4	4	12	44.39	0.42	0.702968	0.592482	1.000000		o
T5	5	12	44.39	0.42	0.731720	0.615821	1.000000	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
T1	1	12	276.79	5.05		*	o	o	*
T2	2	12	281.33	2.84	0.028897		o	*	o
T3	3	12	278.69	5.69	0.336520	0.178475		o	o
T4	4	12	277.04	4.75	0.894775	0.034647	0.372409		*
T5	5	12	280.90	3.49	0.043328	0.815562	0.231127	0.049765	

**Body weight - day 24**

**Tab. No. 6c**

Treatment	Treat. No.	No. of birds	Average (g)	Standard deviation	Scheffe test				
					T1	T2	T3	T4	T5
T1	1	1522	1256.24	183.32		**	o	o	o
T2	2	1522	1281.06	186.57	0.007211		o	o	*
T3	3	1519	1263.67	183.49	0.868614	0.142292		o	o
T4	4	1517	1263.22	182.59	0.892885	0.123874	0.999997		o
T5	5	1525	1258.35	177.75	0.998733	0.019332	0.958156	0.969655	

**Body weight - day 35**

**Tab. No. 6d**

Treatment	Treat. No.	No. of birds	Average (g)	Standard deviation	Kruskal-Wallis test				
					T1	T2	T3	T4	T5
T1	1	1515	2294.03	320.66		o	*	o	o
T2	2	1511	2316.83	293.31	0.803190		***	**	**
T3	3	1511	2264.64	301.99	0.042343	0.000040		o	o
T4	4	1505	2283.31	313.97	0.816622	0.004768	1.000000		o
T5	5	1507	2275.53	307.45	0.562667	0.002521	1.000000	1.000000	

**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
T 1	1	1	130	44.62	130	275.00	126	1266.83	126	2363.02
		6	130	44.23	130	283.85	127	1172.60	127	2055.28
		11	130	44.62	130	275.00	126	1171.43	125	2256.96
		16	130	44.23	130	274.23	128	1273.36	128	2295.78
		21	130	44.62	130	271.15	127	1350.08	125	2471.20
		26	130	43.85	130	272.69	128	1305.47	128	2423.20
		35	130	44.23	130	285.38	128	1233.98	128	2471.13
		40	130	43.85	130	275.38	127	1282.68	127	2377.80
		45	130	44.62	130	276.54	126	1272.94	124	2198.79
		50	130	44.62	130	285.00	126	1238.73	125	2212.96
		55	130	45.00	130	275.38	126	1253.17	125	2122.00
		60	130	45.00	130	271.92	127	1252.60	127	2274.33
T 2	2	2	130	45.00	130	283.08	125	1384.48	124	2334.27
		7	130	44.23	130	285.38	128	1239.45	128	2268.75
		12	130	44.62	130	283.08	128	1207.11	128	2300.47
		17	130	44.23	130	284.23	128	1219.22	128	2355.16
		22	130	44.62	130	278.46	126	1307.06	126	2288.81
		27	130	43.85	130	280.77	126	1281.35	125	2466.32
		34	130	44.23	130	276.77	126	1177.54	124	2354.36
		39	130	43.85	130	278.85	126	1275.87	123	2420.06
		44	130	44.62	130	283.08	128	1309.30	126	2324.68
		49	130	44.62	130	279.23	127	1367.32	127	2172.91
		54	130	45.00	130	278.85	127	1286.06	125	2298.24
		59	130	45.00	130	284.23	127	1320.08	127	2224.57
T 3	3	3	130	45.00	130	279.23	127	1360.55	126	2210.16
		8	130	44.23	130	282.69	127	1250.39	126	2250.08
		13	130	44.62	130	268.85	126	1258.25	125	2328.00
		18	130	44.23	130	283.08	127	1207.95	127	2221.65
		23	130	44.62	130	274.62	127	1316.54	127	2388.50
		28	130	43.85	130	272.69	126	1193.49	125	2362.64
		33	130	44.23	130	282.31	127	1162.13	126	2207.82
		38	130	43.85	130	280.77	127	1270.24	127	2261.49
		43	130	44.62	130	278.46	126	1299.52	125	2342.24
		48	130	43.85	130	270.77	125	1268.88	124	2181.29
		53	130	45.00	130	284.62	127	1360.00	126	2217.94
		58	130	44.62	130	286.15	127	1215.83	127	2204.25

**Body weight per phases**

**Tab. No. 7a (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
T 4	4	4	130	45.00	130	274.23	128	1244.45	127	2181.10
		9	130	44.23	130	275.38	127	1220.71	125	2042.72
		14	130	44.62	130	275.77	126	1230.00	125	2288.96
		19	130	44.23	130	272.69	124	1300.32	124	2403.47
		24	130	44.62	130	281.15	124	1230.65	124	2283.71
		29	130	43.85	130	283.08	127	1242.36	127	2486.93
		32	130	44.23	130	271.00	127	1243.86	126	2349.37
		37	130	43.85	130	275.77	128	1204.45	126	2406.18
		42	130	44.62	130	275.77	125	1285.36	123	2312.28
		47	130	43.85	130	285.38	126	1329.52	124	2322.74
		52	130	45.00	130	271.92	128	1390.00	128	2121.88
		57	130	44.62	130	282.31	127	1237.24	126	2203.57
T 5	5	5	130	45.00	130	273.54	127	1229.13	127	2146.06
		10	130	44.23	130	282.31	128	1283.91	127	2183.07
		15	130	44.62	130	284.23	127	1231.97	127	2273.15
		20	130	44.23	130	282.31	128	1279.61	127	2368.50
		25	130	44.62	130	278.46	126	1325.48	125	2427.68
		30	130	43.85	130	286.15	126	1349.29	124	2522.34
		31	130	44.23	130	283.46	127	1216.46	126	2349.43
		36	130	43.85	130	278.46	128	1267.34	125	2273.99
		41	130	44.62	130	283.85	127	1190.63	124	2238.31
		46	130	43.85	130	278.85	127	1242.36	125	2221.20
		51	130	45.00	130	278.46	127	1194.02	124	2088.23
		56	130	44.62	130	280.77	127	1290.87	126	2216.51

Weight gain per phases (WG) and daily weight gain

Tab. No. 7b (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
T 1	1	1	230.38	23.04	991.83	70.84	1096.19	99.65	2318.40	66.24
		6	239.62	23.96	888.75	63.48	882.68	80.24	2011.04	57.46
		11	230.38	23.04	896.43	64.03	1085.53	98.68	2212.34	63.21
		16	230.00	23.00	999.13	71.37	1022.42	92.95	2251.55	64.33
		21	226.54	22.65	1078.92	77.07	1121.12	101.92	2426.58	69.33
		26	228.85	22.88	1032.78	73.77	1117.73	101.61	2379.36	67.98
		35	241.15	24.12	948.60	67.76	1237.15	112.47	2426.90	69.34
		40	231.54	23.15	1007.29	71.95	1095.13	99.56	2333.96	66.68
		45	231.92	23.19	996.40	71.17	925.85	84.17	2154.17	61.55
		50	240.38	24.04	953.73	68.12	974.23	88.57	2168.34	61.95
		55	230.38	23.04	977.79	69.84	868.83	78.98	2077.00	59.34
60	226.92	22.69	980.68	70.05	1021.73	92.88	2229.33	63.70		
T 2	2	2	238.08	23.81	1101.40	78.67	949.79	86.34	2289.27	65.41
		7	241.15	24.12	954.07	68.15	1029.30	93.57	2224.52	63.56
		12	238.46	23.85	924.03	66.00	1093.36	99.40	2255.85	64.45
		17	240.00	24.00	934.99	66.78	1135.94	103.27	2310.93	66.03
		22	233.85	23.38	1028.60	73.47	981.75	89.25	2244.19	64.12
		27	236.92	23.69	1000.58	71.47	1184.97	107.72	2422.47	69.21
		34	232.54	23.25	900.77	64.34	1176.82	106.98	2310.13	66.00
		39	235.00	23.50	997.03	71.22	1144.18	104.02	2376.21	67.89
		44	238.46	23.85	1026.22	73.30	1015.39	92.31	2280.07	65.14
		49	234.62	23.46	1088.09	77.72	805.59	73.24	2128.30	60.81
		54	233.85	23.38	1007.22	71.94	1012.18	92.02	2253.24	64.38
59	239.23	23.92	1035.85	73.99	904.49	82.23	2179.57	62.27		
T 3	3	3	234.23	23.42	1081.32	77.24	849.61	77.24	2165.16	61.86
		8	238.46	23.85	967.70	69.12	999.69	90.88	2205.85	63.02
		13	224.23	22.42	989.41	70.67	1069.75	97.25	2283.38	65.24
		18	238.85	23.88	924.88	66.06	1013.70	92.15	2177.42	62.21
		23	230.00	23.00	1041.92	74.42	1071.97	97.45	2343.89	66.97
		28	228.85	22.88	920.80	65.77	1169.15	106.29	2318.79	66.25
		33	238.08	23.81	879.82	62.84	1045.69	95.06	2163.59	61.82
		38	236.92	23.69	989.47	70.68	991.25	90.11	2217.64	63.36
		43	233.85	23.38	1021.06	72.93	1042.72	94.79	2297.62	65.65
		48	226.92	22.69	998.11	71.29	912.41	82.95	2137.44	61.07
		53	239.62	23.96	1075.38	76.81	857.94	77.99	2172.94	62.08
58	241.54	24.15	929.67	66.41	988.43	89.86	2159.64	61.70		

Weight gain per phases (WG) and daily weight gain

Tab. No. 7b (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
T 4	4	4	229.23	22.92	970.22	69.30	936.65	85.15	2136.10	61.03
		9	231.15	23.12	945.32	67.52	822.01	74.73	1998.49	57.10
		14	231.15	23.12	954.23	68.16	1058.96	96.27	2244.34	64.12
		19	228.46	22.85	1027.63	73.40	1103.15	100.29	2359.24	67.41
		24	236.54	23.65	949.49	67.82	1053.06	95.73	2239.09	63.97
		29	239.23	23.92	959.29	68.52	1244.57	113.14	2443.08	69.80
		32	226.77	22.68	972.86	69.49	1105.51	100.50	2305.13	65.86
		37	231.92	23.19	928.68	66.33	1201.73	109.25	2362.34	67.50
		42	231.15	23.12	1009.59	72.11	1026.92	93.36	2267.66	64.79
		47	241.54	24.15	1044.14	74.58	993.22	90.29	2278.90	65.11
		52	226.92	22.69	1118.08	79.86	731.88	66.53	2076.88	59.34
57	237.69	23.77	954.94	68.21	966.33	87.85	2158.96	61.68		
T 5	5	5	228.54	22.85	955.60	68.26	916.93	83.36	2101.06	60.03
		10	238.08	23.81	1001.60	71.54	899.16	81.74	2138.84	61.11
		15	239.62	23.96	947.74	67.70	1041.18	94.65	2228.53	63.67
		20	238.08	23.81	997.30	71.24	1088.89	98.99	2324.27	66.41
		25	233.85	23.38	1047.01	74.79	1102.20	100.20	2383.06	68.09
		30	242.31	24.23	1063.13	75.94	1173.05	106.64	2478.49	70.81
		31	239.23	23.92	933.00	66.64	1132.97	103.00	2305.20	65.86
		36	234.62	23.46	988.88	70.63	1006.65	91.51	2230.15	63.72
		41	239.23	23.92	906.78	64.77	1047.68	95.24	2193.69	62.68
		46	235.00	23.50	963.52	68.82	978.84	88.99	2177.35	62.21
		51	233.46	23.35	915.55	65.40	894.21	81.29	2043.23	58.38
56	236.15	23.62	1010.10	72.15	925.64	84.15	2171.89	62.05		

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
T 1	1	1	1219.86	1336.28	1570.04
		6	1163.14	1355.41	1637.08
		11	1196.08	1371.62	1581.88
		16	1162.97	1302.26	1558.05
		21	1170.50	1238.13	1471.42
		26	1169.53	1246.68	1466.36
		35	1106.74	1376.73	1499.49
		40	1155.31	1300.11	1506.85
		45	1125.45	1209.82	1585.01
		50	1154.12	1342.86	1596.05
		55	1155.31	1308.65	1612.28
60	1192.64	1312.04	1552.99		
T 2	2	2	1066.85	1269.44	1597.67
		7	1009.70	1324.48	1600.96
		12	1107.61	1342.43	1563.22
		17	1071.99	1358.66	1557.36
		22	1157.73	1234.73	1534.85
		27	1049.59	1231.46	1455.62
		34	1098.11	1382.72	1512.98
		39	1114.76	1285.46	1503.09
		44	1038.32	1294.78	1596.83
		49	1069.15	1273.56	1681.59
		54	1142.34	1319.51	1628.98
59	1077.40	1248.38	1626.33		
T 3	3	3	1000.00	1245.32	1631.36
		8	1024.49	1279.16	1571.07
		13	1077.25	1299.77	1554.60
		18	1120.92	1300.27	1587.62
		23	1127.45	1233.40	1511.78
		28	1084.63	1345.80	1431.83
		33	1064.03	1388.23	1617.41
		38	1086.30	1281.20	1566.24
		43	1034.53	1197.72	1520.54
		48	1063.92	1275.61	1621.79
		53	1041.89	1227.13	1619.22
58	1076.61	1336.57	1624.06		



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

**Tab. No. 7c (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
T 4	4	4	1056.10	1323.19	1608.84
		9	1215.08	1361.38	1693.10
		14	1073.92	1345.72	1599.83
		19	1125.53	1355.71	1568.39
		24	1036.94	1306.13	1557.55
		29	1108.70	1296.04	1461.94
		32	1104.17	1319.17	1561.36
		37	1082.29	1352.88	1522.31
		42	1124.13	1318.29	1619.48
		47	1072.78	1277.72	1570.75
		52	1063.65	1199.08	1659.39
57	1084.47	1335.93	1637.54		
T 5	5	5	1040.49	1334.81	1663.08
		10	1074.93	1302.85	1658.39
		15	1025.71	1317.11	1569.39
		20	1057.22	1290.22	1495.74
		25	1093.92	1239.24	1494.85
		30	1112.90	1220.41	1480.15
		31	1099.05	1417.41	1577.53
		36	1041.44	1317.29	1603.35
		41	1008.13	1318.51	1596.70
		46	1095.17	1340.66	1627.90
		51	1033.15	1322.36	1678.84
56	1063.01	1284.76	1627.97		

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
T 1	1	1	1456.09	1070.30	1847.31	1600.79
		6	1377.85	1073.76	2019.63	1673.48
		11	1427.71	1090.12	1816.55	1614.42
		16	1386.62	1052.65	1882.40	1588.83
		21	1401.02	1002.38	1761.75	1498.98
		26	1393.61	1003.09	1727.48	1493.54
		35	1309.73	1121.73	1624.20	1527.00
		40	1374.09	1053.40	1755.81	1535.39
		45	1341.96	963.82	2120.21	1618.60
		50	1368.32	1075.43	1927.76	1629.61
		55	1380.97	1053.34	2066.86	1647.99
	60	1429.15	1054.34	1856.50	1584.60	
T 2	2	2	1268.50	1049.24	2094.69	1629.91
		7	1194.90	1092.90	1940.04	1632.97
		12	1314.84	1083.93	1811.72	1594.30
		17	1269.55	1109.55	1774.42	1587.36
		22	1378.62	987.49	1945.76	1565.84
		27	1243.83	1000.66	1706.43	1482.53
		34	1306.98	1124.94	1648.43	1542.51
		39	1322.75	1040.10	1756.09	1531.61
		44	1232.58	1070.91	1996.91	1628.39
		49	1272.46	1054.16	2386.37	1717.29
		54	1362.17	1072.56	2040.35	1662.10
	59	1280.06	1017.24	2192.48	1660.17	
T 3	3	3	1192.12	1039.45	2269.23	1665.83
		8	1214.52	1046.91	1944.40	1603.01
		13	1291.60	1067.36	1864.23	1585.77
		18	1328.50	1038.62	1939.18	1620.17
		23	1346.15	998.88	1862.42	1540.83
		28	1292.44	1096.19	1521.66	1459.44
		33	1261.71	1130.42	1880.08	1650.91
		38	1287.34	1040.84	1939.41	1597.57
		43	1231.91	974.61	1936.74	1550.74
		48	1269.49	1046.44	2120.51	1655.92
		53	1237.56	1008.39	2254.08	1653.18
	58	1275.48	1082.83	1985.18	1658.02	

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

**Tab. No. 7d (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
T 4	4	4	1263.42	1091.13	1999.70	1643.10
		9	1447.59	1086.38	2202.25	1731.24
		14	1281.20	1103.75	1904.89	1632.32
		19	1343.43	1115.96	1826.89	1598.72
		24	1232.52	1065.84	1860.93	1589.54
		29	1311.90	1043.03	1631.03	1488.52
		32	1319.54	1079.16	1843.08	1591.75
		37	1286.90	1106.35	1697.42	1550.89
		42	1341.10	1075.10	2010.93	1652.19
		47	1267.52	1045.95	1976.25	1601.64
		52	1274.58	991.75	2549.64	1695.48
		57	1288.03	1088.71	2038.21	1671.94
T 5	5	5	1245.37	1102.97	2112.49	1699.11
		10	1274.64	1067.16	2180.04	1693.01
		15	1216.69	1080.27	1874.39	1601.18
		20	1253.63	1057.99	1743.56	1524.45
		25	1302.63	1007.92	1812.65	1523.48
		30	1314.29	983.69	1790.79	1506.93
		31	1302.25	1160.83	1753.54	1608.24
		36	1236.07	1089.25	1978.69	1635.38
		41	1196.14	1078.33	1929.74	1630.00
		46	1299.51	1094.27	2006.58	1661.35
		51	1232.29	1082.30	2173.43	1716.33
		56	1263.84	1053.40	2122.09	1661.92

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
T 1	1	1	43.61	175.30	255.15	474.06
		6	42.92	163.44	226.40	432.76
		11	42.76	165.40	247.00	455.16
		16	41.46	174.65	246.35	462.46
		21	41.26	175.25	247.55	464.06
		26	41.46	170.55	247.15	459.16
		35	41.06	180.40	257.20	478.66
		40	41.36	176.40	244.20	461.96
		45	40.46	158.35	244.25	443.06
		50	42.76	171.75	235.05	449.56
		55	41.36	170.45	223.45	435.26
	60	42.16	172.30	240.90	455.36	
T 2	2	2	39.26	186.85	246.40	472.51
		7	37.46	176.55	255.60	469.61
		12	40.76	170.70	253.55	465.01
		17	39.61	176.20	258.00	473.81
		22	41.91	167.21	240.69	449.81
		27	38.31	165.90	252.90	457.11
		34	39.51	172.20	242.70	454.41
		39	40.41	171.10	248.55	460.06
		44	38.21	182.55	257.05	477.81
		49	38.81	186.25	244.15	469.21
		54	41.41	179.65	257.15	478.21
	59	39.81	175.00	251.85	466.66	
T 3	3	3	36.30	183.05	241.90	461.25
		8	37.65	169.50	246.20	453.35
		13	37.65	172.70	248.30	458.65
		18	41.25	163.55	249.65	454.45
		23	40.25	171.25	253.55	465.05
		28	38.45	168.65	224.25	431.35
		33	39.05	171.00	248.20	458.25
		38	39.65	171.50	244.15	455.30
		43	37.45	163.40	251.90	452.75
		48	37.45	170.80	240.30	448.55
		53	38.55	177.50	245.10	461.15
	58	40.05	170.70	249.20	459.95	

**Feed consumption per phases**

**Tab. No. 7e (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
T 4	4	4	37.65	176.80	236.85	451.30
		9	43.50	171.65	226.75	441.90
		14	38.50	175.40	252.20	466.10
		19	39.90	185.50	249.90	475.30
		24	37.90	167.90	243.00	448.80
		29	40.80	168.00	257.80	466.60
		32	38.90	174.70	256.55	470.15
		37	38.80	173.90	258.20	470.90
		42	40.30	177.95	256.15	474.40
		47	39.80	179.40	245.00	464.20
		52	37.60	179.65	238.85	456.10
57	39.80	175.05	246.75	461.60		
T 5	5	5	37.00	175.80	246.00	458.80
		10	39.45	178.40	248.45	466.30
		15	37.90	172.65	247.85	458.40
		20	38.80	176.55	241.35	456.70
		25	39.60	172.35	249.35	461.30
		30	41.40	171.85	261.65	474.90
		31	40.50	183.00	251.55	475.05
		36	37.70	179.85	249.05	466.60
		41	37.20	166.80	249.40	453.40
		46	39.70	176.10	245.00	460.80
		51	37.40	168.40	243.80	449.60
56	38.80	176.45	246.95	462.20		

Foot pad lesions

Tab. No. 7f (page 1)

Treatment	Tr. No.	Box	Evaluation	
			right foot	left foot
T 1	1	1	1.00	1.38
		6	0.93	1.03
		11	1.03	1.08
		16	1.30	1.58
		21	0.60	0.63
		26	1.20	1.23
		35	1.00	1.08
		40	1.23	1.23
		45	1.20	1.18
		50	1.30	1.48
		55	1.30	1.25
		60	2.03	1.88
T 2	2	2	1.25	1.30
		7	0.80	0.80
		12	0.80	0.88
		17	0.68	0.88
		22	0.70	0.78
		27	1.68	1.93
		34	0.53	0.45
		39	0.35	0.38
		44	0.83	1.00
		49	1.25	1.13
		54	0.88	0.68
		59	1.58	1.48
T 3	3	3	1.13	0.98
		8	1.23	1.40
		13	0.75	0.95
		18	0.80	0.85
		23	0.83	0.70
		28	0.83	0.88
		33	0.13	0.08
		38	0.23	0.23
		43	0.40	0.43
		48	0.78	0.60
		53	1.15	1.08
		58	1.18	1.25

Foot pad lesions

Tab. No. 7f (page 2)

Treatment	Tr. No.	Box	Evaluation	
			right foot	left foot
T 4	4	4	1.00	1.08
		9	0.70	0.60
		14	0.80	1.00
		19	1.00	1.33
		24	0.65	0.68
		29	1.98	2.18
		32	0.90	0.93
		37	0.03	0.03
		42	1.05	0.83
		47	1.10	1.15
		52	1.18	1.30
		57	0.98	0.80
T 5	5	5	0.85	0.63
		10	1.08	1.03
		15	0.85	1.15
		20	1.15	1.43
		25	0.95	1.08
		30	1.03	0.98
		31	0.35	0.38
		36	0.25	0.28
		41	0.48	0.33
		46	0.53	0.58
		51	0.45	0.53
		56	0.90	0.80